Distributed Computer Systems

This product survey presents the salient characteristics of current distributed computer systems. All models contained in this survey perform in a distributed environment or within a network as a distributed processor, intelligent terminal, cluster controller, or local network controller. **This survey does not include personal computers or microcomputer systems.** For detailed product information on these products, please refer to Data Decisions, **Microcomputers** reference service. The detailed characteristics of **35 systems (124 models)** from **17 vendors** are contained in this survey. Listings are arranged alphabetically by vendor name and then by specific model. Each listing contains functional categories that describe characteristic features common to all systems.

DISTRIBUTED COMPUTER SYSTEMS OUTLINE

COMPANY	MODEL	TYPE OF DEVICE — Distributed Processor	Intelligent Terminal	Cluster Controller	Local Network Controller	DISTRIBUTED FUNCTIONS — Transaction Processing	File/Database Processing	Electronic Message/Mail	Word/Text Processing	Data Processing	RJE/Batch	ASSOCIATED SYSTEMS/NETWORKS — Burroughs BNA	DEC DNA	Honeywell DSA	IBM SNA	NCR CNA	Sperry DCA	X.25	Other
Burroughs Corp	B 90 Series	●	—	—	—	—	●	—	●	●	●	●	—	—	●	—	—	—	—
Burroughs Corp	B 900 Series	—	●	—	—	—	—	—	●	●	—	●	—	—	●	—	—	—	—
Burroughs Corp	B 1900 Series	●	—	—	—	●	●	—	—	●	●	●	—	—	●	—	—	—	—
Charles River Data Sys	Universe Series	●	—	—	—	●	—	—	●	●	●	●	—	—	—	—	—	—	●
Computer Automation	SyFA 200/300/1000/2000	●	—	—	—	●	—	—	●	●	●	—	—	—	●	—	—	—	—
Data General Corp	S micro ECLIPSE, S ECLIPSE, C ECLIPSE	●	●	—	—	●	●	●	●	●	●	—	—	—	●	—	—	●	●
Data General Corp	ECLIPSE MV/4000/8000 II/10000	●	—	—	—	—	●	—	●	●	●	—	—	—	●	—	—	●	●
Data General Corp	NOVA 4 & microNOVA MP/MPT/CS5	●	●	—	—	—	—	—	—	●	●	—	—	—	●	—	—	●	●
Datapoint Corp	ARC Systems	—	●	—	—	●	—	●	●	●	●	●	—	—	●	—	—	●	●
Digital Equip Corp	VAX-11 Series	●	—	—	—	●	●	—	●	●	●	—	●	—	●	—	—	—	●
Digital Equip Corp	PDP-11 Series	●	●	●	—	●	●	—	●	●	●	—	●	—	●	—	—	●	●
Four Phase, Inc	System IV & 5000	●	—	—	—	—	●	—	●	●	●	—	—	—	●	—	—	—	●
Hewlett-Packard	HP 250/20, 250/25, 250/30, 250/40, 250/50	●	—	—	—	—	—	—	●	—	●	—	—	—	●	—	—	—	●
Hewlett-Packard	HP 1000 A/E/F/L Series	●	●	—	—	—	●	—	●	●	●	—	—	—	●	—	—	—	●
Hewlett-Packard	HP 3000 37/37XE/42/48/68	●	●	—	—	●	●	—	●	●	●	—	—	—	●	—	—	●	●
Hewlett-Packard	HP 9000 500/600/700	—	●	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	●
Honeywell Info Sys	DPS 4 Series DPS 4/82	●	—	—	—	●	—	—	●	●	●	—	—	●	●	—	—	—	●
Honeywell Info Sys	DPS 6 Series 6/40, 6/45, 6/75, 6/95	●	●	—	—	●	●	—	●	●	●	—	●	●	—	—	●	—	—
Int'l Business Mach	Series/1 4954 & 4956	●	●	●	●	●	●	—	—	●	●	—	—	—	●	—	—	●	—
Int'l Business Mach	System/36 5360	●	—	—	●	—	●	—	●	—	●	—	—	—	●	—	—	—	—
Int'l Business Mach	System/38 4/6/8	●	●	—	●	●	●	—	—	●	●	—	—	—	●	—	●	—	—
Int'l Business Mach	Series 4300 4361-3	●	—	—	—	—	●	—	●	—	●	—	—	—	●	—	●	—	—
Int'l Business Mach	5280 Series 5285/5286/5288	●	—	●	—	●	—	—	—	●	●	—	—	—	●	—	●	—	—
Int'l Business Mach	8100 Series	●	—	●	—	●	●	—	●	●	●	—	—	—	●	—	●	—	—
Microdata Corp	Series 1000/4000/6000/9000	●	—	—	—	●	—	—	●	●	●	—	—	—	●	—	●	—	—
Microdata Corp	7000 Series SOVERIGN	●	—	—	—	—	●	—	●	●	—	—	—	—	●	—	●	—	—
NCR Corp	I-9010 System	—	●	—	—	●	●	—	●	●	●	—	—	—	●	—	●	—	—
NCR Corp	I-9020 & 9040 Systems	●	—	—	—	●	●	—	●	●	●	—	—	—	●	●	—	—	—
NCR Corp	9300 System	●	—	●	—	●	●	—	●	●	●	—	—	—	●	●	—	—	●
Prime Computer Corp	Series 50	●	—	—	—	—	●	—	●	●	●	—	—	●	●	—	—	●	●

Distributed Computer Systems

Company	Model	Distributed Processor	Intelligent Terminal	Cluster Controller	Local Network Controller	Transaction Processing	File/Database	Electronic Message/Mail	Word/Text Processing	Data Processing	RJE/Batch	Burroughs BNA	DEC DNA	Honeywell DSA	IBM SNA	NCR CNA	Sperry DCA	X.25	Other
Sperry Computer Sys	System 80 4/6/8	●				●	●		●	●					●		●		
Tandem Computers	NonStop Series	●				●	●			●					●			●	●
Texas Instruments	Series 300/600/800	●							●	●					●				
Wang Lab, Inc	Alliance 250	●						●	●						●				
Wang Lab, Inc	VS Series	●					●	●	●	●	●				●				●

DISTRIBUTED COMPUTER SYSTEMS FEATURES

Type of Device ● identifies the system as intelligent terminal, cluster controller, local network controller, or distributed processor.

Distributed Functions ● identifies applications such as transaction processing, file/database management, electronic message/mail, word/text processing, data processing, and RJE batch.

Associated Systems & Networks ● contains host, complementary processor(s), and access to networks.

Communications ● describes the type, number of lines and data rates supported.

Features ● highlights hardware components such as CPU, memory and disk capacities, I/O interfaces, and peripherals.

Software ● identifies the operating system(s) and associated features/components, as well as such other software packages that provide communication and emulation support.

Program Development ● lists the languages provided and the available program development utilities and aids.

Ease of Use Features ● describes available English-type language commands, table-driven and screen aids, file design, and database application aids.

Configuration Flexibility ● a perspective of configurations from small/typical to maximum system support.

First Announced ● announcement dates for each system.

Pricing ● purchase price on a typical basic system package to large system configuration.

DISTRIBUTED COMPUTER SYSTEMS LISTINGS

■ BURROUGHS CORPORATION
Burroughs Place, Detroit, MI 48232 ● 313-972-7000.

☐ **Burroughs B 90 Series: B 91S, B 95 & B 96 Computer Systems**

Type of Device ● small business computer system in standalone, host, or satellite computer in distributed network.

Distributed Functions ● multiprogramming, data entry, program/data processing, network message processing control, and inter-system file transfers in manufacturing/financial-business/accounting applications.

Associated Systems & Networks ● Burroughs B 90 configurations; system-to-systems communications; RJE Burroughs software allows B 90 system to function as RJE satellite to Burroughs host system ● IBM terminal emulation software allows communication with IBM/SNA mainframe host; emulates IBM 2780/3780 terminals, IBM 360/20 HASP multileaving workstation, and IBM 3270 terminal.

Communications ● supports 5 data communications channels at data rates up to 9500 bps ● TDI Connect supports data rates up to 38.4K bps; and Data Communication Power Pak, a TDI/Modem connect that supports data rates up to 38.4K bps (Models B 91S/95 only) and 60K bps (Model B 96 only).

Features ● microprocessor-based CPU with 8-bit-wide data paths and 2-MHz (B 91/95) or 4-MHz (B 96) basic microinstruction cycle time ● memory capacity is 128K to 512K bytes on B 91S; and 512K to 1.5M bytes on the B 95 and B 96; memory is dynamic MOS RAM with 0.5-microsecond cycle time; increments in 64K-

and 128K-byte add ons for B 91 and 256K- and 512K-byte boards for the B 95/96 ● B 90 systems support a maximum of 6 to 10 locally attached interactive terminals; terminal/workstation systems connected using data communications with optional display, all built into CPU cabinet; on B 95/B 96, any locally attached MT 985 or ET workstation can double as operator console and system-display unit ● 2 system printers maximum; 1 serial printer built into system housing on B 91S; optional freestanding serial printer on B 95 and B 96; 160- to 600-lpm printers; 180 to 230 printer.

Software ● Computer Management System (CMS) software family provides program commonality across entire Burroughs line ● CMS includes Master Control Program (MCP), which is a multiuser, multiprogramming operating system; supports local and remote interactive processing in standalone or network environments and accommodates up to 8 interactive terminals ● File Handling software includes such functions as buffer allocations, shared files feature, and media exchange utility ● data manipulation software includes the CM 92 RPO CMS Online REPORTER, CM 92 CMS DOMAIN, Online Data Entry System (ODESY) ● Transaction Distribution Software provides network interfaces; consists of TDS Control MCS (Message Control System); combines data entry and RJE in distributed processing environment ● IBM SNA Interface provides communications with applications program running on an IBM SNA host; Burroughs RJE allows B 90 systems to function as RJE satellite to a Burroughs host; and SYC Systems Communications (SYCOM) expands Burroughs standard RJE package to provide additional system-to-system communications; emulation software supports IBM 360/20 HASP RJE, IBM 2780/3780, and IBM 3270 emulation ●

Distributed Computer Systems

terminal support software includes Generalized Message Control System (GEMCOS), Transaction Distribution System (TDS) Control, and Communications Installation Utility • Communications Software provides X.25 capability • Word Management System • SUPERSTART menu management system.

Program Development • languages include: COBOL, RPG, NDL (Network Definition Language), and MPL (Message Processing Language) Compilers; RPG-Edit for RPG programs, and Command and Edit Language (CANDE) for COBOL and MPL programs, both interactive single-user editors.

Ease of Use Features • operating system provides screen prompts for online data entry/inquiry; Automatic Run Control Systems (ARCS) utility provides single statement execution of repetitive command sequences • ODESY program provides screen-formatted data entry • Printer Backup utility automatically diverts printer files to disk when printer is occupied.

Configuration Flexibility • maximum B 91S System can support up to 512K-byte main memory, 8 I/O channels of which 2 can be data communications channels, 46.8M-byte disk storage, 6 to 8 interactive terminals, 2 system printers, 1 console printer • maximum B 95 System can support up to 512K-byte main memory, 6 slots and 6 I/O channels of which 5 can be used for data communications channels, 28.8M-byte disk storage, 1.4M-byte diskette storage, 2 system printers, 1 serial printer • maximum B 96 System can support up to 1.5M-byte main memory, 10 I/O channels of which 4 can be used for data communications channels, 140M-byte disk storage, 2 system printers, additional serial printers, diskettes, and cassette drives.

First Announced • 1979 for the B 91; 1983 for the B 95; 1983 for the B 96.

Pricing • purchase price is $8,350 for a B 91S system that includes CPU, 128K-byte memory, 6 I/O channels, and console printer is $9,870 • purchase price is $40,615 for a B 96 system with 4-MHz CPU, 256K-byte memory board, 80M-byte fixed disk, 9400 disk controller, Data Communication Power Pak, TD1 kit, printer controller, tape control, tape streamer, and built-in BSMD and controller.

☐ **Burroughs B 900 Series: B 930 Multiple Processor System**

Type of Device • multiprocessor, general-purpose, intermediate-level, multiuser business system; supports interactive terminal/workstations in distributed or standalone environments.

Distributed Functions • interactive data entry/inquiry and data processing • multiprogramming mode in multiprocessor environment and executing concurrent online information gathering/multiple compilations/production-run functions.

Associated Systems & Networks • supports information exchange with BNA (Burroughs Network Architecture) host systems; IBM SNA interfaces provide communications with application programs executed on IBM SNA host system; Burroughs RJE software allows B 930 to function as RJE satellite to a Burroughs host; SYCOM package expands RJE to provide additional system-to-system communications • emulation software supports B 930 system as remote job entry terminal to any host supporting IBM 360/20 HASP multileaving protocol; can function in batch-oriented mode to any host supporting IBM 2780/3780 terminals; can function as interactive terminal to any host supporting IBM 3270 display system; supports SNA RJE and SNA 3270 pass-through capability; can operate as station on an X.25 network.

Communications • interactive communications through up to 32 communication lines connected to up to 2 data communications processors (DCPs); each DCP supports up to 16 lines at data rates up to 38.4K bps; aggregate data rates is 150K bps per DCP • communications facilities support asynchronous modems up to 1800 bps; asynchronous direct connect for data rates up to 9600/19.2K/38.4K bps at 1000/500/250 feet; synchronous/BSC modems at data rates up to 9600 bps; BDLC modem up to 9600 bps.

Features • B 930 Multiple Processor System is positioned between the small B 90 to mid-range B 1900 computer series of Burroughs

900 computer family; consists of 5 to 8 separate microprocessors, each has its own physical memory and operates independently but is dedicated to a single task: operating system, disk file management, data communications, or application program processing • communication among processors is over common memory interface bus; peripheral device communication through operating system, disk file management, or data communications processors • system of multiple processors operates under control of single operating system and reconfigures should a processor fail; optional processor redundancy feature • memory capacity is 640K to 3M bytes with 256K to 512K bytes allocated to OS processor, 64K bytes for disk file management, 64K to 512K bytes for data communications processor, and 256K to 512K bytes for data communications processor, and 256K to 512K bytes for up to 4 task processors • 1.6G-byte maximum disk storage includes 1.6M-byte disk pack storage plus 92M-byte system loader disk cartridge and 243K-byte media exchange diskette • supports multiple local/remote terminal/workstations with a practical maximum of 50 interactive workstations and 2 160- to 500-lpm chain or 650-lpm band printers • I/O channel supports peripheral, storage or communications device, and controllers, for attachment to appropriate processor; 41 I/O channels available with 5 allocated for disk, 32 for communications, 2 for line printers, 1 for console, and 1 for magnetic tape • disk cache performance option.

Software • Computer Management System (CMS) provides software compatibility across Burroughs small computer line: CMS programs run on B 80, B 90, B 800, B 900, B 1800, and B 1900 without reprogramming, but console-based programs are not portable to B 930 • CMS software includes MCP, common utility routines, high-level languages, online programming, distributed processing, various software program conversion aids • MCP (Master Control Program) operating system is multiuser, virtual memory OS with multiprogramming in a multiprocessor environment; supports local/remote interactive processing as standalone system or as part of network and supports practical maximum of up to 50 workstations; runs on dedicated operating system processor • MCP Resource Management supports independent processing in up to 8 dedicated processors; concurrent total systems multiprogramming of up to 15 jobs in the 2 to 5 task processors • MCP Program Processing supports multiprogramming in a virtual memory environment; user programs/user-oriented utilities executed by 2 to 5 dedicated task processors • MCP Data Management is disk-based file management system performed by dedicated disk file management processor; supports diskettes, fixed disks, disk cartridges, and disk pack subsystems • MCP Communications Support handles communication controlled by dedicated data communication processors; programs support IBM SNA and Burroughs BNA network services; IBM 360/20 HASP RJE, IBM 2780/3780, and IBM 3270 emulation X.25, SNA RJE, SNA 3270 pass through • MCP User Interface supports local operator interactions through keyboard-display console controlled by operating system processor; user interactions via terminals/workstations connected to data communications processors, communications lines • data manipulation software includes: CM 900 RPO Online REPORTER, DOM DOMAIN (inquiry/file maintenance), INQ CMS Inquiry, Online Data Entry System (ODESY) for batch data application input • communication software includes: CM 9500 RNS Remote Network Services (to BNA); CMS 9500 B 25 X.25 Station Group; CM 900 BNS Burroughs Network Services, SNA IBM SNA Interface, RJE Burroughs RJE Package, SYC Systems Communication Package (SYCOM), and terminal emulation software such as CM 900 HSP IBM HASP RJE, R37 IBM 2780/3780, and R32 IBM 3270 • terminal support software includes GMC (Generalized Message Control) System that links terminal users to application programs; Transaction Distribution software that interfaces users to data communication network and combines data entry and RJE functions in distributed processing environment • office automation software includes: WMS (Word Management System) for multiuser, general-purpose entry/editing and supports up to 8 interactive operations; Office Automation System for shared resources, electronic math, productivity tools, and DP interface • application programs include: manufacturing, contractor, distribution, credit union system, financial/medical, and government/education packages.

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Program Development • COBOL compiler supports ANSI 74 COBOL language subset and is used on B 930 for online application development; RPG Compiler supports RPG II and is used on B 930 for batch-oriented program development; NDL (Network Definition Language) compiler supports proprietary NDL language and is used on B 930 to generate network controller program executed by data communication processor; MPL (Message Processing Language) compiler supports proprietary MPL II language and is used on B 930 to develop Message Control System for specific network function or a specialized task; Command and Edit Language (CANDE) is interactive single-user editor for creating and updating source and data files, and is used with COBOL, RPG, NDL, and MPL II programs • conversion aid available to assist user converting IBM S/32 programs to run on B 930.

Ease of Use Features • operating system provides screen prompts for online data entry/inquiry; Automatic Run Control System (ARCS) utility provides single statement execution of repetitive command sequences • ODESY program provides screen-formatted data entry • Printer Back-up utility automatically diverts printer files to disk when printer is occupied • "superstart" menu driven application control.

Configuration Flexibility • users can grow from a 4-microprocessor minimum configuration (B 930 Model 1) to 8-processor maximum configuration • basic B 930 Model 1 includes 4 B 900-3 Processors, 1 operating system processor with 256K-byte memory, 1 disk file management processor with 64K-byte memory, and 1 task processor with 256K-byte memory • basic B 930 Model 2 includes 5 900-3 Processors, 1 operating system processor with 256K-byte memory, 1 disk file management processor with 64K-byte memory, 1 data communications processor with 64K-byte memory, 2 task processors with 256K-byte memory each, disk file cache module with 256K-byte memory, extended backplane and redundancy kit • both B 930 maximum models include 8 subprocessors with 3.0M-byte total memory, 1 OS Processor with 512K-byte memory, 1 Disk File Management Processor with 32K-byte memory, 1 Data Communications Processor with 64K-byte memory, 4 Task Processors with 512K-byte memory each, 300K maximum systems data communications throughput, up to 32 data communications channels, practical maximum of 50 terminals/workstations depending on job mix, 1.6G-byte total disk storage with 1.6M-byte online disk pack storage, 9.2M-byte system loader disk cartridge, and 243K-byte media exchange diskette, up to 4 tape drives, and up to 2 line printers.

First Announced • November 1982.

Pricing • purchase price for basic B 930 Model 1 as outlined above is $23,228 • for B 930 Model 2 as outlined above is $33,000.

☐ **Burroughs B 1900 Series: B 1900 SP & B 1990 DP Computer Systems**

Type of Device • distributed processor implemented as host or node in Burroughs Network Architecture (BNA) network using BDLC bit-oriented protocol; online, interactive remote terminal-oriented environment.

Distributed Functions • file processing; data entry/processing; database access applications; timesharing message control; network message control • multinode multiprogramming, interactive operations.

Associated Systems & Networks • B 1900 implemented as node or host in BNA networks via Burroughs Network Service (BNS) or B 1900 systems can be linked together in loosely coupled or remote multiprocessing environment; 2 B 1900 systems can be linked together via SYCOM for file transfer, remote execution from console keyboard, and program communication between systems • Remote Job Entry Programs for RJE to Burroughs hosts supports B 1900 as remote terminal to any larger Burroughs mainframe (B 2000/B 3000/B 4000/B 6000/B 7000) systems • Remote HASP Environment Simulator supports B 1900 as IBM 360/20 remote batch terminal online to an IBM S/360- or S/370-compatible system • POWER/RJE Remote Terminal Program supports B 1900 as an IBM 2770 remote workstation that functions as online remote batch terminal to an IBM S/360- or S/370-compatible host • IBM 3270 BSC/SNA emulation.

Communications • dual-line and multiline controllers and data communication processors (DCPs) supply communication capabilities (none are front ends) • Dual-Line Control supports 2 BDLC communication lines • Multiline Control: DMA controller supports up to 8 lines via Line Adapter interface for each line; supports asynchronous/synchronous/bisynchronous communications at data rates to 9600 bps and wideband at data rates to 50K bps • DCP is a communication subsystem available in conjunction with Computer Management System (CMS) software for compatability with B 80/90/800/900 computers; supports 3 single or dual communication lines, each requires DCI or TCI Adapter; 4 additional lines with DCP-Extension; supports total of 14 communication lines when fully configured with adapter and extensions; each extension requires a Line Adapter.

Features • B 1990 systems are replacements for 1800 and 1900; uses variable micrologic to handle operands ranging from 3 to 24 bits like the B 1800, and can directly address 224 bits (not bytes) of memory • single-processor or tightly coupled dual-processor configurations with microprocessor-based I/O; dual-processor systems function in master/slave configuration that provides full backup capability; slave can be redesignated as master in case of system failure • disk capacity from 65M to 804M bytes • tape controller supports 1 cassette drive, 800-bpi/1K-byte-per-second data transfer rate; Magnetic Tape Subsystem with 1 controller and 1 to 16 9-track/1600-bpi tape drives with 40K/80K/120K-byte-per-second transfer rates • I/O is accomplished by the Network Controller and Network Controller's remote file interface.

Software • basic system combination packages designated TCS III/IV, TCS for RDP, and CMS TCS include operating system and several other software modules: TCS III minimum package for B 1905/1910 processors only and includes native mode MCP II operating system, sort utilities, Network Definition Language, CANDE, and ODESY and 1 language compiler; the TCS IV is minimum software package for B 1955/1955-1/1985/1985-1 processor but can run on other B 1900 models as well and includes facilities of TCS III plus DMS II, REPORTER, DMS II Inquiry, GEMCOS, and UPL; the TCS for RDP (Remote Document Processing) program is designed for B 1913 running remote MICR Reader/Sorter and includes native mode MCP II, NDL, TCR, utilities, compiler, choice of Burroughs RJE or IBM HASP RJE; CMS TCS runs on any B 1900 model and features the CMS-MCP operating system instead of Native Mode MCP II; also includes CMS NDL, CMS Sort, CMS utilities, CMS CANDE, CMS ODESY, and RPG or COBOL compiler • operating systems: Native Mode Master Control Program II (MCP II) performs multiprogramming, simultaneous batch and communications tasks; includes SORT; Computer Management System (CMS) runs on all 1900s and includes CMS-MCP, Data Control System, and DOMAIN • database management: DBS II runs under native mode MCP; DMS II Inquiry runs under MCP and DMS II and provides a language interface and terminal user interface for interactive access to a DMS II database from a terminal; Advanced Reporter II runs under native mode MCP and consists of Vocabulary (VOCAL) and Report Writer II (REPORTER II) free-form language; On-Line REPORTER runs under CMS-MCP and native mode MCP; Audit-Reporter (AUD) runs under native mode MCP; DISK FORTE/2 runs under native mode MCP • communications: BNS Burroughs Network Services for implementation of B 1900 BNA host or node; Network Definition Language (NDL) for creation of custom networks; GEMCOS message handling facilitates network control; Advanced GEMCOS includes message paging and message switching capabilities; GEMCOS Format Generator; Command and Edit (CANDE) program supports file handling in an online, interactive terminal-oriented environment; System Communication Module (SYCOM) permits B 1900 systems to be linked together in a loosely coupled or remote multiprocessing environment; HASP Remote Terminal Program permits the B 1900 to operate as a HASP workstation; RJE Terminal Programs support B 1900 as remote terminal to larger Burroughs systems.

Program Development • high-level languages: COBOL, FORTRAN, BASIC, RPG, and User Programming Language (UPL), and Network Definition Language (NDL) • supports non-Burroughs languages via conversion aids such as IBM 1400 Interpreter and NCR Neat/3.

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Ease of Use Features • Native Mode MCP II operating system communicates with operator in abbreviated English phrases; operations procedures are simplified by notifying operator of missing data, errors, start, and end-of-job procedures, and special conditions • DMS II Inquiry uses English commands • Advanced Reporter II provides 2 free-form languages allowing user to specify independent descriptions • On-Line REPORTER offers instructional TEACH command to page through runtime error report • Text Editor conversational feature via English commands.

Configuration Flexibility • basic system (1900-SP) includes 6-MHz CPU with 512K-byte memory, multiline control, I/O subsystem Microprocessor, quad line adapter, ET 1000 • maximum system (1900-DP) inlcudes dual 6-MHz CPU with 1M-byte memory, multiline control, I/O subsystem Microprocessor, quad line adapter, ET 1000, expansion cabinet, I/O extension backplane, I/O subsystem backplane, dual processor kit.

First Announced • 1983.

Pricing • purchase price for basic system (1900-SP) as outlined above is $59,300 • purchase price for maximum system (1900-DP) as outlined above is $114,300.

■ CHARLES RIVER DATA SYSTEMS INC

983 Concord Street, Framingham, MA 01701 • 617-626-1000.

□ Charles River Data Systems Universe Series UV68/05, 35F, 35T, 67T, 137T & UV2203

Type of Device • 32-bit computer system.

Distributed Functions • real-time, key-to-disk, and data manipulation applications.

Associated Systems & Networks • Universe Net, conforming to 7-layer Open Systems Interconnection (OSI) networking standard of the International Organization on Standards (ISO).

Communications • 4 or 8 serial ports or 1 24-bit parallel port • maximum configuration of 64 serial ports plus 7 parallel ports requires 8 TP-30X boards and 2 TP-3XX cabinets • serial ports half-/full-duplex asynchronous up to 38.4K-bps SDLC/HDLC protocols • RS-232C/RS-422B interfaces.

Features • CPU for Universe systems except 2203 is CP32, single processor using 12.5-MHz version of MC68000 • 2203 uses VCP-2000, dual-board processor also using MC68000 • memory: 256K to 3M bytes (68/05); 512K to 3M bytes (68/35F); 512K to 5M bytes (68/67T, 68/137T); 512 to 2M bytes (2203) • I/O capacity: selector channel for system uses SASI/SCSI bus with aggregate rate of 20M bps; 16-bit burst transfer at 4.2M bps and 32-bit burst transfers at 8.4M bps • for memory transfers 2203 uses VME bus with aggregate data rate in excess of 40M bytes; 16-bit transfers at 5M bps and 32-bit transfers at 10M bps • up to 480M bytes add-on plus drive storage configured with system package • printers obtained from outside source, attach via serial or parallel port.

Software • UNOS-01 or UN/System V operating systems • UNOS-01, UNIX-compatible with real-time extensions; multiuser, multitasking, timesharing and transaction processing capabilities; dedicated and batch processing features • UN/System V-01 UN/System V derivative of AT&T UNIX System V uses System V kernel code including file system tasking control, swapping, scheduling, and user survey; shares device drivers, file formats, and object formats with UNOS, so any program or file is fully transportable • database management; Unify, multiuser, relational database management system provides spectrum of tools for developing and operating database-oriented applications • communications software, Universe Net implements 7-layer Open System Interconnection (OSI) networking standards of the International Standards Organization (ISO); supports wide area networks, local area networks, and gateways to other networks • office automation includes electronic mail.

Program Development • C Compiler, RM/COBOL-01, RM/COBOL, UN/FORT-01 FORTRAN 77, UN/PAS-01 Pascal, UN/BAS-01 BASIC • program/application develoment aids provided with operating systems and/or tool kit.

Ease of Use Features • menu-driven; Enter, full-screen interactive data entry.

Configuration Flexibility • UV68/05A • Universe 68 system with 256K bytes of memory, 4 serial ports, built-in 10M-byte fixed disk drive, and 1.2M-byte floppy disk drive (system backup) • 7-inch high desktop cabinet unit can be rackmounted • integral IOP (I/O processor) • built around VERSAbus and SASI/SCSI (Shugart Associates System Interface/Small Computer System Interface) bus • UV68/05 Maximums • 256K to 3M bytes of memory • 10M to 490M bytes of mass storage (7 drives maximum) connected via multiple selector channel interface boards with 1.2M-byte floppy disk for system backup • 4 serial ports expandable to 64; up to 7 parallel ports, printers, terminals, modems, LANs, and other character-oriented user-supplied devices connect via serial or parallel ports • 7-inch, 5-slot VERSAbus chassis; processor board, memory board, and selector channel interface board require 3 slots, leaving 2 slots for expansion • Micro Module and Multibus adapter boards permit Micro Module and Multibus cards to be plugged directly into the VERSAbus card cage • IEEE 488 interface also available • UV68/35F-B • Universe 68 system with 512K bytes of memory, 4 serial ports, built-in 35M-byte fixed disk drive, and 1.2M-byte floppy disk drive (system backup) • 7-inch high desktop cabinet; unit can be rackmounted • integral IOP • built around VERSAbus and SASI/SCSI bus • UV68/35T-B • Universe 68 system with 512K bytes of memory, 4 serial ports, built-in 35M-byte fixed disk drive and 0.25-inch 45M-byte streaming cartridge tape drive (system backup) • 7-inch high desktop cabinet; unit can be rackmounted • integral IOP • built around VERSAbus and SASI/SCSI bus • UV68/35 Maximums • 512K to 3M bytes of memory • 35M to 515M bytes of mass storage (7 drives maximum) connected via multiple selector channel interface boards with either 1.2M-byte floppy disk or 0.25-inch 45M-byte streaming cartridge tape drive for system backup • 4 serial ports expandable to 64; up to 7 parallel ports; printers, terminals, modems, LANs, and other character-oriented user-supplied devices connect via serial or parallel ports • 7-inch, 5-slot VERSAbus chassis; processor board, memory board, and selector channel interface board require 3 slots, leaving 2 slots for expansion • Micro Module and Multibus adapter boards permit Micro Module and Multibus cards to be plugged directly into the VERSAbus card cage • IEEE 488 interface also available • UV68/67T-B • Universe 68 system with 512K bytes of memory, 4 serial ports, built-in 60M-byte fixed disk drive and 0.25-inch 45M-byte streaming cartridge tape drive (system backup) • piggybacked desktop cabinets each 7 inches high; unit can be rackmounted • integral IOP • built around VERSAbus and SASI/SCSI bus • UV68/67 Maximums • 512K to 5M bytes of memory • 60M to 340M bytes of mass storage (15 drives maximum) connected via multiple selector channel interface boards with 0.25-inch 45M-byte streaming cartridge tape drive for system backup • 4 serial ports expandable to 64 with 12 in the main chassis • up to 7 parallel ports with 1 in the main chassis • printers, terminals, modems, LANs, and other character-oriented user-supplied devices connect via serial and parallel ports • 7-slot VERSAbus chassis; processor board, memory board, and selector channel interface board require 3 slots, leaving 4 slots for expansion • Multibus and VME adapter boards permit smaller Multibus and VME cards to be plugged directly into VERSAbus card cage • UV68/137T-B • Universe 68 system with 512K bytes of memory, 4 serial ports, built-in 120M-byte fixed disk drive, and 0.25-inch 45M-byte streaming cartridge tape drive (system backup) • piggybacked desktop cabinets each 7 inches high; unit can be rackmounted • integral IOP • built around VERSAbus and SASI/SCSI bus • UV68/137 Maximums • 512K to 5M bytes of memory • 120M to 600M bytes of mass storage (15 drives maximum) connected via multiple selector channel interface boards with 0.25-inch 45M-byte streaming cartridge tape drive for system backup • 4 serial ports expandable to 64 with 12 in the main chassis • up to 7 parallel ports with 1 in the main chassis • printers, terminals, modems, LANs, and other character-oriented user-supplied devices connect via either serial or parallel ports • 7-slot VERSAbus chassis; processor board, memory board, and selector channel interface board require 3 slots, leaving 4 slots for expansion • Multibus and VME adapter boards permit smaller Multibus and VME cards to be plugged directly into the VERSAbus card cage

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• UV2203T-B • Universe 2203 system with 512K bytes of memory, 4 serial ports, built-in 35M-byte fixed disk drive, and 0.25-inch 45M-byte streaming cartridge tape drive (system backup) • 7-inch desktop cabinet; unit can be rackmounted • integral IOP • built around VE bus and SASI/SCSI bus • UV2203 Maximums • 512K to 2M bytes of memory • 35M to 515M bytes of mass storage connected via 1 or more selector channel interface boards with 0.25-inch 45M-byte streaming cartridge tape drive for system backup • 4 serial ports for printers, terminals, modems, LANs, and other character-oriented user-supplied devices • 7-slot VME bus chassis; 2 processor boards, memory board, and selector channel interface board require 4 slots, leaving 3 slots available for expansion.

First Announced • 1983 for 68/05, 68/35F; 1984 for 68/67T, 68/137T, 2203.

Pricing • purchase price for systems as outlined above are: $11,900/$16,900/$14,900/$24,900/$26,900/$16,900 (68/05A, 68/35F-B, 68/35T-B, 68/67T-B, 68/137T-B, 2203T-B).

■ COMPUTER AUTOMATION

2181 Dupont Drive, Irvine, CA 92713 • 714-833-8830.

☐ Computer Automation SyFA Series: SyFA 200, 300, 1000 & 2000 Computer Systems

Type of Device • distributed processing/cluster systems complemented by MicroBooster intelligent front ends or peripheral controllers, cache disk, and Virtual Network Controller for configuration of multisystem SyFA 1000/2000 distributed networks.

Distributed Functions • transaction processing and distributed processing applications; online interactive entry/inquiry/update, batch, and interactive computer-to-computer communication; local/remote communication.

Associated Systems & Networks • asynchronous communication between systems • emulation support: IBM SNA PU Type 2 Emulator supports SyFA systems as 3790 communications controller (SNA/SDLC protocol); IBM 3270 Emulator supports systems in remote multipoint IBM 3270 network; IBM 360/20 HASP Workstation Emulator supports communication with host processor using IBM HASP II Workstation protocol; IBM 3780 Emulator supports point-to-point communication with an IBM system or other SyFA system; ICL 7020 Emulator emulates ICL 7020 Remote Batch Terminal for communication with host using ICL Half-Duplex Control Procedure protocol; X.25 Emulator supports X.25 packet switching in local/remote communications • asynchronous communication link between Datapoint and SyFA system; online communication when both share same network.

Communications • 8-port asynchronous multiplexer for SyFA 300 and 1000 Series; 2 8-port expansion increments available for total of 24 ports; supports half-duplex data rates of 50 to 19.2K bps • 8-port MicroBooster Asynchronous Multiplexer offloads character-per-character editing, echoing functions; 2 additional 8-port MicroBoosters available • from SyFA Network Processor BSC Communications Controller provides front-end communication with BSC protocol support together with IBM 3270/3780/360-20 HASP software • SDLC MicroBooster supports front-end communications with SDLC protocol together with SNA network for concurrent interaction and batch operations; for full compatibility with SNA/SDLC multipoint lines using SyFA SNA PU Type 2 IBM 3790 software emulation; up to 4 Logical Units • SDLC MicroBooster supports up to 15 Logical Units on SyFA 2000 • Virtual Network Controller based on 256K-byte Computer Automation LSI/4/90 supports distributed networks where any terminal can access any globally defined data file stored at any system in network; expands to 31 systems in virtual network • Distributed Database MicroBooster (1 per system) together with Virtual Network Controller and X.25 protocol emulation software provides interface between SyFA system and virtual network.

Features • SyFA Series in 4 models (200, 300, 1000, 2000) based on 16-bit processors with MOS error-correcting memory; computer chassis with 5 or 9 I/O slots supports CPU, memory, peripheral/communication controller or interface boards; intelligent interfaces or MicroBoosters offered on 1000/2000 systems provide 16K-byte dedicated memory and use DMA

access for communication, peripheral, or data management • standard multiplexers support up to 24 ports; MicroBooster multiplexers support up to 32 ports • all systems upward compatible; can use either 100- or 150-nanosecond processor board; differences between models in chassis, I/O slots, memory management, terminal attachment facilities (see Configuration) • memory: from 64K to 384K bytes on SyFA 200 and 300; 64K to 320K bytes on SyFA 1000; 256K to 544K bytes on SyFA 2000 • disk: up to 2 controllers with 4 drives per controller; 220M bytes per drive; 1760M-byte maximum; cache disk adds up to 1M bytes of semiconductor RAM as substitute for up to 4 of the 8 drives; RAM can also be used as disk cache memory • support of up to 64 local/remote interactive terminals; up to 992 terminals under virtual network architecture; 2 system printers maximum • all systems have Maxibus I/O channel which operates at up to 411K-word-per-second (822-byte-per-second) data rate; supports programmed I/O, automatic I/O, block I/O, and conditional I/O; and DMA transfers on SyFA 1000/2000 at up to 1.8M bytes per second; MicroBooster intelligent interface via DMA attachment on SyFA 1000/2000 configuration; up to 128 direct memory channels supporting up to 248 addressable devices.

Software • SyFA Concurrent Logic Operating System (SyCLOPS) is multiprogramming, interrupt-driven, multiuser operating system supporting up to 304K bytes of memory; mapping on 2000 Series addresses up to 544K bytes • incorporates virtual storage techniques and supports concurrent execution of up to 64 interactive applications, 16 batch utilities, 4 printer spooling jobs, synchronous communication emulator, and CCITT X.25 standard packet-switching link • supports Virtual Network Controller, RJE emulation for IBM 3780, 360/20 HASP, 3790 or 3270, and ICL 7020 • provides sequential, random, and indexed file access • data management: no general-purpose data management software • communication software as follows: IBM SNA PU Type 2 Emulator supports SyFA system as 3790 communications controller; SyFA systems and IBM 3790 can share same multipoint communication line • IBM 3270 Emulator supports SyFA system in remote multipoint IBM 3270 network; supports up to 15 terminals operating in 3270 mode • RJE supports SyFA system in bisynchronous point-to-point mode with mainframe computer or other SyFA system simulating RJE protocol; supports communication concurrently with other applications; under RJE facility SyFA system appears as emulated hardware as seen from the remote computer • X.25 Emulator together with Virtual Network Controller establishes communications from programs running on SyFA systems with SyFA for other vendors' systems that support CCITT X.25 standard protocol • INTERCOM provides asynchronous communication link between Datapoint and SyFA system; supports transfer of Datapoint programs to SyFA system for translation to SyBOL; also supports online communication between Datapoint and SyFA systems if both are in same network • SyNET designed for use with SyFA systems and IBM host mainframes; duplicates IBM HCP and DSX functions.

Program Development • SyBOL is English-type, business-oriented, online interactive application language; supports 32 interactive terminals concurrently; includes programming aids; interfaces within application program via interactive communication emulators such as IBM 3270 and 3790 • SyMPLE (Multiprogramming Language Extender) for interactive creation of SyBOL programs • Panel Manager provides aid to programmer for coding display handling routines and allows programmer to define terminal screen panels; facilitates screen manipulation in application programs.

Ease of Use Features • SyBOL is English-like language with short statements; SyMPLE provides menu selection programs and screen displays • Panel Manager is programmer aid.

Configuration Flexibility • a maximum SyFA 200 or 300 system supports up to 384K bytes of memory (750 nanoseconds for SyFA 200, 550 nanoseconds for SyFA 300), 2 spooled print jobs, 1 synchronous communications task, 1 X.25 virtual communications task and 16 batch programs, up to 8 communication ports connected to up to 8 CRTs and 8 serial printers, and up to 32 interactive applications • a maximum SyFA 1000 system supports up to 384K bytes of memory, up to 32 interactive application programs, 2 spooled print jobs, 1 synchronous communication

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task, 1 X.25 virtual network communication task, and 16 batch utility programs; up to 1760M bytes of disk pack storage (8 drives), 1M-byte semiconductor (4-millisecond) disk storage; up to 32 CRT terminals and 32 serial printers, 16 communication ports • a maximum SyFA 2000 System supports up to 544K bytes of memory, 1024-word, 50-nanosecond cache memory; up to 64 interactive application programs, 2 spooled print jobs, 1 synchronous communication task, 1 X.25 virtual network communication task, and 16 batch utility programs; up to 1760M bytes of disk pack storage (8 drives) plus 1M-byte semiconductor disk or disk cache; supports up to 32 CRT terminals and 32 serial printers; up to 32 communications ports • virtual network controller supports from 4 to 31 systems; 12 to 28 disk drives.

First Announced • SyFA 1000 in 1975; SyFA 100/200 in 1979; SyFA 2000 in first quarter of 1981.

Pricing • purchase price is $16,000 for Series 200 including CPU, 128K-byte 550-nanosecond ECC memory, memory bank controller, disk controller for removable media or Winchester drive subsystem, 5 slots, 8-port asynchronous multiplexer, single-bay or desk enclosure; $18,000 for Series 300 including same components as Series 200 except with 9 slots; $21,000 for Series 1000 same components as Series 300 except with disk controller for 4 drives in vertical enclosure; $32,000 for Series 2000 including CPU, 256K-byte, 500-nanosecond ECC memory, cache memory, 8-port microbooster multiplexer, disk controller for 4 drives, 17- and 9-slot chassis and power supply, and vertical enclosure.

■ DATA GENERAL CORPORATION

4400 Computer Drive, Westboro, MA 01581 • 617-366-8911.

☐ **Data General 16-bit ECLIPSE Series: S microECLIPSE, S ECLIPSE & C ECLIPSE Systems**

Type of Device • single terminal/standalone processor application communicating with IBM or other Data General System; or multiprocessor configuration in a distributed processing network • academic/business/scientific-oriented environments in various system configurations.

Distributed Functions • remote job entry; transaction processing, text/word processing, or graphics processing in business- or scientific-oriented environments • multiprogramming, multiuser operations; real-time and batch processing • database management supports network and hierarchical data structures.

Associated Systems & Networks • interactive communication with other Data General systems or IBM systems in point-to-point or multipoint configurations through emulation of IBM terminals (2780/3780 RJE, 3270 display clusters) and BSC protocol • access to SNA network through ECLIPSE system emulating SNA Physical Unit Type 2 (PU 2) • X.25 packet-switching networks.

Communications • data controller provides character assembly/disassembly and buffering for 64 asynchronous communications lines; maximum of 128 lines per system • communications controller, high-speed, half-/full-duplex; for use with AT&T 201, 203, 208 data sets or equivalent; automatic line synchronization, word assembly, end of transmission recognition • 4-line synchronous communications interface, 4-line subsystem of 64-line maximum synchronous multiplexer with hardware character assembly/disassembly/full character buffering; microEclipse asynchronous interface for console only; programmable synchronous line controller supports half-/full-duplex, full modem control; EIA RS-232C/CCITT V.24 compatible; AT&T 201, 203, 208, 209 data sets or equivalent; asynchronous interface board, single-line interface supports half-/full-duplex at data rates up to 19.2K bps, full modem control, RS-232C/20-mA current-loop compatibility; programmable asynchronous line multiplexer supports half-/full-duplex at data rates up to 19.2K bps, full-character buffering and modem control, RS-232C/CCITT V.24 compatible, AT&T 201, 203, 208, 209 data sets or equivalent; multiprocessor communications adapter, connects up to 15 Data General computers in multiprocessing ring configuration, transfers through DMA Channels, timeshared bus allows multiple conversions simultaneously, transmit rate 200K bps (15 computers, 150 feet of cable), 330K bps (4 computers, 40 feet of cable), supported by RDOS; asynchronous line controller, 20-

mA current-loop interface for Teletype, display, or AT&T modem, half-/full-duplex with data rates up to 9600 bps; asynchronous line controller, 20-mA current-loop interface for Teletype terminal or receive-only printer, half-/full-duplex at data rates up to 9600 bps; P EIA interface for asynchronous controller, supports AT&T Teletype Models 37ASR/KSR via AT&T 103 or equivalent modems; ALM 4/ALM 8, 4- or 8-line programmable asynchronous multiplexer for remote operations, half-/full-duplex at data rates up to 9600 bps, full character buffering, RS-232C/CCITT V.24 compatibility, supports AT&T 103, 202, or equivalent modems; ALM 8/ALM 16, 8 or 16 direct-connect multiplexer, half-/full-duplex at data rates up to 19.2K bps, full character buffering, RS-232C/CCITT V.24 or 20-mA current-loop compatibility, AT&T 103 modem, manual-answer-only compatibility; 802.3 connection for end-to-end communications between ECLIPSE S/20 and C/30 processors, requires AOS, AOS/Workstation operating system, and XODIAC communications software products; 8- or 16-line asynchronous multiplexer, full-duplex, data rates up to 19.2K bps; 1-line synchronous controller for remote terminals RS-232C compatible, half-/full-duplex at data rates up to 9600 bps via AT&T 201, 203, 208, or equivalent modems; bit-synchronous interface, 1-line with complete modem support; Universal Line Multiplexer, 4-line asynchronous RS-232C/CCITT V.24 or 20-mA current-loop, half-/full-duplex at data rates up to 9600 bps; ULM 5, 1-line synchronous RS-232C/CCITT V.24 compatible, half-/full-duplex at data rates up to 9600 bps via AT&T 201, 203, 208, 209, or equivalent modems.

Features • ECLIPSE Series provides 8 models built around 16-bit processors: microECLIPSE models S/20 and S/120; the ECLIPSE scientific models S/130, AP/130, S/140, and S/250; and the ECLIPSE commercial models C/150 and C/350 • microprocessor-based S/20 and S/120 differ in board size, memory integrity (parity or ECC), and I/O implementation: the S/20 uses microNOVA-sized boards/8-slot chassis and I/O, 128K- to 512K-byte parity MOS memory, optional floating-point board (maximum memory/floating board use 6 slots); the S/120 uses standard NOVA/ECLIPSE components, 5- or 16-slot chassis, from 128K- to 512K-byte ECC/MOS memory, automatic self-test/power-failure detect/auto restart • the S-series models oriented toward scientific OEMs: S/130 allows core memory and writable control storage in rackmounted compiler; the S/130 CPU is also used in the AP/130 and C/150 systems; the S/140 system differs by providing better price/performance than S/130-based systems when core/WCS are not required and offers an optional Burst Multiplexer Channel; the parity core memory on 32K-byte boards available in 64K-byte increments from 64K to 512K bytes on all ECLIPSE models except AP/130 and S/140; ECC MOS memory for all ECLIPSE models in 64K-, 128K-, and 256K-byte-per-board increments from 64K to 2M bytes • the S ECLIPSE systems are as follows: the S/130 offers 2-slot CPU with separate memory boards, 32K-byte core or 64/128/256K-byte ERCC MOS core, or 1024K-byte MOS/ECC memory, optional character instruction, floating-point instructions, optional writable control store or PROM, optional 12-slot I/O chassis • the AP/130 includes S/130 CPU with from 64K to 768K bytes of MOS/ERCC memory, includes 8K-byte bipolar memory with 200-nanosecond access time, standard 12-slot chassis (6 used by CPU MAP and AP, 6 available for memory or I/O controller boards), and optional 12-slot I/O expansion chassis • the S/140 includes CPU with 128K-byte 2-way interleaved to 2048K-byte 4-way interleaved MOS/ERCC memory and standard 16-slot chassis (3 dedicated to CPU, ERCC, FPU floating-point unit; 8 available for memory or I/O controller boards, 5 for I/O only) • the C/150 includes S/130 CPU with Commercial Instruction Set, standard data channel and I/O bus, MAP, asynchronous serial I/O controller, from at least 128K bytes of core MOS/ERCC memory, core memory can be added in 32-byte boards to maximum of 512K bytes; MOS/ERCC memory can be added in 64K-, 128K-, or 256K-byte boards to a maximum of 2 bytes, or 1M bytes of MOS/ERCC memory, standard battery backup for memory, memory can be added in 64K-, 128K-, 256K-byte increments, standard 12-slot chassis (8 used for memory and I/O controller boards), and optional 12-slot I/O expansion chassis • the S/250 and C/350 scientific-/commercial-oriented ECLIPSE systems differ in that the C-series always provides character handling instructions; the S/250 can add satellite and integral array processors; the S/250 system

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includes from 64K to 512K bytes of core or 128K to 2048K bytes of MOS/ERCC memory, MAP, standard data channel and programmed I/O channel, standard 18-slot chassis (4 slots for CPU, MAP, real-time clock, interval timer; 8 slots for optional floating-point processor and burst multiplexer channel; 10 slots for memory and I/O), memory I/O system module adds 8 slots for memory or I/O, and I/O system modules add 8 slots for I/O only; the C/350 includes at least 128K-byte core or 128K-byte MOS/ERCC memory, core memory can be added in 32-byte boards to maximum of 512K bytes; MOS/ERCC memory can be added in 64K-, 128K-, or 256K-byte boards to a maximum of 2M bytes, programmable interval timer, standard 26-slot chassis (8 for CPU and console; 18 for memory and I/O boards), and optional 8 additional I/O slots for expansion ● disk capacities: up to 200M bytes on S/20; up to 760M bytes per subsystem on S/120, AP/130, or other ECLIPSE models without BMC; up to 1.1G bytes per subsystem on S/140, S/250, or C/350 with BMC; up to 2 subsystems under RDOS; can be greater but not practical in MP/AOS or AOS ● I/O channel support: S/20 I/O Bus is 16-bit-word I/O channel with 300K-byte-per-second data rate, cycle strealing, supports all Data General peripherals, and peripheral controllers (except for 1.2M-byte diskette and new "in-chassis" units) reside in device housing requiring no chassis slots; standard data channel supports medium-to-high-speed devices at data rates up to 2.5M bytes per second; programmed I/O channel supports low-speed terminals/printers/card readers, and both asynchronous/synchronous communication multiplexers can be attached directly; BMC (burst multiplexer channel) interfaces up to 4 high-speed controllers at data rates up to 10M bytes per second of input and 6.7M bytes per second of output; I/O Bus Switch and chassis provide 14 slots for 2 Data General computers to share peripherals ● optional communications hardware features: S/20 Systems provides controller board for up to 4 Line Interface Boards supporting up to 16 asynchronous or 4 synchronous lines, programmable synchronous line controller supports full-/half-duplex operations, RS-232C/CCITT V.24 compatible, and accommodates Bell 201/203/208/209 data sets; Programmable Asynchronous Line Multiplexer supports full-/half-duplex communications at up to 19.2K bps ● S/120 and larger systems provide Multiprocessor Communications Adapter to connect up to 15 Data General computers in multiprocessor ring configuration, DMA transfers, timeshared bus for concurrent multiple conversations, 200K-byte-per-second transmit rate with up to 15 computers, and 150-foot cable in normal mode; Data Control Units (NOVA-based) connect to Communications Chassis and support asynchronous/synchronous line multiplexers and 256 lines per DCU; Communication Chassis with 4 slots supports mix of synchronous/asynchronous multiplexers, interface through computer I/O bus or DCU, 4 chassis daisy-chained for 256-line support; XODIAC Network Management Bus (NBS) implements baseband local area network using token-passing protocol over coaxial cable; up to 32 Data General processors on up to 1-mile segment ● terminal/workstations include Graphics Display Terminals, Diagnostic Displays, and terminal printers with local/remote attachment; 20-mA current loop or EIA interface; full-/half-duplex communication with selectable data rates to 19.2K bps; 240- to 900-lpm drum printers; 150 cps, 180-cps bidirectional and 340-cps dot-matrix printers; 55-cps letter-quality printers; 230- to 300-lpm band printer subsystems; other peripherals include card and paper tape equipment and plotters.

Software ● AOS is multiprogramming, multiuser operating system oriented to processes; supports up to 2M bytes of main memory with simultaneous control of timesharing, multiple batch, online, and communications operations concurrently; manages up to 127 interactive terminals and supports RJE 80, HASP II, RCX 70 emulator utilities, and Xodiac Network Management System for distributed processing and RJE operations ● MP AOS is real-time-oriented superset of MP/OS operating system for Data General NOVA/microNOVA computers with AOS feature/function/operational compatibility; requires system with 192K bytes of memory, at least 10M bytes of disk storage, and 1.2M bytes of diskette or mag tape for development system; runtime dedicated system can fit into 128K bytes; supports up to 16 memory-resident processes; system-wide total support of 256 concurrent tasks ● RDOS Mapped supports foreground/background environment

for real-time and batch processes; manages 64K to 512K bytes of memory; supports 256 level priority interrupt structure for real-time events; multitasking permits multiple execution paths to perform functions asynchronously, tasks are scheduled based on processor, memory and peripheral use through a tasking queue ● RTOS is memory-resident, general-purpose multitasking, runtime-only operating system; supports up to 512K bytes of memory; supports contiguously organized disk and diskette files as well as magnetic subsystems; supports CAM I, which provides basic communications management; HASP II emulates IBM HASP II workstation (IBM 360/20); RJE 80 emulates IBM 2780/3780 RJE terminals; RDOS X.25 provides X.25 sensor I/O routines; supports programs written in FORTRAN IV or V, DH/L, and assembly language ● RTOS Unmapped provides same support and capabilities as mapped verison except supports only 64K bytes of memory-associated limitations; runs with 16K bytes of memory and real-time clock ● ECLIPSE IC/COBOL is interactive COBOL operating system, includes compiler, runtime support, and utilities; requires any mapped ECLIPSE series processor with character instruction set; real-time clock, communications chassis and asynchronous line monitor, 1 DASHER D2, D200, D3, D4, D5 display terminal, 20M- or 25M-byte disk; supports category A ● S/140 IC/COBOL is interactive COBOL oeprating system for 1 to 16 users on S/140, includes compiler, runtime software, and utilities; requires ECLIPSE S/140 processor with minimum 128K-byte memory, real-time clock, communications chassis and asynchronous line monitor, terminal interface or modem interface, 1 DGC P10 or DCH line printer, 12.5M- to 190M-byte disk; supports category C ● DG/DBMS based on Codasyl recommendations supports network and hierarchical data structures ● AOS DG/DBMS PRESENT, interactive, nonprocedural, read-only query facility supporting access to DG/DBMS databases using English keywords and phrases ● AOS INFOS II, database file management system based on 2 data access methods, ISAM and DBAM; requires C series with 512K-byte memory, any terminal, 10M-byte hard disk, real-time clock, interval timer, and mag tape; support category A ● AOS PRESENT QUERY interactive inquiry program supporting access to AOS, INFOS, ISAM, DBAM files without extra programming; requires C series with 512K-byte memory, any terminal, 10M-byte hard disk, real-time clock, interval timer, mag tape ● AOS TPMS provides support for design, development, testing, execution, and maintenance of transacting processing applications; includes 4 integrated runtime modules: TCP, CCP, SSP, and LM; requires AOS with 256K-byte memory, mag tape or 1.2M-byte diskette, real-time clock, interval timer, 10M-byte hard disk, and Dasher D2 or D200 terminal ● RDOS CAM I supports local or remote asynchronous/synchronous communications under RDOS or RTOS using IBM BSC protocol and DCU managed asynchronous/synchronous lines; tailored using CGEN ● Xodiac Network Management provides for multiple systems to exchange data and share resources, connecting directly via communications lines or indirectly via public data networks; can use NBS local area network ● AOS X.25 provides CCITT X.25 protocol capabilities; supports multiple switched or permanent virtual circuits between AOS and X.25-based processes via private, leased, or switched facilities with X.21 bis/RS-232C interface; requires 256K-byte memory, 4206 MCA or SLM with CRC option and DCU/200 ● DG/SNA Communications Software allows AOS system to operate within IBM SNA, appears to IBM host as Physical Unit Type 2 (PU2); consists of 3 software modules that make ECLIPSE systems compatible to all 6 levels of IBM's SNA network, supports up to 16 end user-to-user sessions, where an end user may be a person, device, application program, or system software/subsystem; can run concurrently with X.25-based Xodiac network management software for SNA and X.25 networks including AOS DG/SDLC, AOS DG/SNA, AOS SNA/3270 options ● MP/3270/MP/AOS/3270 emulates IBM 3271 Cluster Controller and 3277 Display using IBM BSC protocol ● SNA/RJE emulates IBM 3770 remote batch processing devices, transfers files to and from an IBM host; allows DG/SNA to gather and transfer files in Xodiac network to IBM host in 1 transmission ● SNA/3278/APL D450 and D460 emulates IBM 3278 terminals running APL language ● AOS RCX 70 emulates IBM 3270 Information Display System ● AOS RJE 80/RDOS RJE 80/MP/AOS MP/RJE 80 emulates IBM 2780/3780 terminals to communicate with IBM 360/370 or other Data General terminals ● AOS/RDOS HASP II emulates IBM HASP 360/20 workstation

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• AOS X.25 provides CCITT X.25 protocol capabilities; supports multiple switched or permanent virtual circuits between AOS and X.25-based processes via private, leased, or switched facilities with X.21 bis/RS-232C interface; requires 256K-byte memory, 4206 MCA or SLM with CRC option and DCU/200 • DG SNA Communications Software allows AOS system to operate within IBM SNA, appears to IBM host as Physical Unit Type 2 (PU2); consists of 3 software modules that make ECLIPSE systems compatible to all 6 levels on IBM's SNA network, supports up to 16 end users-to-users' sessions, where an end user may be a person, device, application program, or system software/subsystem; can run concurrently with X.25-based Xodica network management software for SNA and X.25 networks including AOS DG/SDLC, AOS DG/SNA, AOS SNA/3270 options • MP/AOS microNOVA Synchronous Control Package (MSCP) functionally compatible to CAM I support under MP/OS for BSC communications only • IBS (Interface BUS Software) Package, IEEE-488-1978 support software under MP/AOS, DROS/RTOS, AOS or AOS/VS • AOS DG/GATE, RDOS DG/GATE, general asynchronous terminal emulator for AOS or RDOS.

Program Development • application/program development includes such facilities as IDEA for screen formatting and implementation of data entry and inquiry/response; SAM supports sensor device interface; TPMS (Transaction Processing Management System) supports transaction processing; TRENDVIEW graphics terminal support; DATAPREP key to disk software • Extended and Business BASIC, COBOL, FORTRAN IV and 5, RPG II supported on AOS and RDOS; AOS also supports PL/1, MP/Pascal; MP/AOS supports MP/FORTRAN IV, MP/Pascal, MP/BASIC, and MP/Pascal.

Ease of Use Features • HELP under AOS operating system supports CLI command facility, basic user/system interface; DG/DBMS IQ supports access to DG/DBMS databases using English keyword and phrases; includes HELP facility • AOS RPG II allows debugging programmer to reference both original source and tutorial (HELP) file describing debugger operations • PROXI Program Generator is menu- and prompt-driven, interactive COBOL code generator • menu-driven CEO (Comprehensive Electronic Office).

Configuration Flexibility • S/20 basic system includes microECLIPSE, 8-slot chassis, power supply, 128K-byte memory board, MAP, parity generation/checking, real-time clock, programmable interval timer, asynchronous serial interface, instructions, including character and floating-point; maximum S/20 includes basic system with 512K-byte parity MOS memory, battery backup, optional hardware floating-point • C/30 basic system includes S/20 processor with Commercial Instruction set, 8-slot chassis, power supply, battery backup, floating-point unit, 512K-byte memory board; maximum C/30 includes basic system with 2M-byte memory • CS Series 100 basic system includes S/20 processor, 128K-byte memory, one-half bay, 29-inch cabinet, partial battery backup; maximum system includes basic system with 512K-byte memory, plus 50M-byte disk storage, 1 tape drive, 1 parallel interface printer up to 300 lpm, and asynchronous/synchronous interfaces; support 9 concurrent users • S/120 basic system includes single-board microECLIPSE plus 128K-byte on-board memory, standard real-time clock, programmable interval timer, console terminal interface, automatic self-test power failure detect/auto-restart, and 5-slot chassis, uses standard ECLIPSE peripherals; S/120 maximum includes basic system with 512K-byte memory, and 16-slot chassis • CS Series 200 basic system includes S/120 processor, 256K-byte memory, 25M-byte fixed disk with 1.2M-byte diskette, lowboy benchtop cabinet, master console, universal line multiplexer (ULM), RDOS RTU, runtime Interactive COBOL or Business BASIC, and choice of commercial language; CS 200B maximum includes basic system 1024K-byte memory, 1452M-byte storage, 1 tape drive, 2 parallel interface printers up to 600 lpm, 32 asynchronous plus synchronous communications lines, 25 (RDOS), 13 (AOS) concurrent users • S/130 basic system includes 2-slot CPU with separate memory boards, 32K-byte core or 64K-byte ERCC MOS, MAP/battery backup standard on all over 64K-byte MOS models; S/130 maximum includes basic system with MAP board, 256K-byte core memory, or 1024K-byte ERCC MOS memory, battery backup, optional character, and floating-point

instructions, optional 12-slot I/O chassis • AP/130 basic system includes 64K-byte memory, standard data channel, programmed I/O channel, floating-point instruction set, high-speed multiply/divide firmware, MAP, Writable Control Store (WCS), array processor, 8K-byte bipolar memory, separate control microprocessor, 1,024-entry PROM sin/cosin table, array processing instruction set and cabinet; maximum includes basic system with 2048K-byte memory • S/140 basic system includes CPU, 128K-byte 2-way interleaved memory, MAP, standard data channel, programmed I/O channel, real-time clock, battery backup, programmer console, asynchronous controller, standard instruction set, 16-slot chassis; maximum includes basic system with 2048K-byte 4-way interleaved memory • C/150 basic system includes S/130 CPU with commercial instruction set, standard data channel and I/O bus, MAP, asynchronous serial I/O controller, real-time clock, 256K-byte memory, battery backup, 12-slot memory chassis, 12-slot I/O chassis, 1-bay cabinet; maximum includes basic system with 2048K-byte memory • S/250 basic system inlcudes 128K-byte memory, MAP, standard data channel, programmed I/O channel, real-time clock, interval timer, programmer console, asynchronous interface, floating-point instruction set, standard instruction set, cabinet; maximum includes basic system with 2M-byte memory, high-speed floating-point processor, integral array processor, character instruction set, writable control store, 2 types of Satellite processors, I/O bus repeater, BMC (Burst Multiplexer Channel), I/O expansion modules, additional cabinets • S/180 basic system includes single-board microprogrammed CPU, 512K-byte memory with 36K-byte microstore, S-Series instruction set, firmware and character instruction set extensions, 4K-byte system cache, pipeline architecture, memory management and protection unit (MMPU), NOVA/ECLIPSE I/O bus, 10 I/O slots, auto-program load and power fail/auto-restart, real-time clock, programmable interval timer (PIT); maximum includes basic system with 2M-byte memory, high performance hardware floating-point unit (FPU), BMC, full battery backup • C/350 basic system includes CPU, 128K-byte memory, MAP, Commercial Instruction Set, Extended Arithmetic Unit, asynchronous console interface, real-time clock, interval timer, character instruction set, cabinet; maximum includes basic system with 2M-byte memory, BMC, I/O Bus Repeater, battery backup, expansion I/O system modules, and additional cabinets.

First Announced • AP/130, C/350 in 1978; C/150 in 1979; S/140 in 1980; S/20 and S/120 in 1982.

Pricing • purchase price for basic units as outlined above are: S/20—$6,900; S/30—$10,300; CS Series 100B—$9,450; S/120—$9,500; CS Series 200—$20,090; S/130—$15,700; AP/130—$38,440; S/140—$21,750; C/150—$30,220; S/250—$39,150; S/280—$30,000; C/350—$67,000.

☐ **Data General ECLIPSE MV/4000, MV/8000 II & MV/10000 Computer Systems**

Type of Device • compatible family of 32-bit general-purpose, high-performance information processing systems in multiprogramming/multiuser environment • used as a standalone system with multiple local/remote terminals or as distributed processors in communication network; upward compatible with 16-bit ECLIPSE line.

Distributed Functions • data entry/processing and word processing for general business, manufacturing, industrial, and scientific applications; concurrent timesharing, batch, and online interactive processing • database management support for network and hierarchical data structures.

Associated Systems & Networks • XODIAC networking architecture implemented using CCITT X.25 packet-switching protocol • supports IBM SNA appearing to IBM host as Physical Unit 2 • IBM 2780/3780, 3271/3277/3278 and HASP II terminal emulation • supports multiple local/remote terminals.

Communications • single-line controller, asynchronous/synchronous, half-/full-duplex at data rates up to 9600 bps, RS-232C/20-mA current-loop interface • 4/8/16-line asynchronous multiplexer, half-/full-duplex at data rates up to 9600 bps, RS-232C/20-mA current-loop interface • 1-/2-line synchronous multiplxer, half-/full-duplex, AT&T 201, 203, 208, 209 compatible

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● 8-line asynchronous modem interface, full-duplex at data rates up to 19.2K bps, AT&T 103, 200, or equivalent compatible; 1-/2-line synchronous interface, full-duplex RS-232C/V.24 interface, AT&T 201, 203, 208, 209, or equivalent compatible ● asynchronous 16-line terminal interface full-duplex at data rates up to 19.2K bps, used with locally connected devices or dedicated lines ● intelligent asynchronous controllers for 8/16 lines, consists of processor, 32K-byte memory, line control facilities, data rates up to 19.2K bps; up to 64 lines supported on MV/4000; up to 128 lines on MV/8000II; up to 192 lines on MV/1000 ● Data Control Unit (DCU) interfaces to any DG processor; performs character-oriented tasks associated with line multiplexers, supports asynchronous/synchronous terminal control; local memory up to 4K words ● multiprocessor communications adapter interconnects up to 32 DG computers (single adapter required for each computer) ● XODIAC network bus systems (NBS) includes 15-inch controller board.

Features ● 32-bit upward-compatible family includes MV/4000, MV/6000, MV/8000, and MV/10000; all models upward compatible with 16-bit ECLIPSE AP/S/C/M family ● 32-bit architecture implemented with 36.4M-byte-per-second internal system bandwidth ● up to 16M bytes of real memory with 4G bytes of logical address space: 1M to 8M bytes on MV/4000; 1M to 4M bytes on MV/6000; 1M to 12M bytes on MV/8000; 1M to 16M bytes on MV/10000 ● up to 4.8G bytes of disk storage on MV/4000; up to 7.2G bytes on MV/8000II; up to 18.1G bytes on MV/10000 ● Standard System Control Processor (SCP) on MV/8000II, MV/10000 performs self-diagnostics on internal system functions; system diskette used on MV/8000II and MV/10000 ● MV/4000 supports extensive self-diagnostic capabilities ● terminals supported: up to 64 on MV/4000; up to 128 on MV/8000II; up to 192 on MV/10000 ● printer support: up to 2 system printers on MV/4000; up to 4 on MV/8000II and MV/10000 ● I/O: the systems incorporate 3-level, independent I/O capability with overall bandwidth of 28.6M bytes per second for MV/10000, 18.2M bytes per second for MV/8000II, and 5M bytes per second for MV/4000; all systems except MV/4000 cache buffer memory and I/O; MV/4000 has BMC (5M bytes per second), medium-speed data channel (2.5M bytes per second), and I/O controller; MV/8000 has BMC (16.16M bytes per second), data channel (2.5M bytes per second), and I/O processor; the MV/10000 has BMC (16.16M bytes per second), data channel (2.5M bytes per second), and 1 or 2 I/O controllers ● communications equipment and peripheral devices use controllers to attach to appropriate channel.

Software ● all systems run under AOS/VS, a multiprogramming, multiuser, demand paging, virtual memory management operating system; supports up to 64 users (MV/4000), 128 users (MV/8000II), 192 users (MV/10000); develops and executes interactive and batch-oriented operations simultaneously; program development and execution in both 16- and 32-bit modes; supports up to 255 concurrent processes; 32 tasks per process (a process is a collection of program tasks sharing up to 512M-byte address space); intertask and interprocessor ● Virtual Memory management supports up to 4G-byte logical address space; up to 2G-byte logical address per program; demand paging systems, 2K-byte pages; Address Translation Unit (ATU) accelerates, logical-to-physical address translations ● AOS/RT32 is subset of AOS/VS timesharing system; multitasking, multiprocessing for real-time processing and high throughput; supports up to 64 parallel processes, each with up to 32 tasks; supports FORTRAN 77, PL/1, and DG/L ● AOS operating system used with 16-bit ECLIPSE models can be used as transition operating system on 32-bit MV/8000 only ● AOS/VS/DG/DBMS database management system based on 1978/1980 Codasyl; supports network and hierarchical data structures; includes Data Definition Facility (DDF), an interactive screen-oriented utility that helps create and maintain the database design description; Data Manipulation Language (DML), the commands within the application program to read or write database records ● AOS/VS PRESENT interactive inquiry and report writing software; graphics-oriented decision-support software with inquiry writing ● AOS/VS INFOS II integrated file management system for creating and maintaining large data files ● AOS/VS INFOS II QUERY interactive and report writer for accessing INFOS II ISAM and DBAM files ● AOS/VS DATAREP key to disk/data entry

package ● AOS/VS Sort/Merge independent sort, merge, and copy programs, includes report writing ● AOS/VS MP/File Management routine library and file utility for ISAM ● communications software includes XODIAC Network Management based on CCITT X.25 packet-switching protocol certified by TELENET, DATAPAC, and TRANSPAC, connection via synchronous full-duplex lines; AOS/VS XODIAC functional layer of network performing user-oriented access functions consists of 3 modules: VTA (Virtual Terminal Agent), CLI (Command Line Interpreter), or RMA (Resource Management); AOS/VS X.25 provides CCITT X.25 protocols Level 1 (X.21 bis-physical), Level 2 (bit or byte HDLC using balanced or unbalanced link access procedure software), Level 3 (the X.25 packet) ● IBM SNA communications software: AOS/VS DG/SNA connects ECLIPSE system to IBM SNA network; appears to IBM host as a Physical Unit 2; AOS/VS DG/SDLC emulates IBM 3270 display system operation in IBM SNA environment ● Terminal Emulation: AOS/VS SNA/3270 provides IBM 3270 Information Display System emulation, executes interactive tasks and communicates with IBM SNA networks while supporting all IBM 3270 screen commands, supports 3278 terminals and 3286/3289 Data Stream Compatible printer; 3286/3289 3278 terminal emulator allows Dasher terminal to appear as IBM 3278 to the network; AOS HASP II under AOS/VS provides communications capabilities from DG to IBM 360/370 or to another DG computer emulating IBM HASP workstation, supports HASP, ASP, and JES command formats ● AOS/VS SNA/3278/APL allows Dasher D450/D460 to emulate IBM 3278 Model 2 with APL ● AOS/VS SNA/RJE provides IBM 3770 RJE workstation emulation ● AOS RJE 80 under AOS/VS emulator provides IBM 2780/3780 remote job entry; supports point-to-point and multipoint communications to and from IBM 370-compatible or another DG computer ● AOS RCX 70 under AOS/VS provides IBM 3271 and 3277 terminal emulation ● AOS Remote Database Agent (RDA) provides remote access to DG/DBMS database files using DG/DBMS DML commands as if attached to local database ● AOS Remote INFOS II Agent provides remote access to Data General INFOS II files.

Program Development ● native mode, 32-bit address space programming; provides AOS/VS PL/1, AOS/VS FORTRAN 77, AOS/VS BASIC, AOS/VS COBOL, AOS/VS RPG II (highly compatible with IBM System/3 and DOS/VS RPG II), and AOS/VS APL, a programming language that implements a superset of IBM's APL Language with features added to enhance compatibility with I.P. Sharp Associates (IPSA) and Scientific Time-Sharing Corporation (STSC) APL ● emulation mode, 16-bit address space programming; languages under AOS/VS include AOS COBOL, AOS DG/L, AOS Extended BASIC, AOS FORTRAN 5, AOS MPL, AOS PL/1, and AOS RPG II ● application development aids include AOS/VS DATAPREP, an interactive data entry facility, AOS Az-Text Word Processing System, AOS IDEA, and AOS Transaction Processing Management Software (TPMS) ● Program Development aids include PROXI program Generator, a menu-driven and prompt-driven interactive COBOL code generator ● SWAT Source Language Debugger provides source code level debugging facilities for AOS/VS FORTRAN 77, COBOL, and PL/1 programs.

Ease of Use Features ● HELP facility on AOS operating system supports CLI command information; basic user/system interface; DG/DBMS IQ supports access to DG/DBMS databases; uses English keyword and phrases and includes HELP facility ● PROXI program generator is menu-prompt driven.

Configuration Flexibility ● MV/4000 Systems includes 2-board CPU with 1M to 2M bytes of 4-way interleaved memory (expansion to 8M bytes maximum), system control unit (SCU), system processor unit (SPU), real-time clock, power fail/auto-restart, programmable interval timer, 2-bay system/peripheral cabinet, and either AOS/VS or AOS/RT32 operating system ● MV/4000 is housed in a 10.5-inch CPU chassis with 16 slots; the CPU takes 2 slots, memory up to 4 reserved slots, hardware floating-point 1 reserved slot, and 9 slots for I/O ● some packages also include software entitlements that are credits used to simplify the ordering/configuration process; as an example, 12 software entitlements entitles the use of AOS/VS COBOL, AOS/VS INFOS II, and AOS/VS Sort/Merge; or AOS/VS FORTRAN 77, and AOS/VS "C" Compiler ● MV/8000II Systems include CPU with 1M to 4M

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bytes of 4-way interleaved memory (expansion to 12M bytes maximum), system control processor (SCP), I/O processor, real-time clock, power fail/auto-restart, programmable interval timer, 30-inch/1 meter high CPU bay, and dual 19-inch peripheral bays ● either AOS/VS or AOS/RT32 operating system ● MV/8000II is housed in a CPU chassis with 18 slots in addition to CPU boards; memory takes up to 4 reserved slots, hardware floating-point 1 reserved slot, and 13 slots for I/O ● some packages also include software entitlements; see MV/4000 systems ● MV/10000 Systems include CPU with 1M to 2M bytes of 4-way interleaved memory (expansion to 16M bytes maximum), 16K-byte cache memory, system control processor (SCP), 4G bytes of logical address space ● a 30-inch-wide processor bay is required to hold the 56-slot main chassis and backplanes ● up to 8 slots are reserved for memory ● other slots are required: 1 or 2 for I/O controllers, 2-board floating-point unit, 8- to 16-line intelligent controller ● other features include real-time clock, power fail/auto-restart, programmable interval timer ● packages include 19-inch peripheral bay and AOS/VS or AOS/RT32 operating system ● some packages include software entitlements; see MV/4000 systems.

First Announced ● 1983.

Pricing ● purchase price is $45,270 for an MV/4000 System package including 2-board CPU with 1M-byte main memory, 15M-byte Winchester-type disk with integrated tape cartridge backup subsystem, IAC/8 (Intelligent Asynchronous Controller) for 8-line support, DASHER D400 system console, cabinet, and AOS/RT32 operating software; monthly maintenance is $326 ● purchase price is $87,100 for MV/8000II including CPU with 2M-byte main memory, system control processor, I/O processor, real-time clock, power fail/auto-restart, programmable interval timer, 30-inch-high CPU bay, dual 19-inch peripheral bays, AOS/VS operating system, 18-slot chassis ● purchase price is $264,355 for MV/10000 with 4M-byte main memory, 1062M-byte fixed disk in subsystem consisting of 3 354M-byte disk drives, IAC/8, IAC/16, rackmounting terminal connection assembly (TCA) with 8-line terminal connection box, 16-line terminal connection box for expansion of TCA, Dasher TP2 KSR printer terminal, dual-bay meter-high cabinets, 60-inch-high rackmount peripheral cabinet, AOS/VS, and 21 software entitlements.

☐ **Data General NOVA & microNOVA Series: NOVA 4 & microNOVA MP/MBC/MPT Computer Systems**

Type of Device ● 16-bit single- or double-board minicomputer system; software-compatible with other Nova systems; operates in standalone or distributed processing environments.

Distributed Functions ● business/scientific data entry/processing applications; application software via OEM ● communication management functions ● supports concurrent foreground/background for real-time interactive and batch processing.

Associated Systems & Networks ● Multiprocessor Communications Adapter connects up to 15 Data General computers in multiprocessor ring configuration ● communicates with IBM S/370-compatible mainframe through terminal/workstation emulation: IBM 2780/3780 RJE terminal, IBM HASP workstation, and IBM 3270 terminal ● public packet-switched data networks through X.25 network management and X.21 interface.

Communications ● local/remote communication under RTOS or RDOS via Communications Access Manager software ● NOVA communications: Multiprocessor Communications Adapter connects up to 15 Data General computers in multiprocessor ring configuration; transfers through DMA channels; timeshared bus allows multiple conversations simultaneously; 200K-bps transmit rate with up to 15 computers (150 feet of cable in normal mode); 330K-bps transmit rate with up to 4 computers (40 feet of cable, fast mode); asynchronous communication through 1/4/8/16-line serial interface units or multiplexers; full/half-duplex, at data transfer rates up to 19.2K bps; synchronous communication through 1/2-line interfaces, full/half-duplex mode, at data rates up to 56K bps; Data Control Unit (DCU) accommodates up to 256 asynchronous and synchronous lines; full/half-duplex at data rates up to 56K bps; communication chassis accommodates up to 4 multiplexers; connects to Standard Data Channel or to DCU

● microNOVA communications: MBC/2 and MBC/3 Synchronous/Asynchronous Interface is standard; 4-line controller board supports 16 asynchronous or 4 synchronous lines; Programmable Synchronous Line Controller supports half/full-duplex operations, provides full modem control, EIA RS-232C/CCITT V.24 compatibility, and Bell 201/203/208/209 data set compatibility; Programmable Asynchronous Line Multiplexer supports full/half-duplex operations at data rates up to 19.2K bps ● Universal Line Multiplexers (ULMs) support 4 asynchronous lines or 1 synchronous line half-/full-duplex at data rates up to 9600 bps RS-232C/CCITT V.24, 20-mA current-loop compatible.

Features ● NOVA and microNOVA systems consist of 16-bit processors with multiple addressing modes, multiple accumulators, hardware stack and frame pointers, programmed priority interrupt to 16 levels, separate memory and input/output busses, and Direct Memory Access channel ● NOVA computers implemented on 15-inch square boards with chassis housing CPU, memory, and I/O controllers; microNOVA computers implemented on 7x9-inch boards, with chassis housing CPU, memory, and a select few in-chassis device controllers; both product lines feature modular power supplies; optional battery backup, memory self-test, autonomous memory refresh, and virtual consoles ● NOVA 4 models are available in either 5-slot or 16-slot chassis and can address 61 device controllers; models are designated as 4/C with 32K to 64K-byte non-mapped MOS memory; 4/S with 32K to 64K-byte MOS memory; and 4/X with 64K to 256K-byte MOS memory; NOVA 4/C is single-board computer; 4/S and 4/X are 2-board computers; horizontal microcoded instruction set offers byte manipulation instructions as well as hardware/divide ● microNOVA based on MP/100, MP/200, and MPT/100 microcomputers; single-board MP/100 and double-board MP/200 available with 8-slot chassis; MPT/100 packaged with keyboard/display and dual 358K-byte diskette drives; memory up to 32K MOS on 4/C; 32K to 64K MOS on 4/S; 64K to 256K MOS on 4/X; 32K- to 128K-byte RAM/PROM on MP/100, 16K to 64K MOS on MP/200, 64K-byte RAM on MPT/100 ● NOVA systems support up to 760M bytes of disk per subsystem (maximum 2 subsystems); up to 200M bytes of disk on microNOVA ● both product lines support up to 16 terminals, 30-cps to 180-cps terminal printers, and 240- to 900-lpm system printers ● I/O Bus on NOVA: 16-bit-word DMA channel supports 1M-word-per-second input (NOVA 4/S to 4/X), 0.7M-word-per-second input (4/C), and 0.71M-word-per-second output (4/S and 4/X), 0.6M-word-per-second output (4/C); up to 10 peripheral controllers standard I/O Bus Repeater supports 10 additional I/O controllers ● I/O Bus on microNOVA: 16-bit-word I/O channel similar to NOVA I/O bus, uses same I/O commands; 296K-byte-per-second input (MP/100 and MPT/100 models), 300K-byte-per-second input (MP/200); 344K-byte-per-second output (MP/100, MPT/100), 300K-byte-per-second output (MP/200) ● microNOVA High-Speed Bus is the memory bus with I/O rates up to 3.7M bytes per second (MP/200) or 2M bytes per second (MP/100 and MPT); for OEM; no DG software support.

Software ● runs under RDOS mapped/unmapped, RTOS mapped/unmapped, DOS and MP/OS operating systems ● Real-Time Disk Operating System (RDOS) supports foreground/background environment for real-time and batch processes; manages 64K to 2M-byte memory (256K maximums on Nova 4); supports 256-level priority interrupt structure for real-time events; multitasking permits multiple execution paths to perform functions asynchronously; includes Command Line Interpreter (CLI) basic user/system interface; supports CAM I, which provides basic communication management of any ALM, SLM, ULM, DCU interface; supports IBM emulators, and SAM (Sensor Access Manager); supports program development in COBOL, FORTRAN IV and V, Extended and Business BASIC, DG/L, ALGOL, and macro assembler ● RTOS (Real-Time Operating System) is memory-resident, general-purpose multitasking, runtime-only operating system; supports up to 512K-byte memory; supports CAM I, SAM, IBM terminal emulators, FORTRAN IV or V, DG/L (Data General System Programming Language), and assembly language ● Disk Operating System (DOS) is multiuser, multitasking diskette-based executive; supports 64K-byte memory; supports CAM I, emulators, FORTRAN IV, Extended and Business BASIC, and macro assembler; includes CLI; programs developed

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under DOS can execute under RTOS and RDOS operating systems; also available with magnetic tape support • MP/OS is single-user, multitasking, real-time executive; supports MP/Pascal; MP/FORTRAN IV, MP/COBOL, Business BASIC, and MP/OS CLI; supports cross program development on AOS ECLIPSE, NOVA 4, and microNOVA systems running under MP/OS; supports new File Management package, which consists of ISAM and sort/merge utility • communications software includes CAM I Communications Access Manager, RDOS X.25 Network Management System, HASP II, RJE 80, and MP/3270 • CAM I supports local/remote asynchronous connections and synchronous lines with or without modems using IBM BSC protocol • RDOS X.25 Network Management System implements CCITT X.25 protocol; supports multiple switched or permanent virtual circuits between a NOVA-based process and an X.25-based process; connections using X.21/BSC/RS-232C interface, Multiprocessor Communications Adapter (MCA), or public packet-switched network • RJE 80 emulates IBM 2780/3780 terminals for communication with an IBM S/370-compatible host or another Data General computer; supports point-to-point and multipoint configurations • IC/RJE 80 provides same capabilities for NOVA computers running Interactive COBOL as RJE 80 does for NOVAs running RDOS, DOS, or RTOS • HASP II workstation emulator supports communication from microNOVA/NOVA to IBM S/370; supports HASP, ASP, and JES command format • MP/RJE 80 allows NOVA 4 computer to emulate IBM 2780/3780 remote job entry workstations in 3 types of communications networks: point-to-point configuration hosted by DG computer running host RJE software; point-to-point configurations hosted by any other computer emulating IBM 2780/3780 protocol; networks featuring multidrop slave stations on dedicated lines linked to any master RJE 80 emulator • MP/3270 allows NOVA 4 to communicate with IBM S/370 or 30 series computer using BSC protocol; emulates IBM 3271 control unit and 3277 display station using IBM BSC protocol; data rates up to 4800 bps; dedicated multidrop, RS-232C interface.

Program Development • DOS/RDOS Business BASIC, DOS Extended BASIC, DOS/MP FORTRAN IV, DOS/RDOS FORTRAN IV HFP, RDOS FORTRAN V, MP/Pascal, Interactive COBOL, RDOS Algol • application development aids: RDOS CSP, RDOS MBC/M, RDOS Dataplot, RDOS Discrete Fourier Transform, DOS Business Basic Dictionary and Report Writer, SAM, and RDOS Sort/Merge.

Ease of Use Features • DOS Business BASIC interpreter language has a Screen Maintenance (SM) utility to design, layout, and modify screens.

Configuration Flexibility • NOVA 4/C basic system includes CPU with microprogrammed Commercial Instruction set, 32K-byte MOS memory, standard data channel, programmed I/O channel, asynchronous interface, power fail/auto-restart, automatic program load, virtual console, and 5-slot chassis; maximum includes basic system with 64K-byte MOS memory, 16-slot chassis, real-time clock, 25M-byte nonremovable disk, and streaming tape • NOVA 4/S basic system includes dual-board 4/S CPU with microprogrammed Commercial Instruction Set, 32K-byte 4-way interleaved MOS memory, standard data channel, programmed I/O channel, asynchronous interface, power fail/auto-restart, automatic program load, real-time clock, virtual console, 5-slot chassis; maximum includes basic system with 64K-byte memory, battery backup, hardware multiply/divide, hardware floating-point unit, and 16-slot chassis • NOVA 4/X basic system includes dual-board CPU with microprogrammed Commercial Instruction Set, 128K-byte 4-way interleaved MOS memory, standard data channel, programmed I/O channel, asynchronous interface, power fail/auto-restart, auto-program load, real-time clock, virtual console, 5-slot chassis; maximum includes basic system with 256K-byte memory, in 32K/64K, 128K-byte increments, battery backup, hardware multiply/divide, hardware floating-point unit, and 16-slot chassis • microNOVA MP/100 basic system includes single-board CPU with microprogrammed instruction set, 8K-byte MOS memory, control panel with automatic program load, 8-slot chassis, asynchronous interface; maximum includes basic system with 32K-byte MOS memory, and sockets for up to 32K-byte EPROM memory • microNOVA MP/200 basic system includes dual-board CPU with microprogrammed instruction set including

multiply/divide, 16K-byte MOS memory, power fail/auto-restart, real-time clock, control panel with automatic program load, asynchronous interface, 8-slot chassis; maximum includes basic system with 64K-byte MOS memory, 25M-byte nonremovable disk, streaming tape, standard data channel, console debug with automatic program load, and magnetic storage in cabinet • microNOVA MPT/100 includes microNOVA computer with 64K-byte RAM memory, 2 358K-byte integral diskettes, 2 serial asynchronous/synchronous I/O ports, microNOVA I/O bus, integral CRT display, keyboard, MP/OS operating system with MP/FORTRAN, MP/BASIC, MP/Pascal, macro assembler; maximum includes basic system plus 4K-byte memory dedicated to screen refresh, and microNOVA MP model external I/O • CS/5 basic system includes CPU, 64K-byte memory, integral display/keyboard, 2 358K-byte 5.25-inch diskette drives; maximum includes basic system, and 30M-byte disk storage (2 drives), tape unit, 150-cps printer, and communications interface.

First Announced • 1979 for NOVA 4 and microNOVA; 1982 for CS/5.

Pricing • purchase prices for basic systems as outlined above are $3,745 for NOVA 4/C; $6,835 for NOVA 4/S; $12,080 for NOVA 4/X; $3,500 for NOVA MP/100; $5,200 for NOVA MP/200; $5,350 for NOVA MPT/100; $5,850 for CS/5.

■ DATAPOINT CORPORATION

9725 Datapoint Drive, San Antonio, TX 78284 • 512-699-7000.

☐ **Datapoint ARC Systems: 1560, 6600, 8600 & 8800 Series**

Type of Device • operate primarily as a file or applications processor member in distributed processing systems on ARCNET; some models can also function in standalone processing environments with remote communication to mainframe systems and other ARC systems.

Distributed Functions • distributed data processing; office automation; concurrent interactive and batch application processing; telecommunication applications; transaction processing management • supports expanded file management and shared-resources network environments • IEOS (Integrated Electronic Office System) includes electronic message system and word processing.

Associated Systems & Networks • RMS, DOS ARC, and CP/M support ARCNET, can co-reside on 1 network • ARCGATE provides interface between ARC systems and IBM mainframes; supports SDLC, emulates IBM 3274 controller, IBM 3276 RJE, IBM 3271 BSC, multipoint configurations, half-/full-duplex at data rates up to 9600 bps • MULTILINK supports Burroughs NEWLINE RJE and poll/select protocols; also supports CDC, Sperry, and X.25 protocols • REMDOS supports centralized service and maintenance to remote systems.

Communications • 1560 communications includes 2 channels; first channel supports asynchronous/synchronous, half-/full-duplex at data rates up to 9600 bps asynchronous, external clock can be used for synchronous transmission, typically used for host system; second channel typically used for basic local printer support under processor control, or can be used as second communications channel • 6600-based systems supplies hardware/software channel adapter products: Direct Channel Interface Option (DCIO) linking IBM mainframe to ARC system; Multilink Channel Interface (MLCI) allows Datashare (application processor) in an ARC system to interface with IBM mainframe in either interactive or medium-speed batched mode; Datapoint Attached Support Processor (DASP) provides remote batch to IBM mainframe without teleprocessing facilities, Channel Input/Output Unit Record Utility (CHIOUR) emulates up to 16 IBM unit record devices; asynchronous/synchronous communications facilities provided for 6600-based systems • 8600 communications includes Multiport Asynchronous Communications Interface, provides 8 ports to connect devices directly or via modems and telephone lines from remote locations, full-duplex at data rates up to 300 bps with AT&T 202-type modem or up to 9600 bps with RS-232C modem or device, provides auto-dial/-answer, 3 maximum; 2 Multifunction Communications Adapters: 1 transfers large amounts of data at high speeds up to 408K bps,

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operates in full-duplex modem compatible with SDLC protocol, half-duplex compatible with BSC protocol or in program-controlled half-duplex for general synchronous operations, provides comprehensive error checking including VRC, LRCC, polynomnal cycle redundancy character generation/checking, compatible with RS-232C/CCITT V.24 synchronous modems; second is single-line communications controller, full-duplex at data rates up to 56K bps with separate reverse channel using BSC, SDLC, HDLC, ADCCP, or GENSYNCH protocols, asynchronous operations also, RS-366/RS-366A auto-call compatible, operates under RMS only, RS-232C/RS-422, 423 compatible; Multiport Communications Adapter (MPCA) supports up to 4 local/remote interactive terminals under DOS or RMS, full-duplex at data rates up to 19.2K bps using RS-232C modem/terminal, 3 maximum ● 8800 communications includes Multiport Communications Adapter (MPCA) to support up to 8 local/remote interactive terminals, full-duplex up to 9600 bps using RS-232C modem/terminal or up to 300 bps using AT&T 202-type modem, auto-dial/-answer, 3 maximum; Multifunction Communications Adapter (MFCA) same as 8600; Peripheral Processor provides scheduling and control functions for MPCA and MFCA ● single line asynchronous communications adapter, 110 to 2400 bps, connects to AT&T 103 or 202-compatible modem and I/O bus ● synchronous communications adapter, single line, 110 to 2400 bps, connects to modem and I/O bus ● Datashare answer-only or originate-mode modem, 1200/150 bps ● Local Area Network connection through a RIM (Resource Interface Module) is standard on 1561, 6600, and 8600, and up to 6 are optional on 8830, 1 RIM card is included in 8840 system ● LightLink allows full-duplex transmission between 2 LightLink units located up to 1 mile apart at the same rate as the ARCNET cable, 2.5M bps.

Features ● systems function on ARCNET as Application or File Processors with attached terminals/workstations; some processors can also operate in standalone mode; 1550 can interface to ARCNET only through an ARC processor; 6600 Series operate as Applications Processors; 8600, 8800 can function as either Application or File Processor; the 1560 can also operate as Application/File Processor interconnecting to other 1560s on ARCNET or it can function in standalone environment ● 1560 is Z80A-based microcomputer running under DOS.H and version of industry standard CP/M; supports 64K-/128K-byte RAM; includes CRT, multipurpose keyboard, communications interface, and up to 40M bytes of disk storage; can support 3 additional terminals and a printer through RS-232C interfaces; 1561 model includes RIM Interface Card; optional SDLC operations ● the 8-bit 8600 contains 6600 user mode instructions; generalized use running under DOS or RMS; standard RIM chip and can use 10M-byte cartridge disks or 20M-byte non-removable disks ● 8800 is 16-bit system; requires RMS operating system; supports up to 1M bytes of memory and 1G bytes of disk storage.

Software ● operating systems: 3 versions of DOS currently offered, although 7 versions are supported, DOS.D runs on all ARCNET processors except 8800 ● DOS.D, disk operating system is essentially identical to DOS.G except is supported on ARCNET system; supports Partition Supervisor; supports up to 160M bytes of 20M-byte cartridge or 180M bytes of 60M-byte disk pack on 6600 systems; up to 40M bytes of 10M-byte cartridge or 100M bytes of 20M-byte nonremovable disk on 8600 standalone systems or 8600 systems without disk as ARC Applications Processor ● DOS.E requires 6600 processor with 48K-byte memory, up to 4 cartridge disks with controller; does not support ARCNET ● DOS.H, entry-level system, upward-compatible with DOS on larger Datapoint systems ● RMS operating system runs on all models except 1560; multiuser, multitasking system supports standalone or ARC network configurations; up to 24 local/remote interactive terminals per RMS standalone or ARC Applications Processor; up to 255 processors, over 6,000 interactive terminals per ARC network, multiple ntworks can be interconnected with full resource sharing; dynamic resource management supports user/task sharing, including processors, memory, communications devices, disk storage, peripherals; program processing, concurrent interactive and batch application processing ● Data Handling, sequential, indexed-sequential, random file access methods supported by RMS through COBOL and DATABUS; emulates IBM 2780/3780, HASP, DATAPOLL ● Database Management, DOS File Management provides general file

management via a library of utility programs; RMS Disk File Structure, are logically divided into files, up to 10,000 files per disk; Associative Index Generator (AIMDEX) produces index required for Associative Index Method (AIM) access to disk data files, runs under DOS ● no transaction management packages supplied ● Office Automation: IEOS (Integrated Electronic Office System) includes electronic message system and word processing; EMS (Electronic Message System) network controller connects to Teletype, TWX, and Telex networks; Infoswitch communication management system operates as standalone system or applications processor on ARC ● communications: includes 4 broad classes of Datapoint products: ARCGATE, ARCLINK, DATAPOLL, and MULTILINK ● ARCGATE products allow ARCNET processors to communicate with a mainframe computer through terminal emulation or channel attachment ● ARCLINK provides facility for processors on ARCNET to communicate with remote File Processor on another ARCNET ● DATAPOLL allows Datapoint processors to communicate with each other in master/slave mode for file collection and distribution ● MULTILINK is enhancement to the DATABUS language and interpreter to provide facilities for concurrent communication with program execution; the MULTILINK modules are basically line drivers implementing various protocols for DATABUS language extensions.

Program Development ● higher-level languages available for program development include SNAP/3 macro assembler, BASIC PLUS interpreter, DATABUS compiler, MULTILINK extension to DATABUS, DATAFORM, MULTIFORM, extension to DATAFORM, FORTRAN, RPG II, and SCRIBE (text processing) under DOS only ● languages available under DOS and RMS include DATABUS (interpreter), DATASHARE extension to DATABUS to allow multiple users to access interpreter, COBOL, RPG PLUS, and CHAIN (command and job control).

Ease of Use Features ● DOS.G takes near-English requests from operator ● DATABUS provides extensive human interaction via simple English commands; comments can be inserted into programs at any point to increase readability ● DATAFORM includes high-level language for writing short field validation programs for applications requiring complex verification of data; includes English sentence instructions.

Configuration Flexibility ● 1560 basic system includes self-contained 1920-character CRT, typewriter-style keyboard, communications and printer interface; Z80A microprocessor includes 12K-byte system ROM, 64K-byte RAM, 2 serial channels; RAM expandable to 128K bytes, optional removable keyboard, optional Multifunction Communication Interface (MFC) providing RS-232C-compatible serial channel ● 6600 Series includes 4000, 6000, 6600 models, based on 6600 8-bit processor, memory features parity checking, 6600 includes small integral CRT, keyboard, 2 "Phillips" cassette tape drives (unless 6000 ARCNET), 128K-byte memory, 134M-byte dual disk pack subsystem, MCA, without RIM ● 8600 basic system includes ergonomic CRT, keyboard, 128K-byte memory, integral RIM chip, keyboard/display subsystem board with serial I/O channel for system printer; maximum system includes basic system with 256K bytes ECC memory, 2 10M-byte removable cartridge disk drives ● 8800 basic system includes CPU, 256K-byte memory, cabinet, 8811 Peripheral Processor, 8200 Datastation system console, and 20 card slots.

First Announced ● 1560 in 1980; 6600 in 1976; 8600 and 8800 in 1981

Pricing ● purchase price is $3,995 for 1561 including 128K-byte memory with ARCNET Interface Card, integrated communications adapter (ICA), removable keyboard; $10,150 for 1566 including 64K-byte memory, single-spindle 1M-byte diskette drive, 10M-byte Winchester disk drive, ICA, and removable keyboard ● $53,300 for 4650, based on 6600 with 128K-byte memory, 134M-byte dual disk pack subsystem, MCA, without RIM; $55,100 for 4750 based on 6600 with 256K-byte memory, 134M-byte dual disk pack subsystem, MCA, and without RIM ● $14,950 for 8627 based on 8605 processor with 1M-byte diskette drive, 10M-byte fixed disk; $24,950 for 8645 based on 8605 processor with 2 10M-byte removable disk drives ● $28,100 for 8830 Applications Processor System with RIM module, MCPA module and uses 9 card slots; $66,950 for 8860 Standalone

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System with 2 Peripheral Processors, MCPA module, 67M-byte disk-pack disk, 202M-byte dual disk drive, 135M-byte nonremovable disk, and 13 card slots.

■ DIGITAL EQUIPMENT CORPORATION

146 Main Street, Maynard, MA 01754 ● 617-897-5111.

☐ **Digital Equipment VAX-11 Series: VAX-11/725/730/ 750/780/782/785 & MicroVAX I Computer Systems**

Type of Device ● 32-bit general-purpose, superminicomputers utilized as transaction, distributed, or host processing system in Digital's DNA network.

Distributed Functions ● general data processing, timesharing, and real-time applications for engineering, medical, laboratory, government, education, manufacturing, and telephone environments ● multiuser, multiprogramming, concurrent batch and real-time processing ● supports building networks through DECnet-VAX for task-to-task communication, network file transfer, remote file access, remote computer access from local terminal, network resource sharing using Digital Network Architecture protocols ● supports remote access to database management systems located on DNA network ● automated office, word processing.

Associated Systems & Network ● DECnet-VAX under VAX/ VMS supports multiple DECnet VAX systems; Phase 4 supports connection to Ethernet-based local area networks and up to 1,023 nodes ● DECnet/SNA gateway between DECnet and SNA networks ● DNA offers integrated set of networking capabilities; DECnet uses DDCMP and X.25 protocols ● IBM 2780/3780/ 3171 and CDC MUX200 terminal emulation.

Communications ● Intelligent Front-End Processor allows 730, 750, 780, and 785 users to do custom communications applications requiring unique protocols as well as networking, 56K-byte user programmable memory for implementing custom functions, implements PDP-11 instruction set, supports 2 64K-bps or 1 130K-bps lines, full-duplex, RS-232C/RS-422/RS-423/ RS-449 interfaces, secondary microprocessor provides HDLC/ BSC framing capabilities ● Intelligent Multipurpose Communication Controller enables combination of modems/terminals to communicate with VAX; provides 8-line asynchronous interface, full-duplex at data rates up to 19.2K bps, 2 lines have full modem control and capability of split speeds, 6 for local terminals only, supports SILO/DMA: single-line synchronous interface for connection to network at data rates up to 19.2K-bps double-buffered DMA, modem control, bit-/byte-oriented protocol support; parallel interface supports line printer in DMA mode or user-developed in word-by-word, 64-word SILO DMA mode; supported by VAX/VMS, DECnet/VAX, VAX-11 PSI, VAX-11 2780/3780/3271 ● synchronous interface, 8-line front-end for VAX-11/780, ADCCP, HDLC, IBM 3271 BSC protocols, RS-232C; V.24, MIL-188-144 unbalanced interfaces ● asynchronous multiplexer controls up to 16 half-/full-duplex lines, programmable data rates up to 9600 bps with local terminals, up to 300 bps using AT&T 103, 113 modems or up to 1200 bps using AT&T 212 modems ● MicroVAX I 4-line multiplexer offers programmable line speeds up to 9600 bps, modem control, enough data set control to permit dial-up with full-duplex modems (DEC DF01, DF02, DF03, AT&T 103, 113, 212, or equivalent) ● MicroVAX I 4-line interface offers jumper-selectable line speeds 150 to 38.4K bps, RS-232C/RS-422/RS-423 interfaces, modem compatible with DEC DF01/02/03 and AT&T 103 113; half/full-duplex Ethernet Communications Controller provides DECnet and non-DECnet software support, 10M-bps throughput ● DECnet point-to-point interface uses microprocessor-based DDCMP protocol to provide connection to another interface ● Single-Line Interface programmable to handle 8-bit character-oriented protocols including DDCMP, BSC, and bit-oriented protocols such as SDLC HDLC ● DECnet Multipoint Interface microprocessor-based DDCMP provides point-to-point or multipoint network links using DDCMP protocol ● Auxiliary Communications Microprocessor multiplexes 2 lines at 9600 bps using DEC PSI, 4 lines at 50K bps, 8 lines at 19.2K bps using X.25 link-level software ● Network Link microprocessor-based, programmable, synchronous communications controller provides for the interconnection of VAX-11 and PDP-11 systems ● DEUNA Ethernet communications controller allows system connection to LAN and direct connection

with up to 1,023 other computer systems, transmits and receives at 10M bps ● DECSA, DECnet router hardware includes DEUNA and PDP-11/24 with 512K bytes of ECC memory, console/ bootstrap/terminator module, and protocol assist modules; supports up to 8 full-duplex synchronous RS-232C and V.35 lines ● DECmux Terminal Concentrator, statistical multiplexer for connection of 8 asynchronous terminals to UNIBUS-based system via synchronous full-duplex line ● asynchronous modem, 300 or 1200 bps, full-duplex, RS-232C, direct-connect modem, AT&T 103J, 212A, and DEC DF03 compatible, with or without 16-digit capacity automatic call unit ● synchronous/asynchronous modem, 300 or 1200 bps, full-duplex, RS-232C, direct-connect modem, up to 300-bps asynchronous, 1200-bps synchronous, AT&T 103J, 212A, DEC DF02 compatible, with or without 16-digit capable automatic call unit ● multipoint parallel interface, connects up to 16 processors in local network, full-duplex in block mode with DMA via 16-bit parallel bus.

Features ● 32-bit Series consists of the MicroVAX I, VAX-11/ 725, VAX-11/730, VAX-11/750, VAX-11/780, VAX-11/782, and VAX-11/785 models; 2 high-end VAX-11 processors—of the uniprocessor VAX-11/785 and the dual processor VAX-11/782, the VAX-11/782 is more powerful of the 2; it is an attached processor system using VAX-11/780 processors, VAX-11/785, a uniprocessor, uses a completely new VAX-11 CPU, which features improved throughput and internal performance; according to DEC, the VAX-11/785 provides from 50 to 70 percent more performance than the VAX-11/780 in timesharing/ real-time/compute-bound environments; the VAX-11/782 in comparison offers 60 to 80 percent more performance than the VAX-11/780, but is a dual processor; and VAX-11 systems, except the VAX-11/782, are uniprocessors; the VAX-11/785 offers users of VAX-11 uniprocessors an upgrade to a performance level in the range of the VAX-11/782; the UNIBUS and MASSBUS I/O adapters are different for the VAX-11/750 and VAX-11/780; the VAX-11/725 and VAX-11/730 do not accommodate MASSBUS adapters; the MicroVAX I employs the popular Q-bus. The VAX-11/780 accommodates the DR780 32-bit parallel interface. All processors are compatible with the DEC PDP-11 family through the compatibility mode except the MicroVAX I; ● memory capacity is 512K to 2.5M bytes on MicroVAX I; 1M to 3M bytes on VAX-11/725; 8M bytes maximum on VAX-11/782 using dual, shared memory subsystems; 36M bytes maximum on VAX-11/785 using 32M-byte main memory and 4M-byte multiport memory; 204 to 1200-lpm print speed options; 170 and 320-lpm printer/plotter print speeds.

Software ● VAX/VMS virtual memory, general-purpose operating system; supports multiuser, multiprogramming with concurrent multistream batch processing, real-time operation, and online program development; supports 96 concurrent online terminals; RSX/IAS-compatible file structure available for PDP-11 compatibility; provides dynamic virtual memory resource management, event-driven priority scheduling and user control over privilege and resource allocation; includes 2 command interpreters for native mode (DCL) or PDP-11 compatibility mode (MCR) commands ● VAX-11 DBMS (database management system); DATATRIEVE provides relational access to DBMS and VAX-11 RMS files; supports sequential, indexed, or relative data organization, variable-length records, and single inquiry access to multiple fields; VAX-11 common Data Dictionary provides common definitions for all files ● VAX-11 DSM consists of multiuser database management system with high-level langauge DEC MUMPS (DSM) language; interpreter supports up to 63 simultaneous users ● VAX-11 RMS (Record Management Services) facilities for data storage, retrieval, and modification; VAX-11TDMS (Terminal Data Management System) eases development of interactive, forms-intensive applications ● office automation: DECMAIL mail and filing system; DX/VMS word processing utility; All-In-1 Office Menu; DECspell Verifier/ Corrector ● communication software includes DECnet-VAX Version 3.1; operates as Ancillary Control Process (ACP) under VAX/VMS; supports network design for distributed data processing networks using asynchronous, synchronous, and parallel facilities; task-to-task communications; network file transfer; remote file access using RMS; remote computer access from local terminal; network resource sharing via DNA protocols; networks can include multiple DECnet-VAX systems as well as

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DECnet nodes consisting of other DEC equipment; requires VAX/VMS system with single communication line supported by synchronous interface; supports user programs written in VAX-11 MACRO or FORTRAN IV-PLUS ● MUX 200/VAX Multiterminal Emulator supports any VAX-11 interactive terminal for remote job entry or command level communication with host system; files transferred to/from any VAX-11, supports mass storage, unit record, or terminal device; host system off-loads programs such as file editing to local processing on VAX/VMS system; supports up to 16 simultaneous users on switched or dedicated 2- or 4-wire facility at up to 9600 bps; communicates with CDC 6000 Cyber Series or other host computer systems via 200 UT Mode 4A communication protocol; ASCII or BCD ● VAX-11 2780/3780 Protocol Emulator supports communication line shared by several users; VAX/VMS user can transfer files to/from another system equipped to handle IBM 2780 or 3780 communication protocols; supports maximum of 4 lines, each with different set of attributes at up to 9600 bps per line; emulates synchronous line protocol used by IBM 2780 or 3780 batch terminal ● VAX-11 3271 Protocol Emulator allows user programs to communicate interactively with user programs running on an IBM System/370-compatible systems; VAX-11 PSI (Packnet System Interface) Version 2.0, allows VAX-11 computers to connect to public packet-switched networks for computer-to-computer and terminal-to-computer communications including United Kingdom, France, Germany, and U.S.; layered product allows use of DECnet VAX facilities over X.25 circuits; supports LAPB variant of X.25 frame level protocol for X.25/V.24 interface; X.25 packet-level protocol over 4-wire synchronous full-duplex lines at 2400/4800/9600 bps, can be permanent or switched virtual circuits ● DECnet SNA Gateway links DECnet users to SNA network; architecturally part of SNA and DECnet networks; on DECnet side it is Phase III routing node and on SNA side it is Physical Unit Type 2 and uses IBM 8100 protocols as a model; each gateway is DECnet node and any number of gateways (up to maximum number of nodes supported) can reside on DECnet network; gateway supports up to 2 DECnet communication lines up to 56K bps and up to 2 SNA communication lines up to 9600 bps; supports local/remote connections, but at least 1 VAX-11 system must be adjacent to the gateway, other systems using gateway can be indirectly connected through any VAX-11 or Phase III routing node.

Program Development ● MACRO bundled with VAX/VMS operating system; DIBOL, APL, FORTRAN, C, BLISS-32, BLISS-16, BASIC, Pascal, CORAL-66, PL 1.

Ease of Use Features ● VAX/VMS operating system user interface via near-English user-extensible command structure with HELP commands for online access ● VAX-11 BASIC has integrated HELP facility and application-related utilities ● VAX-11 DATATRIEVE provides simple data manipulation commands to retrieve data.

Configuration Flexibility ● VAX-11/725 basic system includes CPU, 1M-byte ECC memory with 64K-bit chips, dual tape cartridge drives, 52M-byte fixed/removable Winchester disk drive, controller, 28.5-inch-high pedestal cabinet, power controller/supply, 2 dedicated slots for floating-point and additional 1M-byte memory on 4 hex slots for UNIBUS options, 7 panel slots, and operating license and warranty; maximum includes basic system except 1 hex slot, and 1 panel slot, plus communications controller and DEUNNA ● VAX-11/730 basic system includes CPU, 1M-byte ECC MOS memory with 64K-bit chips, integrated disk controller, communications controller with upgrade option, dual tape cartridge drives, LA100 console terminal, dual RL02 disk drives (system and backup), 4 slots for additional memory, dedicated slot for floating-point accelerator, quad slot for tape subsystem or LP11, system cabinet, operating system license and warranty; maximum includes basic system except R80 system drives replaces RL02, and LA12 replaces LA100; memory increased to 5M bytes, plus 4.3G-byte logical address space, 2G-byte user program space, single UNIBUS, 1.5M-bps throughput, 24 terminals ● maximum VAX-11/750 system includes CPU, 8M-byte memory, 4.3G-byte logical address space, 2G-byte user program space, dual UNIBUS, and tri MASSBUS adapters, (4 adapters total), 7.5M-bps throughput, practical maximum 32 terminals, actual maximum 160 ●

maximum VAX-11/780/782, includes 1 or 2 CPUs, 32M-byte memory, 64M bytes using dual shared memory subsystems, 4.3G-byte logical address space, 2G-byte user program space, quad UNIBUS and quad MASSBUS adapters with 13.4M-bps aggregate throughput, single 32-bit parallel interface, up to 96 terminals in use concurrently, actual maximum of 384 ● maximum VAX-11/785 system includes 32M-byte memory, 36M-byte memory when 4M-byte multiport add-on memory included, 4.3G-byte logical address space, quad UNIBUS and MASSBUS adapters, up to 96 terminals in use concurrently, actual maximum of 384 ● MicroVAX I includes CPU, 512K-byte MOS parity memory, VAXElan runtime license, 4 slots available for quad and dual modules; requires terminal; maximum includes basic system with 1M-byte MOS parity memory, plus 2 400K-byte diskette drives, 28M-byte Winchester fixed disk drive, controller for diskette and fixed-disk drives; 2 slots instead of 4 available for quad and dual modules.

First Announced ● 1978 for VAX-11/780; 1980 for VAX-11/750; 1982 for VAX-11/730 and VAX-11/782; 1983 for VAXcluster and VAX-11/725; 1984 for MicroVAX I and VAX-11/785.

Pricing ● purchase price for basic VAX-11/725 and VAX-11/730 as outlined above are $24,950 and $29,500, respectively ● purchase price is $50,000 for 750 System Building Block including CPU, 2M-byte ECC MOS memory, memory controller, backplane with dedicated slots for options, UNIBUS Backplane with 2 quad slots and 7 hex slots for expansion; requires selection of Winchester disk subsystem, removable disk subsystem, tape subsystem backup, intelligent multipurpose communications controller, asynchronous multiplexer, LA100 or LA12 terminal; cabinet contains 15 I/O connection panels; includes VAX/VMS license, does not include media or documentation for VAX/VMS ● purchase price is $145,000 for VAX-11/780 System Building Block including CPU, 2M-byte ECC MOS memory, memory controller, UNIBUS adapter with dedicated space for options, second UNIBUS expansion cabinet with mounting box, UNIBUS backplane, (second backplane may be added, each backplane provides 7 hex and 2 quad slots); requires selections of Winchester disk, removable disk subsystem, tape subsystem, intelligent multipurpose communications controller, asynchronous multiplexer, fixed media subsystem, LA120 terminal; UNIBUS expansion cabinet with 24 to 40 I/O connector panels depending on options mounted; includes VAX/VMS license; does not include media or VAX/VMS documentation ● purchase price is $320,00 for VAX-11/782 System Building Block include 2 CPU cabinets, Shared Memory Cabinet, UNIBUS expansion cabinet, primary CPU cabinet contains processor, standard components with space for standard options, local memory, shared memory interface, UNIBUS adapter, 2 optional panel spaces; second CPU cabinet contains processor, standard components with space for standard options, local memory, and shared memory interface; shared memory cabinet contains 4M-byte ECC MOS memory (10K-bit chips) with battery backup; UNIBUS expansion cabinet has expansion mounting box with UNIBUS backplane, second backplane may be added, each backplane provides 7 hex and 2 quad slots for expansion, UNIBUS expansion cabinet also has space for a second expansion mounting box or up to 2 rackmounted options; requires selection of Winchester disk subsystem, removable disk subsystem, fixed media subsystem; LA120 terminal; UNIBUS expansion cabinet has between 24 and 40 I/O connector panels available depending on options; includes VAX/VMS license, does not include media or VAX/VMS; documentation ● purchase price is $195,000 for VAX-11/785 System Building Block including CPU cabinet, UNIBUS expansion cabinet, UNIBUS adapter, 2M-byte memory, VMS operating system; UNIBUS expansion cabinet has expansion mounting box with UNIBUS backplane, second backplane may be added; each backplane provides 7 hex and 2 quad slots for UNIBUS expansion, UNIBUS expansion cabinet has space for second expansion mounting box or 2 rackmounted options; requires selection of Winchester disk subsystem, removable disk subsystem, fixed media subsystem, tape subsystem, intelligent multipurpose communications controller, asynchronous multiplexer, LA 120 terminal; UNIBUS expansion cabinet has between 24 and 40 I/O connector panels depending on options mounted

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• purchase price for MicroVAX I basic system as outlined above is $10,095; maximum system as outlined above is $17,085.

☐ **Digital Equipment PDP-11 Series: Micro PDP-11/23, Micro PDP-11/73/PDP-11/23 PLUS, PDP-11/24, PDP-11/44**

Type of Device • 16-bit minicomputer system used as workstation, data processing system, or cluster controller; intelligent terminal in single-user, real-time or multiuser/multiprogramming configurations in standalone environments and in DNA and IBM SNA networks • upward expansion to VAX-11 32-bit processing via PDP-11 compatibility mode.

Distributed Functions • interactive data entry, distributed data processing, timesharing, interactive program development, file handling control, and record management applications in commercial/business/scientific environments • office automation: DEC WORD/DP word processing.

Associated Systems & Networks • DECnet Phase II, III, IV under all operating systems except UNIX MicroPower/Pascal, Micro/RSTS, and DSM-11 • Internet products including IBM SNA under RSX-11M and MicroRSX; IBM 2780/3780 under RT-11, CTS-300, RSX-11M, RSX-11M-PLUS, Micro/RSX, RSTS/E; HASP under RSX-11M, RSX-11M-PLUS; IBM 3271 under RSX-11M, RSX-11M-PLUS, Micro/RSX, RSTS/E; Sperry UN1004 under RSX-11M; CDC MUX 200 under RSX-11M; Packnet interfaces to public packet-switching networks; remote network and Digital to non-Digital host communication under RSX-11 PSI.

Communications • local/remote communications handled through operating systems; asynchronous via 1-, 4-, 8-, and 16-line serial interface units or multiplexers; full-/half-duplex communication at data rates up to 9600 bps, 19.2K bps, and 38.4K bps; synchronous communication via 1-, 4-, and 8-line interfaces; full-/half-duplex communication at data rates up to 9600 bps, 10K bps, and 1M bps • local/remote networks supported via network link microprocessors for both asynchronous/synchronous communications at data rates up to 64K bps • bit-oriented SDLC, HDLC, and X.25 supported • Q-BUS asynchronous line interfaces: single-line interface offers program or jumper selectable line speeds split transmit/receive line speed from 50 to 19.2K bps, half-/full-duplex, RS-232C, compatible with AT&T 103, 113, 202C, 202D, 212, and DEC DF01, DF02, DF03; 8-line interface, full modem control, DMA or silo output, silo imput buffering, data rates 50 to 19.2K bps, split speed available, compatible with AT&T 103, 113, 203C, 202D, 212, and DEC DF01, DF02, DF03, DF104, DF112, DF126, DF127, DF129, or equivalents; 4-line interface, jumper-selectable, half-/full-duplex at data rates 150 to 38.4K bps, provides ability to configure each channel for RS-232C, RS-422, RS-423, compatible with AT&T 103, 113, or equivalent • UNIBUS single-line interfaces, character size, parity, stop half-/full-duplex at data rates up to 9600 bps; 8-, 16-line asynchronous multiplexer, half-/full-duplex at data rates up to 9600 bps • Q-BUS synchronous line interfaces: single-line provides handling under program control for byte-oriented protocols including DDCMP/BSC and bit-oriented protocols such as HDLC/ADCCP, half-/full-duplex at data rates up to 56K bps • Intelligent Microprocessor-Based (IMB) DECnet Interface, supports half-/full-duplex DMA data transfer in point-to-point or multipoint communications, up to 12 multipoint tributaries supported with maximum dependent on operating system and software implementation, handles all DDCMP protocol processing • DEQNAkpDECnet option, connects Q-BUS to DECnet Ethernet LAN • single-line communications interface provides link between Q-BUS-based processor and AT&T 201 or equivalent, half-/full-duplex synchronous at data rates up to 9600 bps • UNIBUS synchronous line interfaces: single-line interface half-/full-duplex at data rates up to 9600 bps, handles DDCMP/BSC, HDLC/SDLC, interfaces AT&T 200 Series modems; DECnet point-to-point interface, half-/full-duplex at data rates up to 1M bps RS-232C/RS-423/CCITT V.24/CCITT V.35 interfaces, compatible with AT&T 200 Series modems or equivalent; DECnet Multipoint Interface provides point-to-point or multipoint network links using DDCMP protocol, half-/full-duplex at data rates up to 1M bps, RS-232C/RS-423/CCITT V.24/CCITT V.35 interfaces, AT&T 200 Series/500A L1/5 compatible or equivalent • auxiliary communications microprocessor used as front-end processor to

UNIBUS-based systems, multiplexes up to 8 synchronous lines through DMA, half-/full-duplex, operates with DEC PSI or X.25 link-level packages, RS-232C interface, data rates software dependent, 2 lines at 9600 bps using DEC PSI, 4 lines at 50K bps or 8 lines at 19.2K bps using X.25 link level software • DEUNNA Ethernet communications controller allows system connection to LAN and direct connection with up to 1,023 other computer systems, transmits and receives at 10M bps • DESCA, DECnet router hardware, includes DEUNNA, PDP-11/24 with 512K bytes of ECC memory, console/bootstrap/terminator module, protocol assist modules; supports up to 8 full-duplex synchronous RS-232C and V.35 lines • DECmux Terminal Concentrator, statistical multiplexer for connection of 8 asynchronous terminals to UNIBUS-based system via synchronous full-duplex line • asynchronous modem, 300 or 1200 bps, full-duplex, RS-232C, direct-connect modem, AT&T 103J, 212A, and DEC DF03 compatible, with or without 16-digit capable automatic call unit • synchronous/asynchronous modem, 300 or 1200 bps, full-duplex, RS-232C, direct-connect modem, up to 300-bps asynchronous, 1200-bps synchronous, AT&T 103J, 212A, DEC DF02 compatible, with or without 16-digit capable automatic call unit • multipoint parallel interface, connects up to 16 processors in local network, full-duplex in block mode with DMA via 16-bit parallel bus.

Features • DEC PDP-11/23-11/73, and 11/23-PLUS computers based on LSI-11 16-bit microprocessors with LSI-11 Q-bus structure that supports system data transfers and communications via programmed I/O or DMA at data rates up to 1.6M bytes per second • DEC PDP-11/24 and 11/44 models based on PDP-11 16-bit processors with UNIBUS structure supporting data transfers and communications via programmed I/O or DMA at 2M bytes per second • all systems support floating-point operations via microcoded instruction set on PDP-11/23-PLUS or by floating-point processor modules with code on PDP-11/24 and 44 models; all models support commercial instruction processor module; interface capability partitioned among backplane slot/expansion box slot and/or expansion chassis slot space • memory: up to 4M bytes on all models; 8K-byte cache memory standard on PDP-11/44 • disk capacity: 52.4M bytes for PDP-11/23 and 11/73; 82.4M bytes for PDP-11/23-PLUS; 1.86M bytes for PDP-11/24 and PDP-11/44 • terminals: single terminal under RT-11 operating system; 12 for RT-11XM; 32 under RSX-11M; 50 under RSX-11M-PLUS; 127 under RSTS/E • printers up to 900 lpm • options: MASSBUS on PDP-11/44 supports I/O for high-speed peripherals using 32-bit data path at rates up to 5.8M bytes per second.

Software • RT-11 is single-user, disk-based, real-time OS supporting interactive program development in foreground under foreground/background executive; batch and low priority jobs executed in background; supports up 17 communication lines including console: RT-11XM version runs under CTS-300 OS • RSX-11M is multiuser, disk-based, multiprogramming, real-time operating system; supports up to 32 simultaneous users; includes FILES-11 volume structuring and protection, data management services, FCS file handling control services, and RMS-11 file organizer subset; also supports RMS-11K keyed access records management and DBMS database management options; supports program development in MACRO-11 provided in OS package as well as in BASIC-PLUS-2, COBOL-81, CORAL-66, FORTRAN IV, and DIBOL 83 and Pascal language options; supports FMS-11/RSX and DATATRIEVE-11 record management packages; supports standard system peripherals including printer/plotters, lab/control modules, and data acquisition peripherals; runs on PDP-11/23 with 48K-byte memory • RSX-11M-PLUS is multiuser, disk-based, multiprogramming, priority structured, event-driven RSX-11M operating system extension supporting up to 3840K-byte memory; designed to optimize performance of PDP-11/44; supports up to 50 simultaneous users current with executing batch jobs, interactive program development and jobs, and timesharing; incorporates all features of RSX-11M and includes RMS-11K file handling; supports DCL command language, multistream batch processing, job accounting, dual-port disks, and enhanced memory management • RSTS/E is multiuser, disk-based, multitasking operating system; supports interactive timesharing, batch processing, program development, and application processing; supports up to 63 jobs and up to 127 terminals

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simultaneously; program development in BASICPLUS and MACRO-11 provided with OS package, or optional COBOL-81, FORTRAN IV, FORTRAN 77, BASIC-PLUS-2, and DIBOL-83 languages; includes RMS record management and CCL (Concise Command Language); DCL command language supports Floating-Point and Commercial Instruction Set processors, up to 16 disk drives, up to 8 magnetic tape drives, up to 8 line printers, card reader and paper tape punch/reader; IBM 2780/3780/3271 emulators and DECnet communications; runs on PDP-11 with 128K-byte memory, memory management and extended instruction set, console terminal, and 10M-byte disk • Micro/RSX is reengineered extended subset of RSX-11M-PLUS for the Micro PDP-11/23 and Micro PDP-11/73; presysgened uses DCL command language; allows up to 10 active users in multitasking and multiuser environment; provides diskette interchange with DEC Professional 300s and data file compatibility with VAX/VMS; uses DEC standard file software including FILES-11, RMS, and ECS; supports RSX communication software including Ethernet, DECnet SNA gateway, IBM 2780/3780/3271 emulation; language support includes FORTRAN 77, BASIC-PLUS-2, COBOL-81, DIBOL-83, and Pascal high-level compilers; Datatrieve and DECtype also available; provided on 5.25-inch diskettes; minimum hardware includes Micro PDP-11/23 or Micro PDP-11/73 with 256K-byte memory which supports up to 2 users, RD51 and RX50 mass storage, and console terminal; maximum configuration supports up to 14 terminals • DSM-11, disk-based multiuser, timesharing operating system supports up to 63 simultaneous users; operates on any of up to 128 terminals; database handler employs in-memory cache with write-through to allow data sharing among all users; automatic power fail/start; transparent bad block management for mass storage; provides error reporting, system-patching utility, debugger facility; online database backup and media preparation; maximum memory of 1M bytes; 96K-byte memory required to build minimum system with up to 3 terminals; handles distributed data management using DMC11 or DMR 11 high-speed communication links; program development in ANSI Standard MUMPS or MACRO-11; runs on PDP-11/23 or Micro PDP-11/73, PDP-11/23-PLUS, PDP-11/24, and PDP-11/44 • MicroPower/Pascal, development package for microcomputer applications, includes subset of RT-11M or RSX-11M; runs on PDP-11 with host resident Pascal compiler and utilities; application programs developed and loaded into ROM, downline loaded over serial line or carried over to target system on floppy disk, includes library of executive services (only those needed), suited for real-time applications, includes MACRO-11 ASSEMBLER • ULTRIX-11, UNIX derivative, general-purpose, multiprogramming, multiprocessing interactive, timesharing operating system, based on AT&T's UNIX Version 7, provides all features of UNIX V7; supports program development in C and FORTRAN 77; incorporates Version 3.7 full-screen editor from Berkeley UNIX; provides modified version of Berkeley User Overlay Scheme; includes enhancements to UNIX Version 7 • database management includes: SORT-11, DATATRIEVE-11 and DMS-500 • DATATRIEVE-11, interactive query, report, data access/maintenance system supporting sequential, indexed or relative files, English-like commands provide value-based data access and update, data dictionary, HELP and report generation functions, utilizes RMS-11K records management software, Applications Design Tool (ADT) provides user assistance in establishing domain and definitions; runs under RSX-11M, RSX-11M-PLUS, and RSTS/E operating systems • DMS-500, extension of RSTS/E systems software includes file access methods and extended sort facility, access methods include IAM, ISAM/RAM, is accessible through BASIC-PLUS • communications/network software includes DECnet Phase I, Phase II, Phase III, and Phase IV; provides Task-to-Task, File Transfer, Remote Resource Access, Network Command Terminal, Virtual Terminal, Network Management, Adaptive Routing, Router Server, Multipoint Link facilities; DECnet RT-11, supports all DECnet functions except command batch file execution/submission (requester only) and downline system/task loading (no support) runs on RT-11 OS with 24K bytes available and appropriate communications peripherals; DECnet/E supports all DECnet functions except downline systems/task loading (no support), runs on DMC-11 driver, 9K for NSP protocol module, 6K for buffers, 40K for utilities; DECnet-11S supports program-to-program communications, local network command terminal capability, file transfer and command batch

file execution, runs on RSX-11S OS with 16K bytes available • DECnet/SNA gateway links DECnet users to SNA network; DECnet-11M-PLUS supports all DECnet functions except command batch execution; RSX DLX-11 provides DEC micro-computer users access to Phase III DECnet networks, operates under RSX-11 for interfacing with DECnet-11M or DECnet-11M-PLUS Phase III node, supports single physical line in point-to-point or multipoint connection controlled by MACRO-11 use written program at each end; DECnet router server provides DECnet routing functions that connect DECnet Phase III or IV local or remote hosts to Ethernet or connect 2 independent Ethernets; supports up to 1,023 nodes; DECnet/SNA RSX 3270 TE offers 3270 emulation; DECnet/SNA RSX RJE supports remote job entry; DECnet/SNA RSX G/W Management provides gateway management routine; RT-11/RSX-11M 2780/3780 provides IBM 2780/3780 emulation; RJE/HASP emulates IBM HASP RJE functions; Digital 3271 Protocol Emulator (PE) provides interactive, program-to-program link between 3271/3277 emulation programs running on a Digital computer to an IBM host, appears to IBM host as IBM BSC cluster controller; RSX-11M/SNA Protocol Emulator (PE) communications between RSX-11/M system and IBM host running on an SNA network, allows simultaneous batch and interactive communications on same line; UN1004/RSX/Sperry 1004 terminal emulator provides remote job entry (RJE) terminal emulation; MUX 200/RSX multiterminal emulator provides multiuser communication over single line with CDC 6000 CYBER Series or using 200 UT Mode 4A commun-ications protocol; RSX-11 PSI/M, PSI/M-PLUS enables connec-tion to Public Packet-Switching Networks for RSX-11M or RSX-11M-PLUS, provides remote terminal communication through a network PAD facility.

Program Development • programming languages include BASIC-11, BASIC-PLUS, BASIC-PLUS-2, C, COBOL-81, CORAL 66, DIBOL-83, FORTRAN IV, FORTRAN 77, MACRO Assembler, MUMPS, Pascal, Assembler • Application Development Environment (ADE) under RSTS/E allows nonprogrammers to develop office/business applications.

Ease of Use Features • HELP facility, text editors, cross-references included in operating systems • DATATRIEVE-11 provides English-like commands and statements to find, display, print, update, and sort data files; also includes HELP facility • INDENT supports interactive data entry and forms management applica-tions with forms definition language; uses English-like syntax • ADE facility.

Configuration Flexibility • Micro PDP-11/23 includes F11 chip-based PDP-11/23-PLUS CPU board with kernel and user modes, minimum of 256K-byte MOS memory, Q-bus, 2 400K-byte RX50 diskette subsystem, backpane configured for 8 slots, 3 slots that may accept quad or dual options and 5 slots that may accept quad option or 2 dual options, system distribution panel for cable connectors; power supply; 2 serial line units; BA23 chassis; diagnostic bootstrap module tests memory; CPU and console terminal; 8K-byte diagnostic/bootstrap ROM; optional 11M- or 31M-byte Winchester disk drive, 256K-byte MOS memory increment, 4- or 8-line multiplexer, USA/English Speaking Canada Country Kit, monochrome video terminal, and 52M-byte fixed/removable disk drive • PDP-11/23-PLUS includes CPU with kernel and user modes, Q-bus, 2 asynchronous single-line EIA/CCITT interfaces, backpane for 6 extended Q-bus quad slots, distribution panel for cable connectors, power supply, cabinet, capability for 1 expansion box; optional 512K-byte MOS memory, 2 10.4M-byte removable cartridge disk drives with controller, 2 0.5M-byte diskette drives • PDP-11/24, UNIBUS-based system includes, CPU with kernel and user operating modes, 1M-byte error correcting MOS memory, 2 asynchronous EIA/CCITT interfaces (1 for console), ASCII console logic for system control and debugging, line frequency clock, UNIBUS I/O connection panel for cable connectors, power supply, 9-slot CPU, and physical address extension module; slot 9 provides for quad option and UNIBUS terminator, other slots accept hex or quad options; 4 system units to accommodate expansion slots; optional 10.5/5.25-inch disk or tape drive mounting space, 10.4M-byte removable cartridge disk drives and controller, 121M-byte disk drive and controller • PDP-11/44 UNIBUS-based system includes CPU with supervisor, kernel, and user operating modes, 1M-byte error

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correcting MOS memory, 8K-byte high-speed cache memory, 2 asynchronous single-line EIA/CCITT interfaces (1 for console), ASCII console for logic for system control and debugging, line frequency clock, UNIBUS I/O connection panel for cable connectors, power supply, DC voltage monitor, 14-slot CPU backpane, slot 1 and 2 for Commercial instruction set processor, slot 3 for floating-point processor, slots 4 through 8 for PDP-11/44 CPU, slots 9 through 12 for memory, slot 14 for UNIBUS terminator; optional 2 10.5- or 5.25-inch disk or tape drives ● Micro PDP-11/73 includes J-11 chip-based CPU board with kernel and user modes, minimum of 512K-byte MOS memory, 8K-byte direct-mapped cache, program controlled line clock, Q-bus, 2 400K-byte diskette subsystem, backpane for 8 slots with 3 slots that can accept dual or quad options, and 5 slots that can accept quad or dual options, system distribution panel for cable connectors, power supply, 1 serial line unit, chassis; optional 31M-byte Winchester disk drive, 4- or 8-line multiplexer, 52M-byte fixed/removable disk drive.

First Announced ● 1980 for PDP-11/44; 1981 for PDP-11/23-PLUS and PDP-11/24; 1982 for Micro PDP-11/23; 1984 for Micro PDP-11/73.

Pricing ● purchase price for basic systems as outlined above are: $7,300 for PDP-11/23; $19,950 for PDP-11/23-PLUS; $14,000 for PDP-11/24; $29,950 for PDP-11/44; and $15,140 for Micro PDP-11/73.

■ FOUR-PHASE, INCORPORATED

10700 North De Anza Boulevard, Cupertino, CA 95014 ● 408-255-0900

☐ **Four-Phase System IV & System 5000 Series: Series IV/40, 50, 60, 65, 70, 80, 90, 95 & Series 5000/700, 800**

Type of Device ● 24-bit processors designed for distributed processing and/or office automation.

Distributed Functions ● data entry and retrieval using local and/or host files; support IBM 3270-style central inquiry.

Associated Systems & Networks ● IBM S360/370 and compatible mainframes; Four-Phase 311/312 mainframes serving as network node controllers; IBM 3270 interactive communications; IBM 3780 batch communications; IBM 2780/3780 batch communications and HASP multileaving batch communications.

Communications ● single-line asynchronous controller, half-/full-duplex up to 2400 bps, RS-232C interface, automatic answer compatible with AT&T 103A/201A/201B/202C/202D or equivalent; single-line synchronous controller supports half-/full-duplex up to 9600 bps, RS-232C interface, compatible with AT&T 201A/201B or equivalent; single-line intelligent controller supports half-/full-duplex BSC/SDLC up to 9600 bps, RS-232C interface, uses 16K bytes of memory, and performs all low-level line and record-handling functions; multiline asynchronous controller, 16K-byte integral microprocessor handles RS-232C or current-loop devices half-/full-duplex up to 9600 bps on MFE/IV system.

Features ● compatible intelligent/distributed processing systems for operation in large-scale IBM environments or standalone independent networks; based on 24-bit CPUs that can support display workstations, printers, disk drives, card readers ● main memory supports program/data storage and acts as refresh buffer for workstations ● memory capacity 24K to 96K bytes on IV/40 and 50; 240K to 720K bytes on IV/60; 288K to 768K bytes on IV/65; 48K to 96K bytes on IV/70; 288K to 864K bytes on IV/80; 192K to 480K bytes on IV/90; 480K to 1.5M bytes on IV/95; 1.5M to 3M bytes on System 700 and 1.5M to 6M bytes on System 800X disk subsystems include drive and controller: 354K-byte on diskette subsystem; 2.5M-byte on cartridge disk subsystem; 13M-byte on cartridge module disk subsystem; 50M- or 67.5M-byte on disk pack subsystem; 10M- or 138M-byte on fixed disk subsystem ● magnetic tape includes a drive and controller; 556/800/1600 bpi; 7 or 9 track ● 16 display/printer workstation on 40/60; 24 display/printer workstation on 50/65; 32 display/printer workstations on 70/80/90/95; 96 display/printer workstations on 700; 96 display/printer workstation on 800; 1 or 2 system printers; up to 4 tape drives.

Software ● Multifunction Executive (MFE/IV) operating system supports concurrent execution of multiple software subsystems, including VISION for data entry/retrieval, GMS/IV an integrated graphics capability, COBOL language processor; for program compilation, COBOL user programs for interactive and/or batch application processing, Programmer Workstation for host-program development, Office Management System for office administration, and ForeWord for word processing ● database management: VISION Environment, integrated system supports data entry, inquiry, local data management and batch communications; data entry features include formatted screens for simplified data entry, up to 15 different screen formats, 24 single-precision or 12 double-precision accumulators per job; Data Inquiry/Retrieval, IBM 3270 communications used to interact with host mainframe in native IBM 3270 or interactive mode ● communications software includes IBM 3270 Interactive Communications Workstations under VISION can operate as IBM 3270 workstations; VISION supports Series IV processor operation as IBM 3770 device for data exchanges with host mainframes using SDLC in SNA environment; IBM 2780/3780 Batch Communications support data exchanges with host mainframes using IBM 2780/3780 protocols; HASP Multileaving Batch Communications support data exchanges with host mainframes using HASP multileaving protocol ● office automation: Corporate Office Management System (COMS/IV) combines facilities of OMS/IV and ForeWord with relational database management/teleprocessing monitor (Datacom/DB/DC by ADR) customized to operate in conjunction with Model 311/312 node controllers; provides Electronic Mail, Document Management/Processing, and Executive Series; ForeWord document-oriented word processing software supports text entry/editing/printing and system control.

Program Development ● COBOL compiler supports low-intermediate implementation of ANSI COBOL Standard X3.23-1974; minimum of 72K/48K bytes of main memory to compile/execute a COBOL program ● MAESTRO software development system provides uniform environment for applications development, includes office automation functions and HELP function.

Ease of Use Features ● VISION data management features Data Entry for formatting screens and table comparisons ● COMS/IV is menu driven for use by non-EDP personnel.

Configuration Flexibility ● basic IV/40 includes 72K-byte memory, BSC communications controller, 2.5M-byte disk drive, 8 display workstations; maximum configuration includes 96K-byte main memory, 22.5M-byte cartridge disk drive, 16 display/printer workstations, card reader and line printer ● basic IV/50 includes 96K-byte memory, BSC communications controller, 12.5M-byte disk drive, 9 display workstations, 55-cps printer; maximum configuration includes 96K-byte main memory, 4 67.5M-byte disk pack drives, 5M-byte cartridge disk drive, 708K-byte diskette drive, 24 display/printer workstations, 2 system printers, card reader ● basic IV/60 includes 192K-byte main memory, BSC communications controller, 40M-byte disk drive, 16 display workstations and 120-lpm printer; maximum configuration includes 768K-byte main memory, 80M-byte disk subsystem, 16 display/printer workstations and 2 system printers ● basic IV/65 includes 192K-byte main memory, SDLC communications controller, 80M-byte disk drive, 13 display workstations and 300-lpm printer; maximum configuration includes 768K-byte main memory, 80M-byte disk subsystem, 24 display/printer workstations and 2 system printers ● basic IV/70 includes 96K-byte main memory, BSC communications controller, 67.5M-byte disk storage, 17 display workstations and 300-lpm printer; maximum configuration includes 96K-byte main memory, 4 67.5M-byte disk-pack drives, 10M-byte cartridge disk drive, 354K-byte diskette drive, 4 magnetic tape drives, 32 display/printer workstations, 2 system printers, and card reader ● basic IV/80 includes 480K-byte main memory, SDLC communications controller, 80M-byte disk storage, 15 display workstations, card reader, and 430-lpm printer; maximum configuration includes 864K-byte main memory, 82.5M-byte fixed/cartridge disk storage, 32 display/printer workstations, 2 system printers, and card reader ● basic IV/90 includes 192K-byte main memory, BSC communications controller, 2.5M-byte disk drive, 67.5M-byte disk drive, 10 display workstations, 300-lpm printer; maximum includes 480K-byte main memory, 4 138K-byte disk drives, 10M-

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byte cartridge disk drive, 354K-byte diskette drive, 4 magnetic tape drives, 32 display/printer workstations, 2 system printers, and card reader • basic IV/95 includes 672K-byte main memory, SDLC communications controller, 138M-byte disk drive, 19 display workstations, 600-lpm line printer, and 55-cps printer; maximum configuration includes 1.5M-byte main memory, 4 138M-byte disk drives, 4 magnetic tape drives, 32 display/printer workstations, 2 system printers, and card reader • basic System 5000/700 includes 1.5M-byte main memory, 2 138M-byte disk drives, 40 Fastrak workstations, 600-lpm printer, and 16 35-cps printers; maximum configuration includes 3M-byte main memory, 8 fixed or removable disk drives, 1.1G-byte maximum, 96 display/printer workstations, 2 system printers, 4 tape drives, and 1 card reader • basic System 5000/800 includes 1.5M-byte memory, 2 138M-byte disk drives, 48 Fastrak workstations, 600-lpm printer, and 20 35-cps printers; maximum configuration includes 6M-byte main memory, 16 fixed or removable disk drives, 2.2G-byte maximum, 128 display workstations, 2 system printers, 128 Workstation Printers, 4 tape drives, and 1 card reader.

First Announced • Series IV in 1972; System 5000 in 1983.

Pricing • purchase prices for basic systems as outlined above are: $35,713 for IV/40; $46,934 for IV/50; $79,818 for IV/65; $75,261 for IV/70; $95,124 for IV/80; $75,597 for IV/90; $112,039 for IV/95; $210,039 for 5000/700; $217,244 for 5000/800.

■ **HEWLETT-PACKARD COMPANY/Data Systems Division**

11000 Wolfe Road, Cupertino, CA 95014 • 408-257-7000.

□ **HP Series, Models 250/20, 250/25, 250/30, 250/40 & 250/50 Computer Systems**

Type of Device • disk-based computer systems for multitasking general business environments requiring automated office functions.

Distributed Functions • multitasking operation for up to 10 users, intended for use in general office automation applications.

Associated Systems & Networks • can access HP 3000 systems; can emulate IBM 2780/3780 batch terminals for synchronous data communication.

Communications • 16-bit asynchronous data bus communications; asynchronous serial interface (ASI) provides multiuser facilities for HP 250, can be configured as 5 RS-232C/V.24 interface ports for direct connection using current loops to HP terminals/printers, connection for up to 5 Remote/250 terminals, and for connection of HP 3000 asynchronous terminal controller (ATC); Intelligent Network Processor (DSN/INP)/250 provides synchronous communications with IBM-compatible host using RJE facilities; plug-in circuit board with 32K-byte RAM and 4K-byte ROM implements RJE/250 software to allow HP 250 to emulate IBM 2780/3780 batch terminal for synchronous data communication; implements RS-232C/CCITT V.24 interface with error detection and transmission under BSC protocol; modem connection for half-/full-duplex transmissions at 1200/4800 bps over switched lines; or 2400 to 19.2K bps over private or leased lines.

Features • 16-bit microprocessor design using sapphire-on-silicon (SOS) NMOS-II logic; 833-nanosecond cycle time • systems and user memory, user partition requires 32K or 64K bytes for up to 10 users maximum • 16-bit wide I/O channel, 1M-bps throughput rate, diskettes and printer connect through interface channel, Winchester-type disk drives, mass storage and communication lines connect directly using microprocessor-based controllers • mass storage: 1.2M-/256K-byte diskette using IBM/HP format; 16.5M/28.1M/65.6M-byte sealed Winchester (fixed) disk drive and controller • integral console display/keyboard workstation; remote 250 terminal; 180-cps impact printer; 20-/40-cps daisywheel or 400-lpm line printer; 80-cps dot-matrix printer; graphics plotter.

Software • O.S.5 operating system is disk-based, permits operation as standalone workstation or as terminal to remote HP 3000 or IBM-compatible host system • supports Business BASIC interpreter for program development; IMAGE/250 for database management; Report Writer/250, Query/250, display screen and keyboard control, peripheral control, and DROMs; DROMs implement enhancements to Business BASIC; can control up to 9 Remote/250s plus user at workstation • IMAGE/250 database management (DBMS) operates in conjunction with QUERY/250, FORMS/250, Report Writer/250, and GPL/250 modules for database application • QUERY/250 provides 17 commands; FORMS/250 allows creation, display, and customizing forms from user-designed form images; ReportWriter/250 is used to produce reports; TEXT/250 is interactive text processing system • communications software includes DSN/DS providing interactive link between HP 250 and HP 3000 systems and DSN/RJE allows HP 250 to emulate IBM 2780/3780 batch terminal.

Program Development • HP Business BASIC enhanced implementation of ANSI X3.60 standard for minimum BASIC; uses features found in COBOL, APL, and FORTRAN; interpretive language with output stored as pointers to microcode implementing functions; language extensions implemented by DROM include database management system, disk/printer/other peripheral device handlers, control functions, and additional statements and operators.

Ease of Use Features • databases developed using IMAGE/250 are compatible with those developed on other HP systems; database orientation makes it very versatile and easy to use.

Configuration Flexibility • all Series 250 use 45260A Shared Resource Processor, includes CPU, 192K/64K bytes of system/user memory, single peripheral interface channel, 5 asynchronous interface ports, and system software on 16M-byte tape cartridge, or 1.2M-byte diskettes; keyboards, character sets and software available for U.S., English, French, German, Swedish, Spanish, Italian, Katakana (Japan), and Danish languages; maximum configuration includes basic system with 896K/704K bytes system/user memory, dual asynchronous serial interfaces, single-line network processor, 260M-byte disk storage, 10 workstations.

First Announced • HP 250/30 in 1978; HP 250/25 in 1981; other models in 1982.

Pricing • purchase price for basic system as outlined above is $9,100; monthly maintenance is $80.

□ **Hewlett-Packard HP 1000: A600, A700, A900, E40, E60, F45, F65 & L65 Series of Computer Systems**

Type of Device • distributed processor in DSN network; standalone processor; and node in DS-1000 IV real-time network.

Distributed Functions • real-time, interactive, and batch processing in standalone, host, and satellite configurations.

Associated Systems & Network • Hewlett-Packard HP 3000 system in DSN networks • IBM 2780 terminal emulation with RTE-6/VM and RTE-IVB systems; IBM MRJE Multileaving HASP Terminal Emulator with RTE-A and RTE-6/VM to IBM S360/370-compatible systems.

Communications • asynchronous Serial I/F provides RS-232C/RS-422/RS-449 interface at data rates up to 9600 bps; supports both local and remote connections, uses AT&T 103 or equivalent modem for communication remote; asynchronous multiplexer provides 8-line connection; point-to-point and multipoint microprocessor-based modem interface using HDLC network protocol, data rates 300/1200/2400/4800/6900/19.2K/230K bps; DS/1000-IV BSC modem interfaces for connection from HP 3000 to A-L-Series under RTE/XL or RTE-A; and DS/1000-IV supports data rates up to 9600-bps through RS-232C/RS-499 interface; DS/1000-IV BSC direct connect interfaces from HP 3000 to A-/L-Series under RTE/XL or RTE/A, supports data rates up to 19.2K bps; DSN/MRJE I/F interfaces asynchronous/synchronous modem connection to IBM S/370/370 to emulate HASP workstation; DSN/X.25 asynchronous/synchronous network modem interface for communications in packet-switching network, implements Level-II Link Access Protocol-B (LAP-B), RS-232C/RS-449 interface; integral modem I/F provides auto-dial/-answer with remote terminals via dial-up lines; 8-channel multiuser multiplexer provides connection to A-/L-Series • asynchronous terminal I/F provides RS-232C/CCITT V.24 interface, supports point-to-point operation at up to 9600 bps using

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AT&T 103/202 data set or equivalent; multipoint/Data Link I/F provides microprocessor buffered RS-232C hardwired or modem interface, BSC protocol, handles up to 32 terminals per multipoint line, asynchronous/synchronous at data rates up to 9600 bps; Data Link Slave I/F interface for E-/F-Series systems operating as terminals in point-to-point and multidrop network; asynchronous multiplexer provides for 8 devices via multiplexer panel to E-/F-Series BSC modem I/F provides half-/full-duplex at data rates up to 57.6K-bps through RS-232C/RS-449 interface to HP 1000 and HP 3000 systems in DS/1000-IV network; DS/1000-IV HDLC modem I/F point-to-point, multidrop microprocessor-based modem interface using HDLC protocol, data rates up to 230K bps, RS-232C/RS-449 interface; DS/1000-IV direct connect I/F for remote E-/F-Series system running under DS-1000-IV network software; Teleprinter I/F provides character mode current-loop interface for direct modem connection at data rates of 110/200/440/880/1760 bps using internal clock, up to 2400 bps using external clock; terminal I/F provides character mode current-loop interface for direct or modem connection, 150/300/600/1200/2400 bps using internal clock, up to 9600 bps using external clock; synchronous communications I/F provides for connecting AT&T 201/203/208/209 data sets, half-/full-duplex; asynchronous communications I/F provides for connecting AT&T 103/202 data sets or equivalent, data rates up to 9600 bps.

Features ● 4 different CPUs referred to as L-, A-, E-, and F-Series; all execute basic HP 1000 base instructions set and are compatible with previous HP 1000 Series computers; 16-bit hardwired microprocessor (L-Series) and microprogrammable processors (E-/F-Series) with from 128K- to 6M-byte memory on A-/L-Series and from 128K- to 2M-byte memory on E-/F-Series; systems run under RTE-L/RTE-XL (L-Series) and RTE-IVB/RTE-IVE (E-/F-Series) operating systems; E-Series provides microprogrammable processor port for direct interface of user-designed hardware processor, 3.18M-byte-per-second aggregate data rates, and up to 11.4M-byte-per-second burst data rate; F-Series has most computational power and includes dedicated floating-point hardware, scientific instruction set for trigonometric/logarithmic operations, a polynomial evaluation instruction, and FORTRAN accelerator routines; connects floating-point processor to microprogrammable processor port; processes 32/48/68-bit single/extended/double-precision floating-point operands; 4.8-microsecond execution time for single-precision add instruction and 12.9 microseconds for double precision divide instruction ● General-Purpose HP-IB Interface provides Hewlett-Packard Interface Bus for multiplexing up to 14 devices at aggregate data transfer rate of 940K bpi; supports dual-cartridge/fixed-disk units plus dual-drive diskette subsystem; alternatively, accommodates up to 14 HP-IB devices selected from printers, tape drives, plotters, graphic digitizers, and measurement instruments ● A-Series similar in architecture to older L-Series implemented in bipolar bit-slice CPU chips; both A600/700 models are 1-MIPS processors with 24 DMA channels and up to 4M bytes of addressable memory; A600 offers 454-nanosecond memory cycle time; A700 model includes floating-point and memory cycle time at 500 nanoseconds, I/O bandwidth is 4M bytes per second; A900 is 3-MIPS processor with 500K FLOPs (floating-point operations per second), 24 DMA channels, 181-nanosecond memory cycle time ● E-/F-Series Multiple I/O Channels provide synchronous data rates up to 2.28M/3.17M bytes per second, multilevel vectored interrupt structure with 50 priorities, user-designed I/O facilities, 3 lines on I/O backplane for micropro-grammable block I/O; General Purpose I/O interface provides up to 411K/575K/760K bytes per second for up to 14 devices to E-/F-Series; 4 interfaces per system ● 270K-/1.18M-byte diskette, 16M-/404M-byte fixed-media disk, 19.6M-byte cartridge/fixed-media disk, and 50M-/120M-byte disk-pack drive options; 528M-byte maximum disk storage on A-/L-Series single I/O channels includes dual 19.6M-byte cartridge/fixed-media drives and dual 1.18M-byte diskette drives; disk storage on multiple I/O channels; 1920M-byte maximum disk pack storage on E-/F-Series systems using 16 drives; 514K-/1.18M-byte diskette drive option ● supports multiple local/remote terminal/workstation configurations; practical maximum of 4 concurrent program development terminal sessions on A-/L-Series; practical maximum of 8 program development or 16 data

entry/retrieval terminal sessions on E-/F-Series systems ● printers; 40-cps daisywheel, 180-cps and 400-lpm impact matrix; 400-lpm thermal graphics with raster dump devices available; 600-/1000-lpm chain printer options.

Software ● RTE Real-Time Executive operating system designed for concurrent real-time, interactive terminal, and batch processing in standalone, host, and satellite configurations; includes variety of memory sizes and supports different processor types ● RTE-A supports A-Series systems with 128K-/632M-byte memory ● RTE-XL supports L-Series systems with 128K- to 512K-byte memory and IMAGE/1000 data management system ● RTE-IVB/IVE for E-/F-Series are priority-scheduled real-time multiprogramming systems featuring concurrent execution of event-driven, time-slice, and batch programs ● RTE-IVE is execute-only memory-based subset of disk-based RTE-IVB and is used with E-/F-Series ● RTE-6/VM includes all capabilities of RTE-IVB plus partial virtual memory implementation and support for IMAGE/1000-II; allows transparent access to 128M bytes of data ● IMAGE/1000 Database Management System with QUERY ● DATACAP/1000-II runs under RTE-IVB to provide online management of up to 54 captive terminals; supports data entry/retrieval for 4 IMAGE/1000 databases ● Distributed Systems/1000-IV supports network resource sharing, remote database access, distributed data file management, communication between application programs, coordinated distribution of workloads among processors in network; requires 256K-byte memory ● DSN/X.25 provides access to private or public X.25 packet-switched networks ● RJE/1000 allows RTE-IVB system to function as IBM 2780 with data rates up to 9600 bps; DSN/MRJE 1000 allows computer to function as HASP workstation ● Multipoint Terminal Subsystem Software allows RTE-IVB and RTE-IVE systems to handle communication with multiple local/remote display/data captive/time-reporting terminals; supports 8 multipoint interfaces with up to 32 terminals per single line or 256 terminals ● other facilities include graphics, diagnostics, measurement/control software.

Program Development ● high-level languages: FORTRAN 77, FORTRAN 4X, Pascal/1000, BASIC/1000D/L/C, Assembler; Microprogramming Package for A 700 (used with RTE-A) supports user online development of microprograms; RTE Microprogram-ming Package for A 900 supports online development of microprograms; Symbolic Debug/1000 for debugging source-level FORTRAN and assembly language programs.

Ease of Use Features ● supports online system generation, switchover to previously generated system/stored on disk, and reconfiguration at boot load; DSN provides intrinsics for network file/peripheral/program/database/terminal, and network file transfer.

Configuration Flexibility ● basic A-Series A600+ includes processor, RTE-A operating system on minifloppy disk, 512K-byte memory, 3 I/O channels, dual minifloppy disk drives, asynch-ronous serial interface, 12009A HP-IB I/F, tabletop package mounting;, requires system console and cable ● maximum A900 includes basic system with 6M-byte MOS ECC memory, 15 card cage slots for memory expansion and I/O interfaces, 1.6G bytes maximum disk storage per card cage slot, up to 8 terminals per multiplexer ● L-Series basic system Model 5 Microsystem includes 16-bit L-Series microprocessor with RTE-XL operating system on minifloppy disk, 128K-byte memory, 12009A HP-IB I/F with capacity for connecting 3 additional disks, diskette controller connected to 12009A interface, 540K-byte diskette storage on dual drives, asynchronous serial interface for connecting console, 8-slot card cage, 3 available I/O slots for expansion, requires purchase of console terminal; maximum includes basic system with 512K-byte MOS parity memory, 15 card cage slots for memory expansion, I/O interfaces, 1.6G bytes maximum disk storage per card cage slot, up to 8 terminals per multiplexer ● basic E-Series Model 40 system processor unit includes 2113E processor, RTE-IVB operating system, 256K-byte high-performance memory with memory protect module, 10 available I/O channels, 12291B power fail recovery system, time base generator, MAC disk interface, buffered asynchronous commun-ications interface, dual-channel port controller, loader ROM for MAC disk, magnetic tape drive, 56-inch cabinet, requires system console, cable, systems disk, and corresponding operating system

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media; maximum includes basic system with 2M-byte MOS parity memory, 11.5K control store words available for user micro-programming, 13 card cage slots for control store cards, I/O interfaces, 1.6G bytes maximum disk storage per card cage slot, up to 8 terminals per multiplexer, up to 32 terminals per multipoint line • F-Series basic package Model 45 includes processor, RTE-IVB operating system, 256K-byte high-performance memory with memory protect and expansion modules, 10 available I/O channels, fail recovery system, time base generator, MAC disk interface, Vector instruction set, buffered asynchronous commun-ications interface, dual-channel port controller, loader ROM for MAC disk, magnetic tape drive, 56-inch cabinet, requires systems console, cable, systems disk, corresponding operating system media; maximum includes basic system with 2M-byte MOS parity memory, 5.5K control store words available for user micropro-gramming, 13 card cage slots for control store cards and I/O interfaces, 1.6G bytes maximum disk storage per card cage slot, up to 8 terminals per multiplexer, up to 32 terminals per multipoint line.

First Announced • 1975 for E-Series • 1979 for F-Series • 1980 for L-Series • 1982 for A-Series.

Pricing • purchase prices for basic system as outlined above are: $14,200 for A-Series; $10,730 for L-Series; $22,500 for E-Series; $31,500 for F-Series.

☐ Hewlett-Packard HP 3000 Series 37, 37XE, 42, 48 & 68 Computer Systems

Type of Device • 16-bit minicomputer systems for general business data processing applications in Distributed System Network (DSN); Model 68 uses dual 16-bit Arithmetic Logic Units (ALUs) to operate like 32-bit system.

Distributed Functions • multiprogramming, multiuser opera-tions: transaction processing; batch processing; word processing; program development; and data communication applications • distributed control in DSN system • database management.

Associated Systems & Network • HP 1000; HP Distributed Systems Network (DSN); HP 250, HP 9835A/9845A can operate as terminals to HP 3000 • all HP 3000 systems can communicate with S/370-compatible mainframes via emulation of IBM 2780/3780, HASP Multileaving, and 3270 terminal protocols • packet-switched networks through X.25/X.21 support; SNA network interconnections for local/remote communication using SDLC protocols.

Communications • asynchronous data communications con-troller (main) for Series 39/4X provides 4 terminal ports for point-to-point connection of terminals/workstations, supports full-duplex AT&T 103/212/202-type modems at 9600/1200 bps, extender expands to provide for 8 terminal ports • Intelligent Network Processor (INP) provides for single communications line for system-to-system or multipoint terminal communications for all models; consists of 16-bit SOS microprocessor and 32K-byte buffer, supports modem and hardwired interfaces up to 56K bps, half-/full-duplex asynchronous modem operation, auto-call capability; supports synchronous BSC/HDLC/SDLC protocols, RS-232C/RS-422 interfaces, connects to general I/O channel, up to 3/3/7/24 INPs permitted on Series 39/42/48/68 • Advanced Terminal Processor (ATP) for Series 48/68 provides intelligent interface for connecting multiple terminals, supports point-to-point operation; full-duplex asynchronous up to 9600 bps, RS-232C/RS-422 interfaces; supports up to 60 hardwire (48) or 96 hardwired/modem (68) terminal connections • Data Link Adapter adapts multipoint line to HP data link line, asynchronous/synchronous up to 60K bps • 300K-bps modem for 262X terminals; fiber-optic multiplexer connects 8 full-duplex channels asynchronous at 9600-bps RS-232C; pair can be used at data rate up to 19.2K bps for distances up to 3,280 feet • multipoint cluster controller connects to DSN/Data Link and modem, provides local or remote control for up to 16 asynchronous point-to-point terminals and up to 9600 bps, RS-232C.

Features • 16-bit bus-centered system that utilizes a stack architecture; Series 68 functions like 32-bit system • all features of the stack are implemented in hardware • Series 37, 37XE, 39, 42, and 48 connect independent elements through central bus structure called Intermodule Bus, additionally 37, 37XE, and 48 have an Advanced Terminal Processor (ATP) attached to the bus, ATP also connects to interactive terminals • Series 68 is configured around a Central System Bus (CSB) and up to 3 Intermodule Buses, which support same devices as for other processor models except does not support communications controller • data communications links for all systems into network are via DSN/INP connected to general I/O channels via HP-IB interface; INPs in conjunction with DSN/Multipoint Terminal Software can attach interactive terminals • all use NMOS memory; 512K to 2M (37), 1M to 2M (37XE), 512K to 3M (39), 1M to 3M (42), 2M to 4M (48), 2M to 8M in 1M increments and 8K-byte cache (68) • I/O adapter module for 68 provides second IMB; general I/O channel for all series provides primary I/O channel for devices other than terminals disk capacities from 27M to 404M bytes, up to 2.1G on 37/37XE, up to 3.23G on 39/42, 4.2G on 48, 9.7G on 68; 300- to 1000-lpm line printers, 40-cps daisywheel and laser printers.

Software • Fundamental Operating Software (FOS) provides MPE, KSAM/3000, IMAGE/3000, QUERY/3000, Dictionary/3000, Inform/3000, Report/3000, and Flexible Discopy/3000, FCOPY/3000 file copier, and SORT-MERGE/3000 facilities • MPE operating system is multiprogramming, multiuser supporting concurrent batch, transaction, online programs development, and communications processing operating with any combination of languages • KSAM provides ISAM and is accessible through all languages • IMAGE database management system features bottom-to-top data structure • QUERY actively interrogates database without special programming • Flexible Discopy provides facility for converting IBM 3741-formatted diskette data • FCOPY is general-purpose utility for copying data files • SORT-MERGE is general-purpose sort/merge of records/files • communication software: Multipoint Terminal Software (MTS) for asynchronous/synchronous multipoint communications; Distrib-uted Systems for interactive communications between HP systems; Interactive Mainframe Facility (IBM 3270 Emulator) for high-level, interactive data communications between HP 3000 and IBM mainframe; Multileaving Remote Job Entry (MRJE) emulation of 6 multileaving batch workstations with job management services for HASP II, JES2, JES3, and ASP; RJE (IBM 2780/3780 emulation).

Program Development • languages include APL, BASIC, COBOL, FORTRAN, Pascal, RPG-II, and SPL (assembly language) • HP Toolset Program Development System provides tools for COBOL II/3000 program development/maintenance • program-ming/applications development aids.

Ease of Use Features • MRJE commands are in English words with relevant meanings • many network functions handled by microcoded intrinsics that are high-level system macros; the DSN/IMF handles low-level screen control character manipulation • Pass Through Facility (PTF) uses single command to switch terminals attached to HP 3000 to IBM host mainframe • RAPID/3000 improves programmer productivity 2 to 10 times for programming transaction/database applications.

Configuration Flexibility • basic Series 37 includes Series 37 SPU (System Processing Unit) with FOS/3000 software, 512K-byte main memory, 55M-byte Winchester disk with 67M-byte cartridge tape backup, 2392A terminal, cable, communications line, system cabinet; maximum includes basic system with 2M bytes of main memory, 8 disk drives for a total of 2.1G bytes, 2 magnetic tapes plus cartridge tape drive with disk system, 14 point-to-point terminals, 2 line/character printers or 2 laser printers • basic Series 37XE includes Series 37XE SPU with FOS/3000 software, 1M-byte main memory, 2 general I/O channels, remote diagnostic capability; maximum includes 2M bytes of main memory, 2.1G bytes on 8 disk drives, 2 magnetic tape drives plus cartridge tape drive with disk system, 28 point-to-point terminals, 2 line/character printers, or 2 laser printers and 3 communications lines • basic Series 39 includes Series 39 CPU with FOS/3000 software package, 512K-byte main memory, 2 general I/O channels, remote diagnostic capability; maximum includes 2M bytes of main memory, 3.23G bytes on 8 disk drives, 4 magnetic drives plus cartridge drives supported with disk systems, up to 56 point-to-point and multipoint terminals, 2 character/line printers, 2 laser printers, 3 synchronous communication lines (INPs) • basic Series 42 includes Series 42

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SPU with FOS/3000 software package, 1M-byte main memory, disk racking, 2 general I/O channels, remote diagnostic capability; maximum includes 3M bytes of main memory, 3.23G bytes on 8 disk drives, 4 magnetic tape drives plus cartridge tape drives supported with hard disk systems, up to 32 point-to-point or total of 92 point-to-point and multipoint terminals, 2 character/line printers, 2 laser printers, 3 synchronous communications lines (INPs) ● basic Series 48 includes Series 48 SPU with FOS/3000 software package, 2M-byte main memory, disk racking, 2 general I/O channels, remote diagnostic capability; maximum Series 48 includes 4M bytes main memory, 4.2G bytes of storage on 16 disk drives, 4 magnetic tape drives plus cartridge tape drives supported with disk storage, up to 104 point-to-point or a total of 152 point-to-point and multipoint terminals, 4 character/line printers, 2 laser printers, and 7 synchronous communication lines (INPs) ● basic Series 68 includes 68 SPU with FOS/3000 software package, 3M-byte main memory, 8K-byte cache memory, disk racking, I/O adapter module, 2 general I/O channels and remote diagnostic capability ● maximum Series 68 includes 8M bytes of main memory, 8K-byte cache memory, 9.5G bytes on 24 disk drives, 8 magnetic tape drives plus cartridge tape drives supported with disk systems, 366 point-to-point or total of 400 point-to-point or multipoint terminals, 8 character/line printers, 2 laser printers, 24 synchronous communications lines (INPs).

First Announced ● June 1983 for Series 39, January 1984 for Series 42, 48, 68; November 1984 for Series 37 and 37XE.

Pricing ● purchase price for basic units as outlined above are: $19,950 for Series 37; $20,000 for Series 37XE; $33,200 for Series 39; $39,800 for Series 42; $67,500 for Series 48; $186,100 for Series 68.

☐ **Hewlett-Packard HP 9000 Series: Models 500, 600 & 700 Computers**

Type of Device ● 32-bit computers used as single-user or multiuser integrated desktop-sized workstation in computer-aided engineering applications.

Distributed Functions ● finite element analysis, 3-D modeling, electronic-circuit simulation applications.

Associated Systems & Networks ● currently is not supported as host/terminal on DSN; planned communication links between HP 9000 and HP 1000, HP 3000, and other HP computer lines ● support Ethernet-based local area network (Standard IEEE-802) ● SRM link allows HP 9000s to communicate with 16-bit workstations to share common databases and peripherals.

Communications ● asynchronous terminal emulator currently; interface to SRM and Ethernet.

Features ● 32-bit systems offered in 3 models: Series 500 uniprocessor, Series 600 dual processor, and Series 700 triple processor can be configured with color-graphics CRT display, keyboard, printer, 10M-byte Winchester disk drive, 256K-byte diskette, and up to 2.5M bytes of error checking/correcting memory ● card cage called memory-processor module houses board supporting superchips of CPU, I/O processor for 8 DMA channels, 128K RAM memory, memory controller and 18-MHz clock ● CPU, I/O, memory communicate over memory-processor bus or backplane at data rate of 36M bytes per second ● uniprocessor in 1-MIPS performance range ● HP's NMOS-III superchips provide 70 times packing density of HP's NMOS-II chips ● Series 500/600 upgrade on-site to 3-CPU configuration via plug-in CPU boards.

Software ● systems run under an HP version of UNIX called HP-UX or high-performance version of HP's Enhanced BASIC ● HP-UX is a multiple-user system; includes IMAGE/9000 database management system and Graphics/9000 software; supports Pascal, FORTRAN, and C languages; also provides communication capability through a terminal emulator for asynchronous data communications, interface to Ethernet for networking and HP's Shared Resource Manager (SRM) for linking clusters of HP 9000s with each other and with HP 9800 Series desktop computers ● HP 9000 BASIC-language operating system is single user; implements the Enhanced BASIC language

developed for the HP 9800 16-bit desktop computer, thus, application programs for HP 9800 can run on the HP 9000; also includes 2-D and 3-D graphics, IMAGE database management system with conversational Query language ● communication software: asynchronous terminal emulator, Ethernet networking, and SRM clustered networking capability ● applications packages include HPSPICE for circuit simulation, HP-FE II finite analysis system, HP DESIGN for mechanical engineers, and other programs through HP PLUS, HP's third-party software program.

Program Development ● Pascal, FORTRAN, and C language; "runtime" compiled BASIC and interpretive BASIC.

Ease of Use Features ● user can track multiple tasks by windowing CRT screen on system running under BASIC OS; includes conversational Query language.

Configuration Flexibility ● Series available in 3 basic packages: integrated workstation, rackmountable box, and minicabinet for single- and multiuser configurations ● single-, dual-, triple-CPU configurations; compact HP 9000 Series computer functioning as integrated workstation can include monochromatic or color-graphics CRT display, from 912K- to 2.5M-byte RAM, keyboard, built-in thermal printer, built-in 10M-byte Winchester disk drive, 256K-byte diskette drive, 8-channel multiplexer, and IEEE-488 interface.

First Announced ● November 1982.

Pricing ● purchase price is $44,900 for an HP 9000 Series 500 Model integrated workstation configuration including single CPU, 1M-byte RAM, IEEE-488 interface, 8-channel multiplexer, multiuser HP-UX operating system, FORTRAN and Pascal computers, and HP graphics library; price includes freight costs for U.S. shipments.

■ **HONEYWELL INFORMATION SYSTEMS (HIS) INC/ Small/Medium Information Systems Division**

200 Smith Street, Waltham, MA 02154 ● 617-890-8400.

☐ **Honeywell DPS 4 Series, DPS 4/82 Computer System**

Type of Device ● small- to medium-scale business system; bus architecture.

Distributed Functions ● GCOS 4 multiprogramming, multiprocessing operating system with features to support batch, communications, transaction processing.

Associated Systems & Networks ● Honeywell VIP procedure, TTY-like support, and BSC synchronous connections ● GCOS 4 provides DPS 4 connection in IBM 2780 mode to IBM 3741, Olivetti DE 525 IBM S/370, multileaving utilities, synchronous polled supervisor, file transfer.

Communications ● communication lines are handled by 2 methods: Input/Output Processor handles up to 8 lines at data rates up to 9600 bps, maximum throughput is 50K bps; Network Control Processor handles communications when capacity throughput requirements exceed the capability of IOP; up to 32 asynchronous/synchronous lines per processor, data rates up to 19.2K bps asynchronous; 72K bps synchronous; total aggregate of single NCP is 200K bps; up to 3 NCPs can be attached to DPS for maximum of 96 lines with throughput rate of 600K bps ● protocols include Honeywell VIP, TTY, and BSC.

Features ● systems are organized around bus structure in which 4 firmware controlled units perform program logic, I/O control, mass storage control, and communications control ● units use a high-performance generalized computing unit (GCU) that contains memory, arithmetic and logic unit, and control store; has basic cycle time of 310 nanoseconds ● 64K-bit-chip MOS memory, error detection and correction feature, minimum addressable unit 8-bit byte, up to 8M bytes of memory ● Input/Output Processor (IOP) required for peripherals other than disk maximum capacity is console, 2 diskettes, 2 printers, card reader, and up to 8 communication lines ● mass storage, up to 3.6G bytes on DPS 4/82, transfer rate 1.2M bytes per disk processor (DP), 2 DPS maximum on DPS 4/82 ● up to 2 200- to 900-lpm printers; 1 printer required.

Software ● GCOS 4 provides multiprogramming, multiprocessing operating system that is workstation-oriented, but has batch

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facilities and provides for communications and transaction processing; is a compatible superset of GCOS 62 that provides basis for easy migration of level 62 user to DPS 4; provides database management facilities for indexed, relative, and sequential files ● transaction management facilities are provided as part of operating system; real-time applications written in RPG or COBOL ● communication facilities provided by series of utility packages ordered separately ● DPS 4 Word Processing Package provides word processing functions including document creation, editing, and formatting ● Job Accounting provides system job accounting ● Interactive Processing System (IPS) and Utilities provides interactive facilities and basic utilities including Sort/Merge.

Program Development ● COBOL-74, FORTRAN IV, RPG II, Macroprocessor ● GCOS 4 operating system provides capability to design and store screen formats for data collection and transactional applications; screens can be linked for repetitive sequencing.

Ease of Use Features ● emphasizes ease of use and menu processing; HELP functions provided to describe any function under operating system; facilities available to allow DPS 4 to act as node in distributed network.

Configuration Flexibility ● DPS 4/82 Central system consists of Instruction Disk Processor, Input/Output Processor, diskette, cabinet with power supply and space for 2 additional processors; maximum includes 3 Instruction Processors, 2 disk processors with 6 disks per processor, 3.6G-byte disk storage, 3 Network processors with 32 lines per processor, 8M-byte main memory, 1 Input/Output processor, 2 printers, 2 diskette units, and card reader.

First Announced ● 1984 in America; 1980 in Europe and Canada.

Pricing ● purchase price is $41,780 for central system as outlined above; $344 per month maintenance.

☐ **Honeywell DPS 6 Series, Models 6/40, 6/45, 6/75 & 6/95**

Type of Device ● 16-/32-bit general-purpose minicomputers.

Distributed Functions ● multiple online applications concurrent with single batch processing.

Associated Systems & Networks ● GCOS 6 supports local/remote asynchronous communications, HASP workstation emulation, and file transmission to Honeywell DPS 6, Level 6, Level 66/DPS, DPS 8, or DPS 88 host; data file transmission using IBM 2780/3780 protocols; RJE, terminal concentration and file transmission to Honeywell Level 66/DPS using Remote Network Processor; accommodates remote job submission to Honeywell Level 66, 66/DPS, DPS 8 using Remote Batch Facility, or DPS 88 ● supports ASCII or binary format file transmission to Honeywell Level 66, 66/DPS, DPS 8, or DPS 88 using File Transmission Facility, IBM 2780/3780/3271 RJE and terminal emulation software ● Honeywell DSA (Distributed Systems Architecture) conforms to referenced model of ISO open systems architecture; supports X.25 packet-switched and X.21 circuit-switched network interface protocols ● IBM Systems Network Architecture (SNA) interactive and RJE support runs under MOD 400 Executive.

Communications ● basic DPS configurations have single Multiline Communications Controller (MLC) with 1 4-line communications adapter to support 4 workstations/serial printer ports ● and expansion capability for 3 additional adapters supporting 4 lines each; maximum MLC aggregate data rate is 128K bps ● systems use MLC-16 controller ● DPS/40, DPS/45 can support maximum of 2 controllers (1 standard, 1 optional) for a total of 32 ports, 28 of which can connect to modems; DPS/75 can support up to 6 MLC-16s (1 standard, 5 optional) for maximum of 96 workstation/printer communication line ports; DPS 6/95 can support up to 8 MLC-16s (1 standard, 7 optional) for a maximum of 128 workstation/printer/communication line ports ● MLC requires 1 Megabus slot ● communications servers can connect Honeywell and other vendors' equipment to a baseband Local Area Network (LAN); LAN products are compatible with Ethernet V.1.0 and IEEE 802.3 electrical

specifications and can support Xerox Network System high-level protocols for network compatibility; compatible with DSA for large and small systems; asynchronous ports to LAN support data rates up to 9600 bps and interface via RS-232C, current loop, MIL 188C, Series 3000 Terminal, and RS-422 workstations ● Synchronous Ports support data rates to 19.2K bps for RS-232C and MIL 188C interfaces; 72K-bps broadband communication for AT&T 301-/303-compatible and CCITT V.35 interfaces ● HDLC Ports support data rates at 19.2K bps for HDLC and MIL 188C HDLC interfaces; 72K-bps broadband for 301/303 HDLC and CCITT HDLC interfaces ● Auto-Dial Module controls 2 asynchronous/synchronous 9600/19.2K/72K-bps ports.

Features ● DPS 6 Series consists of 4 models of 16-/32-bit processors; 16-bit models are 6/40, 6/45, 6/75; 6/95 is 32-bit ● all models run under GCOS 6 MOD 400 operating system ● 6/46 can be field upgraded to 6/75 or 6/95; 6/75 can be upgraded to 6/95 ● Scientific Information Processor (SIP), optional on 6/40, 6/45, 6/75, standard on 6/95; 6/95 has cache mmeory; 512K- to 1M-byte memory for 6/40 and 6/45; 1M- to 2M-byte memory for 6/75, 2M- to 16M-byte for 6/95 ● disk storage: 1G bytes on 6 drives for 6/40, 2G bytes on 10 drives for 6/45 and 6/75, 4G bytes on 18 drives for 6/95 ● I/O capacity: 300-nanosecond asynchronous split-cycle bidirectional Megabus for peripheral attachment; 6M-bps maximum data rate for 16-bit models, 5 to 30 bus slots; 13M-bps maximum data rate for 32-bit models, 20 to 40 bus slots ● up to 4 system printers.

Software ● GCOS MOD 400 Executive provides online, interrupt-driven, multiple applications and concurrent batch processing; supports DSA satellite software, using SHC173 Primary network software, operator provides control through designated terminal using Operator Control Language (OCL); Execution Control Language (ECL) provides user control of running tasks interactively or from batch stream ● supports COBOL, FORTRAN, BASIC, RPG, C, and assembly languages; Logical High-Level Data Link Control (LHDLC) basic software includes File Transfer Facility, Remote File Facility, Remote Batch Facility I and II, Remote File Facility for Levels 66 and 64, Data Entry Facility I and II, Remote Concentration Facility, IBM communications and File Transfer Facility ● TOTAL 6 database management system based on Cincom TOTAL and GCOS 6 Integrated Data store (IDS/II), subset of CODASYL database management system ● GCOS 6 MOD 400 Transaction Processing Facility runs as subsystem under GCOS MOD 400; usually operates as standalone but can function as system linked to Honeywell Series 60 ● Distributed Processing Facility allows TPS and TPS 6/16 to function in DSA environment ● Transaction Control Facility (TCF) allows multiple terminal users to execute multiple transactional-type applications concurrently ● Data Management 6 Transaction Processor (DM 6 TP) multitask subsystem provides concurrent online or batch transaction processing ● Primary Network Software provides HDLC link control and basic communication management/interface services, allowing DPS 6 satellite to communicate with Datanet 8 Front-End Processor attached to Level 64/DPS 7 or DPS 8 host processor; prerequisite for Node Administrator (NAD), Network Operator Interface, File Transfer Facility, Remote Batch Facility, Distributed Concentration Facility, X.25 Public Data Network Connection ● gateway to IBM communication at rates up to 9600 bps; GCOS 6 Honeywell Communication and File Transfer Facility enables data file transfer between any GCOS 6-supported peripheral and host via Visual Information Projection (VIP) and BSC protocols; maximum speed is 50K bps using HDLC; IBM Communication and File Transfer Facility transmits files between DPS 6 and IBM System/370 host using BSC 2780 protocol (converts native ASCII to EBCDIC); GCOS 6 2780/3780 Workstation Facility using BSC protocol and transferring files between DPS 6 (appearing as 2780/3780 workstation) and variety of IBM hosts over leased lines; GCOS 6 HASP Multileaving Facility allows DPS 6 to appear as IBM System 360/20 M5 and to operate as remote multileaving workstation communicating with IBM System/370 host over leased lines; GCOS 6 HASP II Emulator supports all IBM teleprocessing systems that handle BSC multileaving protocol ● IBM SNA software facilities: SNA Transport Facility provides common SNA protocol services for SNA Interactive and RJE facilities; SNA Interactive Facility enables DPS 6 systems with WST 7200/7801 workstations to appear as an IBM 3274 terminal controller with up to 32 IBM 3277/3278 units

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attached; SNA RJE Facility enables DPS 6 systems to appear as an IBM 3777-3 controller.

Program Development • COBOL, FORTRAN, BASIC, Pascal, Macro Assembler, Advanced Assembler, and RPG II, and C.

Ease of Use Features • extensive network software to establish distributed networks.

Configuration Flexibility • DPS 6/40 with Commercial Instruction Processor (CIP), 512K-byte memory, 40M-byte (20M fixed and 20M removable) cartridge disk, 5.25-inch 650-byte diskette; includes MLC16 communications controller with 4 RS-422A workstation ports and 2 empty Megabus slots and 30-inch cabinet; requires a VIP730X System Console • maximum DPS 6/40 System includes 1M-byte memory, 1G bytes of disk storage on 6 drives, 28 communications lines and workstations, 2 magnetic tape units, 4 peripherals (diskette, card reader, or printers); cannot be field upgraded to other models • DPS 6/45 system in 60-inch cabinet contains Model 40 CPU board with System Control Facility (SCF), CIP, 512K-byte memory, Multiple Device Controller with diskette adapter and integrated 5.25-inch 650K-byte diskette; includes MLC16 communications controller with 4 RS-422A workstation ports; requires a disk subsystem • maximums DPS 6/45 system includes 1M-byte memory, 2G bytes of disk storage on 10 drives, 32 communication lines and workstations, 4 magnetic tape drives, 4 peripherals (diskette, card reader, or printers); can be field upgraded to DPS 6/75 or DPS 6/95 • DPS 6/75 system in 60-inch cabinet contains Model 70 processor with cache memory and CIP, memory controller and 1M-byte memory, System Control Facility (SCF), Multiple Device Controller (MDC-111) with diskette adapter and integrated 5.25-inch 650K-byte diskette; includes MLC-16 communications controller with 4 RS-422A workstation ports; requires a disk subsystem and VIP730X system console • maximum DPS 6/75 System includes 2M-byte memory, up to 2G bytes of disk storage on 10 drives, 96 communications lines and workstations, up to 4 magnetic tape units, up to 4 peripherals (diskette, card reader, or printer) • DPS 6/95 Basic Configuration includes 32-bit processor with CIP, Scientific Instruction Processor (SIP), 4K-byte cache memory, memory management unit, 32-bit bus; 1M-byte 64-bit-chip MOS 8-word interleaved memory, multiline communications processor, 2 communication/workstation ports, printer port, card reader or second printer port, disk controller and 2 disk I/O ports, and power failure interrupt • maximum DPS 6/95 System includes 16M-byte memory, up to 4G bytes of storage on 18 disk drives, 4 tape drives, 128 communications/workstation ports, 8 Multiline Communications Processors, 4 printers, 2 card readers, and 2 650K-byte diskettes.

First Announced • July 1983.

Pricing • purchase prices for basic systems as outlined above are: $27,000 for 6/40; $20,000 for 6/45; $35,000 for 6/75; $80,000 for 6/95.

■ **INTERNATIONAL BUSINESS MACHINES (IBM) CORPORATION/Information Systems Group**

National Accounts Division; 1133 Westchester Avenue, White Plains, NY 10604; 914-696-1900 • National Marketing Division; 4111 Northside Parkway, Atlanta, GA 30327; 404-238-2000

□ **IBM Series/1: 4954 & 4956 Computer Systems**

Type of Device • minicomputer; standalone processing, cluster controller, or node in peer-to-peer network.

Distributed Functions • multiuser, batch-oriented applications with modest transactional and interactive capabilities: supervisor, data management, communications, and general utilities functions.

Associated Systems & Networks • SNA and X.25 networks • IBM Series/1 computer systems; up to 16 processors interconnected in a peer-to-peer ring configuration • SNA/SDLC capability as physical unit 2 • BSC support for point-to-point, switched and nonswitched configurations with S/370-compatible host and other IBM systems • channel attachment to S/370-compatible host • RJE terminal to S/370-compatible host • RPS and EDX supports X.25/HDLC communication.

Communications • supports up to 24 communication lines in any mix terminating at a single processor; can attach multiple 4987 subsystems as communication front ends; each 4987 can support 32 point-to-point switched, or multipoint lines; practical limit on number of lines determined by throughput requirements • supports asynchronous, BSC, and SDLC half-duplex communication at data rates up to 19.2K bps (asynchronous), 56K bps (BSC), and 9600 bps (SDLC), and full-duplex communication at 56K bps (HDLC) • provides local area network support for up to 16 interconnected Series/1s • provides communication support of Series/1 to Series/1, Series/1 to host (BSC, channel attachment, SNA/SDLC, and Type P secondary logical unit), Series/1 to 3270, and Series/1 to other devices.

Features • Series/1 System includes 2 basic processors; the 4954 (submodels A/B/C-30D) provides from 64K- to 256K-byte memory; model 4956 (submodels B/C-30D) processor provides from 256K- to 1M-byte memory; model 4953 is no longer marketed • each processor consists of single chassis, power supply, 6 halfwidth or 15 fullwidth card slots, and a self-contained control panel • card slots are used for CPU and basic storage cards; remaining slots accommodate memory add-ons, processor, communications, I/O, sensor, or user attachment cards; single I/O channel is integral component of each processor unit; attachment cards permit an equally large number of related devices and lines to be connected to I/O bus • 1 processor combines up to 6 expansion chassis (each with 15 card slots for a total of 92 slots) in single 19-inch rack; multiple racks interconnect to form complex single-processor or multiprocessor configuration; -30D models integrate a 30M-byte disk, and have options for disk cache, 1.2M-byte diskette, compatible version of 4965 storage and I/O expansion unit • programmable communication subsystem: front end to Series/1 System contains built-in multiplexer with scanner and 11K-byte memory; provides 16 card slots for independent feature attachments; supports several 2-line attachments for a maximum configuration of 32 lines at mixed rates of 45 to 9600 bps; supports auto-call/-answer, auto-polling, break signal processing, auto-error rating; runs under Programmable Communication Subsystem Preparation with Base Program Preparation Facilities or with all versions of RPS Program Preparation Subsystem, Programmable Communication Executive Support with RPS 2, 3, 4, and Programmable Communication Extended Execution Support with RPS 4 • no specified disk limit, logical maximum about 540M bytes • maximum 256 device addresses for terminals/workstations; EDX Terminal Communication System IUP supports up to 32 ASCII display terminals; printers (unspecified limit) include 150- to 300-lpm line printers and 40- to 180-cps character printers.

Software • Real-time Programming System (RPS), Event Driven Executive (EDX), and Control Program Support (CPS) are 3 distinct interactive batch-oriented operating systems with modest multiuser facilities, nonvirtual memory • CPS is basically a macro assembler with a number of separately defined/priced utilities, it supports only BSC operations in RJE host relationships • EDX is similar to CPS except is less fragmented than CPS, supports both BSC and SNA/SDLC operations; program development using COBOL, FORTRAN IV, and PL/1 on Series/1 or PL/1 on host S/370-compatible system • RPS provides all facilities of EDX and CPS (supports both BSC and SNA/SDLC as well as BASIC in addition to other languages) integrated into single operating system with facilities for file processing in batch or transactional modes and in standalone or network environments • RPS V.6.1 and EDX V.4 in conjunction with 4956 storage translation hardware can address up to 1M bytes • RPS provides data management modules for sequential/direct access; separate indexed access method available for RPS, EDX, CPS • RPS Advanced Remote Job Entry program allows remote Series/1 users to query host processor for status of previously supported job; supports BSC and SDLC protocols • database management facilities include: AM2 RPS Indexed Access Method Versions 2.0 and 2.1 provide all features of PRPQ IAMs but permit COBOL/SORT-MERGE programs to access files directly through IAM facilities; TCBRPS Indexed Access Method (IAM) Version 3 supports fixed-length user records, which may be blocked in data file; accommodates indirect high-level language file accessibility through program calls to subroutines written in assembly language; SM2 RPS Sort/Merge implements RPS COBOL SORT

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and MERGE verbs; XR2 RPS QUERY allows user to retrieve data stored in Indexed Access Method or sequential files • RPS communications software includes: RPS Programmable Communications Subsystem Preparation Facility; Extended Execution Support; Communications Manager Versions 2.0 and 2.1; Remote Manager; X.25/HDLC and X.25 Communications Support; SNA Extended Support; BSC Remote Management Utility; Advanced Remote Job Entry (ARJE); Multiple Terminal Manager Versions 3.0 and 3.2; System/370 Channel Attach; MRJE • EDX communications software includes: Communications Facility; SNA Extended Support; RJE; multileaving Remote Job Entry; multiple terminal manger Version 2; ARJE; X.25/HDLC communications support; remote manager; System/370 channel attachment; THA Series 1 support program for TE programmable controllers; THB support program for Gould modem programmable controllers; THC support program for Allen-Bradley programmable controllers; THD support program for GE programmable controllers; terminal communications systems; Series 1 communication controller for System 38 • CPS communications software includes; BSC support; intelligent terminal subsystem; RJE, auto-call unit and telephone data set support • multienvironment communications software: TGC Series/1 and personal computer intelligent workstation support.

Program Development • high-level languages include: macro assembler and COBOL on CPS; COBOL, FORTRAN IV, and PL/1 on EDX and RPS; and BASIC on RPS • Standalone Base Program Preparation Facility is object-code compatible with EDX and CPS • Standalone Virtual BASIC Program requires 256K-byte memory to support 18 active terminals • RPS program development (in addition to above) includes Program Preparation Subsystem, Job Stream Processor, Host PL/1 Compilation Facility, Debugging Aid, COBOL Compiler and Resident or Transient Library, Virtual COBOL Subsystem-Routine Monitor, Sort/Merge • EDX program development includes: Licensed Program Versions 1 and 2; EDX Utilities; Macro Library (Version 1) and Macro Library Host (Version 1); Program Preparation Facility; and Program Executive System Preparation or Executive Support • CPS program development includes: Virtual COBOL Subsystem; Virtual COBOL Support; Virtual COBOL Subsystem Routine Monitor; and Operator Interface/Debug.

Ease of Use Features • RPS Screen Formatter and Design Aid Utility support interactive display creation and testing for 4978, 4979, and 5250 Displays; interfaces with RPS high-level languages; supports audit/edit on 5250 screen field; screen formats can be saved on disk or diskette • RPS Screen Formatter and Presentation Support provide companion module to Design Aid Utility; consists of supervisory modules that link the user-written applications to the displays.

Configuration Flexibility • basic 4954 system includes: 4954 CPU and 64K-byte memory expandable to 256K bytes; integral relocation translator; and available card slots, half-width unit for rackmounting • basic 4956 system includes: 4956 CPU boards; 256K-byte memory board; system expandable to 1M bytes; 13 available card slots; and full-width chassis • all Series/1 processors can expand the number of available channel slots through up to 6 expansion units or up to 92 slots • up to 16 CPUs can be interconnected in a "ring" Local Area Network (LAN) • a maximum of 256 logical devices can be addressed by each processor, but a multiplexed subsystem cluster can be treated as a single device, depending on the nature of the subsystem and its software support • the programmable front end supports up to 32 lines • memory capacity is model dependent.

First Announced • 4954 and 4956 in April 1983

Pricing • purchase price for basic systems as outlined above are: $7,800 for 4954; and $14,150 for 4956.

☐ IBM System/36—5360 Computer Systems

Type of Device • small business computer for standalone and distributed environments, supporting up to 36 local and 64 remote terminals/workstations.

Distributed Functions • System Support Program (SSP) operating system; interactive menu-driven, single- or multiuser, single-program or multiprogramming operation; office automation and

text management facilities, business graphics, special printer functions and IBM displaywriter integration facility.

Associated Systems & Networks • SNA; S/36 can function as Type 2.1 mode which implements Logical Unit (LU) 6.2 protocol; SSP in conjunction with Multiple Session RJE (MSRJE) and SSP-ICF supports up to 36 local and up to 64 remote workstations on up to 4 communication lines using SNA/SDLC line protocols; supports BSC in programs written in RPG II or assembler.

Communications • 1 communication adapter supporting 1 communications line or 1 multiline communications adapter that supports 4 communications lines • data rates up to 9600 bps, half-duplex over switched or nonswitched facilities; maximum total data rate with both lines operating is 9600 bps • multiline adapter supports maximum of 56K bps (1 DDS line) with maximum total rate of 65.6K bps on all 4 lines • jobs can be submitted to System/370 host under HASP II, ASP, RES, JES2, JES3, or VM/370 • integrated modem up to 1200 bps, BSC/SDLC protocols over switched or nonswitched facilities • Digital Data Service Adapter (DDS) provides 4800/9600/56K bps, SBC/SDLC protocols over AT&T nonswitched Dataphone Digital Service network • auto-call adapter provides System/34 when attached to switched network via external modem and auto-call unit to initiate data link connection to a remote device.

Features • 5360 utilizes multiple microprocessor architecture in parallel processor implementation • main storage control microprocessor handles memory up to 512K bytes and 16-bit wide data transfers; control storage processor with 64K-byte local memory provides I/O control and floating-point operation • memory included in basic system package from 128K to 512K bytes, expanded by add-on modules • 246K to 1.2M bytes of diskette storage; 30M/60M/200M/400M-byte hard disk drives; streaming tape drives; up to 36 local or 64 remote terminals; 1 160- to 650-lpm system printer.

Software • System Support Program (SSP) operating system supporting single- or multiprogramming modes and single- or multiuser environments; resident nucleus includes I/O, memory, OCL, and data management functions; additional standard control program capabilities include remote workstation communications, batch BSC spooling, program development and security • I/O management provides input and output operation control for disk, printer, display stations, BSC, SNA/SDLC communications, and magnetic character reader • database management bundled with operating system supports indexed, direct, and sequential access methods • communications software includes: SSP-ICF interactive communications feature, provides program development; MSRJE multiple session RJE; data encryption standard for banking; distributed disk file facility (DDFF) PRPQ for personal computer; device emulation allows S/36 and locally attached 5250 to appear as 3270 cluster system to host system under IMS/VS • office automation software includes office management system; text management systems, business graphics utilities; advanced printer function; information interchange with IBM displaywriter; file support utility for IBM PC and PC/XT • compatibility/emulation/conversion migration aid assists moving S/34 Release 9 application programs to S/36 Release 1 • WSF/36 workstation search facility.

Program Development • RPG II, FORTRAN IV, COBOL, BASIC, assembler, and Macro processor • Utilities Licensed Program provides Data Files Utility (DFU), Sort, Source Entry Utility (SEU), Work Station Utility (WSU), and Screen Design Aid (SDA).

Configuration Flexibility • basic system includes a CPU, 128K-byte main memory, single diskette drive, 30M-byte hard disk drive • maximum system includes 512K-byte memory, diskette or magazine drive, 400M-byte hard disk, 4 communications lines, 1 tape drive, up to 36 local and 64 remote display terminals or printers.

First Announced • 1983.

Pricing • purchase price for basic system as outline above is $21,000.

☐ IBM System/38: 4, 6 & 8 Computer Systems

Type of Device • host computer system to multiple workstations in a standalone transaction processing system with its own

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relational database • can function as a terminal attached to an IBM System/370, 30XX, or 4300 Series processors.

Distributed Functions • Control Program Facility (CPF) virtual memory operating system supports multiuser interactive environments with concurrent batch processing.

Associated Systems & Networks • SNA, Type 2.1 mode that implements LU 6.2 protocol • can function as a single host node on SNA network; as host supports multiple SNA/SDLC 5250 displays; System/38 can emulate 3770 console to System/370 CICS/VS and IMS/VS System protocol • S/38 can connect to Series/1 via Local High-Speed Attachment • AT&T DDS Network via DDSA • supports BSC communication with IBM Series/1, S/3, S/32, S/34, S/38, S/370, S/303X, 4300, 5110, and 5120 computers and with IBM 3741/5230/5260/5280 terminals; user can implement batch and interactive applications to run on other BSC systems • 3270 communications with IBM 5150 PC and 5160 PC/XT • SNA Remote Job Entry (SRJE), BSC Multi-Leaving Remote Job Entry (MRJE), and BSC Multipoint tributary connection support extends the system's SNA/SDLC capabilities • 5798-RDY allows communications between System/38s and a Series/1 by SDLC or with other systems by BSC • 5798-RKB BSC RJE for VSE/POWER supports the system in remote job submission to computers using DOS/VSE with VSE/POWER.

Communications • BSC communication via program-to-program over point-to-point or switched lines • can attach up to 8 communication lines; supports half-duplex speeds up to 9600 bps over point-to-point dedicated lines and 4800 bps over point-to-point switched lines • Digital Data Service Adapter (DDSA) supports up to 56K bps over AT&T Dataphone Digital Service (DDS) network; block lengths at 2K bytes for BSC and 1.8K bytes for SNA/SDLC; maximum 2 56K-bps lines • Local High-Speed Attachment with BSC support at 56K-bps rate connects Series/1 to System/38, allowing Series/1 to operate as a front-end processor.

Features • Models 4, 6, and 8 Computer Systems built around 32-bit-word CPU; MOSFET memory capacities are 768K to 2M bytes on Model 4, 2M to 4M bytes on Model 6, and 4M to 8M bytes on Model 8 • configured using a Model 4/6/8 processor with control storage and integrated I/O channel, memory, system control adapter, operator/service panel, system console/keyboard display, diskette magazine drive, integrated nonremovable disk storage (from 64.5M to 387.1M bytes), integrated diskette subsystem (27.9M bytes maximum); 571.4M to 2.28G bytes auxiliary disk storage on up to 4 disk units, and basic workstation controller system expansion through optional features and related peripherals: 300/650/1200-lpm printers, 3370 disk storage attachments for Models 4/5, multifunction card unit attachments, magnetic tape attachments, from 4 to 8 line attachments, and up to 3 additional local workstation controllers • I/O through single integrated I/O channel on all models with maximum data transfer at 2.5M bytes per second and 5M bytes per second (in 16-bit mode); 3370 disk storage operates in half-word mode; various Processor Unit Expansion features include I/O board, power supply, and assembly for various attachment requirements (workstation controllers, printers, disk storage).

Software • runs under Control Program Facility (CPF) which includes Control Language (CL), productivity aids, database management, and intersystem message facilities; Work Management Facility; Data Management Facility; Security, Intra-System Message Facilities; Spooling, System Service Facilities • error control is under the Concurrent Service Monitor (CSM), which performs online tests and diagnostics • communications software includes SNA/SDLC, BSC, 5798-RDY S/38 Series/1 Communication Utility, and 5798-RKB Binary Synchronous Communication Remote Job Entry for VSE/POWER • communications software: SNA/SDLC supports S/38 as host for multiple remote 5250 and appears as an SNA device • BSC supports S/38 with IBM S/1/3/34/38/370/30XX/4300/5110/5120 computer with IBM 3741/5230/5260/5280 terminals • System/38 SNA/SDLC and BSC includes SNA Remote Job Entry (SRJE), BSC Multi-Leaving Remote Job Entry (MRJE), and BSC multipoint tributary connection • application software supports general business functions.

Program Development • Control Language (CL) is a high-level,

machine-dependent interpretive or compiler language; can be menu driven with system prompting and a HELP facility for error explanations; RPG III is the primary language for application development; ANSI '74 Level 2 COBOL and BASIC also available • conversion aids include System/3-to-System/38 Batch; transition from 3270 to 5250 environment; System/34-to-System/38.

Ease of Use Features • Control Language (CL) is a very high level machine-dependent language that can either be interpreted directly for simple interaction and system facility calls or can be assembled into compiled programs; uses English language mnemonics and free-form syntax • Interactive Database Utilities (IDU) is package for multiuser data handling utilities: Source Entry Utility (SEU) for entering and maintaining source statements; Screen Display Aid (SDA) for interactive design and maintenance of display formats, application menus, and CL programs to execute menus; Data File Utility (DFU) for developing data entry applications; Query Utility to create reports from database files.

Configuration Flexibility • configured using a 5381 system unit which contains model 4, 6, or 8 processor unit with control storage, integrated I/O channel, main memory, system control adapter, operator/service panel, system console, keyboard display, diskette magazine drive, integrated nonremovable disk storage, basic workstation controller, and workstation controller extended • minimum model 4 contains 768K-byte memory and 64.5M-byte disk • maximum model 4 includes 2M bytes of error checking and correction MOS memory; 387.1M bytes of integrated nonremovable disk storage on 6 spindles; 27.9M-byte diskette storage on 23 diskettes; 4.6G bytes of fixed-media disk storage on 4 disk units; 7 local workstation controllers providing local attachment for up to 128 interactive workstations; up to 8 communication lines for remote attachments; 2 line printers; 4 magnetic tape units; single multifunction card unit • minimum model 6 system includes 2M-byte memory and 64.5M-byte disk expansion enclosure • maximum model 6 system includes 4M bytes of error checking MOS memory, 387.1M bytes of integrated nonremovable disk storage on 4 spindles, 27.9M bytes of diskette storage on 23 diskettes, 2.9G bytes of fixed media disk storage on 6 disk units; 7 local workstation controllers providing local attachment of 128 interactive workstations; 8 communication lines for remote attachments, 2 line printers, 4 magnetic tape units, and single multifunction card unit • minimum model 8 system includes 4M-byte memory, 64.5M-byte disk, and expansion enclosure • maximum model 8 system includes 8M bytes of error checking and correction MOS memory, 387.1M bytes of integrated nonremovable disk storage on 6 spindles, 27.9M bytes of diskette storage on 23 diskettes, 4.66M bytes of fixed-media disk storage on 4 disk units, 7 local workstation controllers providing local attachment for 128 interactive workstations, 8 communication lines for remote attachments, 2 line printers, 4 magnetic tape units, and single multifunction card unit.

First Announced • July 1980 for basic product line; July 1983 for Model 8 Series; 1984 for Model 6 Series.

Pricing • purchase prices for minimum systems as outlined above are: $61,640 for Model 4; $82,840 for Model 6; and $140,340 for Model 8 • maintenance prices are $450 for Model 4, $587 for Model 6, and $782 for Model 8.

☐ **IBM 4300—Model 4361-3**

Type of Device • standalone or distributed data processing system.

Distributed Functions • commercial applications; scientific and math-oriented applications.

Associated Systems & Networks • Systems Network Architecture (SNA) • ACF/VTAME access method combines capabilities of ACF/VTAM (running on host) and ACP/NCP/VS (running on front-end communications processors) to support integrated communications adapter • can support 3705/3725 communications controller but not recommended due to cost.

Communications • asynchronous start-stop (SS); BSC; Synchronous Data Link Control (SDLC) protocols • supports 8 communication lines up to 9600 bps per line on adapter, can support

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higher rate, but not on all lines; aggregate data rate limited to 64K bps.

Features ● include processor, card image I/O device, hardcopy output device, 1 of several disk/tape combinations; 2M-, 4M-, 6M-, or 12M-byte basic memory; 16K bytes of reloadable control storage memory; 400 terminals/workstations.

Software ● DOS/VSE, SSX/VSE, VM/SP, VM/BSE, and MVS primary operating systems ● DOS/VSE R.26 and DOS/VSE R.34 can run, but not supported; database management DL/1 under SSX/VSE, DOS/VSE, VM/SP, or VM/BSE; IMS under MVS or VM; DB2 under MVS ● processing management, primarily through CICS/DOS VS1.5.0, operates as TP monitor to interface terminals to application programs in host ● assembler, BASIC, Pascal, COBOL, FORTRAN IV, APL, RPG-II, and PL/1 languages.

Program Development ○ assembler, BASIC, Pascal, COBOL, FORTRAN IV, APL, PPG-II, and PL/1 ● interactive system productivity facility provides control and services to support dialog processing in different hosts; cross system product/query provides access to Virtual Storage files; cross-system product/application development provides interactive interface for developing, testing, generating, and executing application programs in CICS/VS, TSO, or VM/CMS.

Ease of Use Features ● Cross-System Product/Query 1.3.0 for use by non-DP users; Computer-Aided Instruction (CAI) can instruct in any topic.

Configuration Flexibility ● basic system includes 2M bytes of main memory, 1001 Adapter Power Prerequisite, 1901 Control Storage Expansion, 2001 displaywriter printer adapter (DPA), DPA expansion 3401 Integral Diskette Drive, 3898 External Signals, 5531 Power Interface, 5532 Additional Power Interface, 8701 EPS: VM/370, ECPS: VSE, High-Accuracy Arithmetic Facility, Serial OEM Interface, and Programmable Power-off ● maximum system includes 4M-byte main memory, 3 S/370 I/O channels with maximum of 1 high-speed BMPX channel, up to 2 DSAD/8809 Adapters to attach up to 4 3310—3370-AO1/BO1/AO2/BO2 DASDs each; BMPX data rate limited to 1.86M bps and it cannot attach DASDs; high-speed BMPX precludes second DASD/8809 adapter; optional integral communication adapter can attach up to 8 switched or nonswitched communication lines.

First Announced ● 1984.

Pricing ● purchase price for basic system as outlined above is $56,500; monthly maintenance is $295.

□ **IBM 5280 Series: 5285, 5286 & 5288 Distributed Data Systems**

Type of Device ● user-programmable, single- or multiterminal, small-scale distributed data system.

Distributed Functions ● data entry, remote batch/inquiry/printing, remote job entry, and local data processing.

Associated Systems & Networks ● the 5285/5288 members of 5280 Distributed Data System family attach to S/370-compatible host in BSC or SNA/SDLC networks in point-to-point or multipoint configurations ● 3270-Type BSC Communications allows 5280 to appear as IBM 3270 Terminal System to S/370-compatible host; IBM 3741-Type BSC allows 5280 to appear as IBM 3741 Data Entry System when communicating with another 5280, 3740, or a 5265 POS terminal, or with such host systems as IBM Series/1, or IBM S/370-type processors in DOS/VSE environment with BTAM or CICS or in OS/VS environment with BTAM, TCAM, CICS, or IMS; 3780-Type allows 5280 to appear as IBM 3780 Communication Terminal when communicating with IBM S/370-type host with DOS/VSE POWER; S/3 MRJE-Type allows 5280 to appear as S/3 MRJE workstation when communicating with IBM S/370-type host with OS/VS1 RES, OS/VS2 JES2, or OS/VS2 JES3 ● 5280 can appear as SNA Logical Unit Type 1 terminal when communicating with S/370-compatible host in DOS/VSE environment with ACF/VTAM, CICS, or POWER, or in OS/VS environments with ACF/VTAM, ACF/TCAM, CICS, IMS, RES, or JES.

Communications ● 5285- or 5288-based configurations can support a single BSC/SDLC communication line, half-duplex

operation at 600- to 4800-bps half-duplex BSC/SDLC, ASCII/EBCDIC codes facilities; not supported on multiterminal 5285 systems or on 5286-3270 emulation via 5285/5288; BSC/SDLC.

Features ● configurations of the 5280 are based on 5285 Programmable Data Station, the 5286 Dual Programmable Data Station, or the 5288 Programmable Control Unit; programmable 5280 controller supports system configuration with satellite 5281 Data Station or 5282 Dual Data Station, the 5222/5224/5225 and/or 5256 Printer, and communication facilities ● 5285 Programmable Data Station with 64K- to 128K-byte memory supports up to 7 printers and single communication line; diskette storage for 246K to 492K bytes on single/dual diskette drives; 1 10M-byte disk can be configured in place of the second diskette ● 5286 Programmable Dual Data Station with 64K-/96K-byte memory supports single 5281 Data Station or 5282 Dual Data Station (2 to 4 keyboard display terminals per system) in noncommunicating configuration; integral 492K-byte diskette storage on dual diskette drives ● 5288 Programmable Control Unit provides from 64K- to 228K-byte memory supporting up to 4 5281 Data Stations or 5282 Dual Data Stations (intermixed with 1 to 4 keyboard display terminals per system), up to 7 5222/5224/5256 Printers (intermixed), single 5225 Printer, and communication line; 246K- to 1.8M-byte diskette storage; 1 10M-byte disk can be configured in place of optional diskette ● 2500 Communication Adapter is required on 5285/5288 for attachment of BSC or SNA communication line via modem or interface; provides internal clocking for integral or external modem; offers selectable adapter/interface feature: EIA Interface (RS-232C, CCITT V.24/V.28) for attachment of external IBM or non-IBM modem; BSC or SDLC adapters for point-to-point or multipoint operation over AT&T DDS network; 600-/1200-bps switched or non-switched line integral modems ● 3270 Communication Adapter provides similar functions as 2500 Communication Adapter, except with extension to support 3270 emulation; used with Communication Utilities and 3270 Emulation Software programs.

Software ● 5280 System Control Programming (SCP) provides operating system-type facilities for 5280 Distributed Data System via 4 program modules implemented by display prompts; Initial Program Load (IPL) contains system configuration specifications required to complete power-on sequences and system initialization; System Configuration allows user to generate IPL by specifying requirements; describes both logical and physical 5280 system parameters; PTF/Patch allows for implementation of IBM-supplied program corrections or updates, or of user program revisions via program temporary fixes (PTFs) or program patches; and Close Failure Recovery allows for access to data that would otherwise be lost due to not properly closing data sets; SCP supports up to 8 partitions, 4 of which can be foreground ● bundled 5280 SCP program number is 5708-SC1; the database management facility is part of the SCP; only sequential data set organizations are supported; access methods are sequential; the data set organization and access methods are defined by the user program ● diskette/disk data sets can be shared; data sets labeled as shared read or shared read/write (update) to allow multiple programs to access the same data set; if users do not wish to share a data set, a lock-out facility is available ● communications in BSC or SNA/SDLC environments is supported on programmable 5285 or 5288 members of the 5280 Distributed Data System family; the programmable dual-display 5286 will not, however, support communications; communications utilities provide preparation and execution communications utilities for 5280 operations in remote batch, inquiry, RJE, or distributed terminal environments; Multipoint Monitor utility provides response to host polling and selections without requiring communications program to be loaded into memory; RJE Description preparation utility defines Multi-Leaving RJE or SNA RJE execution utility tasks; Data Description preparation defines SNA/BSC Data Communications; BSC Batch Transfer, or BSC Online Test execution utility tasks, Multi-Leaving RJE (MRJE) allows the 5280 to function as remote job entry S/3-type terminal with S/370-type hosts; SNA RJE (SRJE) allows the 5280 to function as RJE workstation in SNA/SDLC environment ● SNA Data Communications support both send and receive batch and inquiry tasks on 5280 in SNA/SDLC environment; up to 4 SNA data communication utilities operating with the same IMS or CICS subsystem can be run concurrently;

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multiple transmit, receive, and inquiry functions may be executed as single job ● BSC Data Communications supports send and receive batch and inquiry tasks on 5280 in BSC environment; 5280 appears to host as 3741 or 3780 (for DOS/VSE POWER hosts) terminal; BSC Batch Transfer supports disk/diskette batch send/receive operations on 5280 as 3741 terminal; multiple send and receive operations may be executed as single job; BSC communications requires 5285/5288 with minimum of 32K bytes, disk/diskette drive, and 960-character display; MRJE requires a minimum of 48K and SNA/SDLC a minimum of 64K bytes of memory.

Program Development ● 5280 DE/RPG enables users to write 5280 data entry and application programs on the 5280 system ● Format Design Aid creates DE/RPG source code from display image entered by user at a 5280 Display Station ● assembler provides control statements and instruction enabling users to write 5280 programs on the 5280 system ● host-compiled COBOL for generating 5280 machine language load programs.

Ease of Use Features ● DDS-type display prompting for ease of program entry for users writing 5280 data entry and application programs (DE/RPG) on system 5280.

Configuration Flexibility ● 5285 Programmable Data Station with 64K/96K/128K-byte memory supports single 5281 Data Station or 5282 Dual Data Station (1 to 3 keyboard display terminals per system) and up to 7 printers in noncommunicating configurations; 246K to 4.8M bytes of diskette storage; 1 diskette is standard and 1 additional drive position is available ● a 10M-byte disk can be substituted for optional diskettes on the 5285 and 5281; a 5285 with attached 5281 displays can contain up to 3 10M-byte disks (5282 supports only diskettes); disks/diskettes can be mixed in any combination ● 5286 Programmable Dual Data Station with 64K-/96K-byte memory supports single 5281 Data Station or 5282 Dual Data Station (2 to 4 keyboard display terminals per system) in noncommunicating-only configuration; 246K to 4.8M bytes of diskette storage ● 5288 Programmable Control Unit with 64K/96K/128K/160K/224K/228K-byte memory supports up to 4 5281 Data Stations or 5282 Dual Data Stations (intermixed, with 1 to 4 keyboard display terminals per system), up to 7 printers (intermixed), single 5225 Printer, and communications; 246K to 9.7M bytes of diskette storage ● 1 diskette is standard on the 5288; up to 3 physical drive positions are available ● a 10M-byte disk can be substituted for optional diskettes on the 5288 and 5281; a 5288 with attached 5281 displays can contain up to 7 10M-byte disks; disks/diskettes can be mixed in any combination.

First Announced ● 1980.

Pricing ● purchase price is $6,213 for 5285 as outlined above with 64K memory and single diskette 1 format drive; $8,263 for 5286 as outlined above with 64K memory and dual diskette 1 format drive; and $6,913 for 5288 as outlined above with 64K memory and single diskette 1 format drive.

☐ **IBM 8100 Series: 8130A, 8130B, 8140A, 8140B, 8140C, 8150A & 8150B Information Systems**

Type of Device ● distributed processing system; standalone processor or host in network of 8100s ● also functions as cluster controller for distributed office, manufacturing system, distributed data processing, and remote job entry environments with programs developed and downline loaded on S/370-compatible host.

Distributed Functions ● multiprogramming, multiuser applications including application-to-application transfer of data records; program-to-remote database/transaction processing; data entry; remote job/data entry; distributed office/document/text/data processing.

Associated Systems & Networks ● supports IBM SNA architecture as SDLC or BSC device under either DPCX or DPPX; as SDLC device directly or as an IBM 3791 controller; as BSC device, 8100 looks like an IBM 3271 controller; under DPPX, 8100 can operate as host to network of 8100s or can operate as standalone system ● specific support includes asynchronous communication with IBM 2741, 3101, and 3767 terminals; BSC communication

with IBM S/370 processors through ICA adapter, 37X5 Communication Controllers, 4331 processor through integrated communication adapter, and other 8130/8140/8150 processors; SNA/SDLC communication with IBM 3274-51 Control Unit, 3276 Control Unit Display Station, 3601/3602 Finance Communication Controller, 3631/32 Plant Communication Controller, 3651-25/75 Store Controller—Programmable Store Controller, 3684 Point of Sale Control Unit, 3767 Communication Terminal, 6670 Information Distributor, 8775 Display Terminal, 8101 Storage and Input/Output Unit, 8130/8140 Processors, 37X5 Communication Controller, 4331 Processor through integrated communication adapter, and 3843 Loop Control Unit ● can support systems that emulate IBM 3270 terminals.

Communications ● supports asynchronous and BSC/SDLC synchronous communications through communication ports configured with communication link or local/remote loop ● number of communication ports varies from 14 to 64 depending on the 8100 model ● communication line data rates up to 9600 (BSC) and 56K bps (SDLC); local loop data rates are 9600 or 38,400 bps; remote loop data rates are 2400, 4800, or 9600 bps.

Features ● an 8100 system is built around an 8130, 8140, or 8150 processor ● it includes the CPU in single, dyadic, or dual versions, main memory, fixed disk storage, removable diskette storage, and communications ports for the attachment of local loop, remote loop, directly attached, and remote (via communications line) terminals ● expansion of fixed disk capacity and local/remote terminal attachment requires 8101 or 8102 Storage and Input/Output unit; the 8101s and 8102s support significant expansion for the attachment of local displays and printers; up to 4 magnetic tape units can be attached to an 8100 processor or 8101/2 Storage unit (but not to both) ● the 8102 provides twice the disk capacity of the 8101 but does not support communication ports ● the configuration rules are complex and are centered around system maximums rather than component maximums.

Software ● Distributed Processing Control Executive (DPCX) operating system is a partially distributed system with program development and program loading performed through the host; replaces and extends host-managed IBM 3790 distributed data processing, IBM 3730 distributed office, and IBM 3630 manufacturing system environments as well as IBM 3270 cluster controller ● provides full-feature distributed processing support with local program development and execution within interactive, multiuser environment; manages 4M-byte virtual address space ● DPPX/SP extends Base and provides integrated transaction processing system; supports 8M-byte logical address space ● Database Transaction Management System (DTMS) provides database/transaction management under DPPX only ● transaction processing management support locally under transaction manager in DPPX/DTMS (Database & Transaction Management System) ● in 8100 host-controlled environment, local application programs can access remote database/transaction processing through remote DTMS ● in IBM S/370-compatible host-controlled environment, under DPPX/DPCX Data Stream compatibility, 8100 appears as IBM 3270 remote controller giving attached terminals and printers direct access to host and its facilities; application programs running on 8100 can interface to IMS/VS or CICS/VS applications on IBM S/370-compatible host.

Program Development ● COBOL, FORTRAN, PL/1, APL, and assembler under DPPX only ● application programs to run under DPCX developed on IBM S/370-compatible host and downline loaded in 8100 ● DPDS (Distributed Processing Development System) provides development language for system programs for 8100/DPPX systems ● Development Management System (DMS)/DPPX and DMS/DPCX provide interactive interfaces for developing application programs easily; DMS/DPPX runs on 8100 under DPPX but can be accessed through terminal at host site; DMS/DPCX runs under control of DOS/VSE, OS/VS1, MVS, or VM/370 on S/370-compatible host.

Ease of Use Features ● both DPPX and DPCX use same DMS (Development Management System) language for developing application software for the 8100: DMS/DPPX running on 8100 and DMS/DPCX running on S/370-compatible host provide self-teaching aids, prompting facilities, program generators, and pre-

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defined applications as well as other facilities to aid user in developing programs.

Configuration Flexibility ● 8130 processors include CPU, main memory, fixed disk storage, diskette storage, and communications ports to accommodate local loop, remote loop (data link attached), local, and remote terminals ● all components are housed in a single cabinet; 4 8130A models provide different combinations of moving-head and fixed-head disk storage; all models include 256K-byte memory; all models support 1 8101 Storage and Input/Output unit directly; 8130A models support a second 8101/8102 unit through a special feature; 8130B models support 2 additional 8101/8102s; a group of up to 4 magnetic tape units can be attached to a processor or to an 8101/8102 unit (but not to both) ● memory can be expanded to 1024K bytes (8130A) or 2048K bytes (8130B); disk storage can be expanded to 577M bytes (8130A) or 832M bytes (8130B) via 8101/8102 units; the processor can be expanded to include up to 6 communication ports; up to 14 ports maximum can be included in a 8130 system via 8101 units; Model 8130 A23 can be upgraded to a Model 8130 B23, Model A24 to Model B24, the Model B23 to B24 ● 8140 single- and dual-processor models include CPU(s), main memory, fixed disk storage, diskette drive, and communications ports for local loop, remote loop (data link attached), local, and remote terminals; all components are housed in a single cabinet; 8140 single-processor models provide different combinations of moving-head disk storage and fixed-head disk storage, main memory, floating-point hardware, communications ports, and support for Expanded Operator Panel ● dual-processor models provide 3 different memory capacities for basic systems containing 123M-byte disk storage, 18 communication ports, and floating-point hardware; all models support up to 4 8101/8102 Storage and Input/Output units; a group of 4 magnetic tape drives can be attached to the 8140 processor in lieu of 1 8101/8102 or to 1 of the 8101/8102 units; memory expansion is supported only on 8140 A3X Series; disk storage is expandable on all models to 1G bytes via 8101/8102 units; number of ports for connecting local and remote devices depends on processor model, connected 8101/2, and conflicting features ● the 8150 systems provide greater reliability and improved storage management processing with higher throughput over other 8100 systems ● the 8150B Models are dyadic processors, systems are designed using VLSI technology; memory capacity is up to 3M(8150A)/6M(8150B) bytes with logical storage up to 16M bytes; system an support up to 4 8101/8102 Storage and I/O Units ● 8150 has a new storage management option with keys and locks to allow more efficient use of logical storage ● single copy of CASS (common address space section) in logical storage is shared by all users; ECC (error correction code) has been enhanced to provide correction of all single- and most double-bit storage errors; during IPL, the system performs a self-test and will automatically reconfigure itself around a failing element; also during operation, the system will re-IPL if a system unit fails and continue operation without it ● with DPPX/SP, the additional 8150 storage can be used with DASD Cache to keep disk records resident, reducing disk accesses; no disk drives are integrated in the 8150; all disks are attached through the 8101/8102 Storage and I/O Units, up to 4 8101s/8102s can be attached to an 8150 system; 1 8101 can be configured with communication ports and/or Display and Printer attachment features; the basic 8150 can be configured with up to 12 communication ports; with an 8101, this total can be increased to 20 ports; ports can be used to attach single- or double-lobe loops or SDLC and BSC links; up to 4 (8150A)/8(8150B) ports can be high-speed (over 9600 bps) ports; 8150 is upward compatible with other members of the 8100 line; various 8150 models can be field upgraded to the next higher model; 8150 is supported by DPPX/SP Releases 1 and 2, DPCX Release 4, and DOSF Release 4; DPPX/SP Release 2 supports all of its functions; DPPX/SP Release 1, DPCX Release 4, and DOSF Release 4 do not support I/O on both of the Processing and Control Elements (PCEs) and the improved storage management option; the performance of the 8150 is 1.3 (8150A) or 2.0 (8150B) times that of the 8140C in the DPCX/DOSF environment and 1.5 (8150A) or 2.4 (8150B) times that of the 8140C in the DPPX/SP Release 2 environment.

First Announced ● 1979 for 8130A and 8140; 1982 for 8140C; 1984 for 8130B; 1984 for 8150s.

Pricing ● purchase price for systems as outlined above are: $19,040 for 8130A with 256K-byte memory and 29M-byte disk; $37,600 for 8130B with 1M-byte memory; 1M-byte diskette storage and 64M-byte nonremovable disk storage; $21,440 for 8140A with 256K-byte main memory and 29M-byte disk; $46,110 for 8140B with 512K-byte memory and 58M-byte disk with 131,072 bytes under fixed heads; $79,500 for 8140C with 1M-byte main memory and 123M-byte disk with 131K bytes under fixed heads; $75,000 for 8150A single processor system with 1M-byte main memory; and $115,000 for 8150B dyadic processor system with 2M-byte main memory.

■ MICRODATA CORPORATION

17481 Red Hill Avenue, P.O. Box 19501, Irvine, CA 92713 ● 714-540-6730.

□ Microdata Series: 1000, 4000, 6000 & 9000 Business Systems

Type of Device ● multiuser small, medium, or large business systems that can be configured fron 1 to 208 users supporting dispersed processing applications.

Distributed Functions ● transaction-oriented processing; integrated data/text processing; remote batch processing; concurrent data entry update and inquiry operations; financial applications; manufacturing control and distribution applications.

Associated Systems & Networks ● support a full range of IBM protocols and full-function, multinode data communications.

Communications ● IBM BSC protocols—2780, 3780, 3741, and 2770; HASP; Batch SNA/SDLC; Interactive 3270 BSC and SNA/SDLC; X.25 ● offers statistical multiplexing and networking of terminals and computers ● users can access processors via an X.25 link, allowing access to a Public Data Network, such as Tymnet ● Master Processing System supports up to 44 trunk lines at speeds up to 19.2K bps ● point-to-point statistical multiplexing; multipoint statistical multiplexing; and full-function, multinode data communications ● users have ability to connect any terminal or serial printer in network with any computer in network; transfer data files (or selected records) between computers within the network; share computer ports and serial printers among several users; provide automatic logoff of inactive ports.

Features ● integrated hardware, firmware, and software implementation of the REALITY data management system ● software is fully upward compatible across system models providing maximum flexibility and a growth path for any user ● 1000 is a series of intelligent workstations that can be used standalone or in a clustered environment ● these systems can be used in conjunction with the 4000, 6000, and 9000 business systems as well as the 7000 Sovereign system ● each series differs primarily in the number of terminals, disk storage, available main memory as well as processor power ● memory begins as low as 128K bytes on the Series 4000 and extends to 6M bytes of main memory on the Series 9000 family ● disk capacity ranges from 30M bytes to 2G bytes; terminals range from 8 to 208.

Software ● REALITY Data Management system supports local or remote interactive applications as well as batch processing for multiple users ● access to the system is controlled with password and identification validation ● REALITY is a firmware-based operating system ● a full range of office automation applications is supported by the Series 1000 product providing full-feature word processing, spreadsheet, business graphics, project planner, and data communication capability ● office automation facilities on the larger REALITY systems are supported by a WORDMATE word processing system and REALCALC for spreadsheet operations.

Program Development ● application development on REALITY systems is through ALL—the Applications Language Liberator, ENGLISH, a dictionary-driven data inquiry and report generation language, and DATA/BASIC for sophisticated application development.

Ease of Use Features ● ALL, Natural Language, ENGLISH, and REALITY database management system provide powerful ease-of-use features within the Microdata environment ● ENGLISH is a powerful and easy-to-use retrieval language and report

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generator, Natural Language is an ad-hoc retrieval language incorporating artificial intelligence techniques.

Configuration Flexibility • upward-compatible Microdata product family supports user growth from single-station system with as little as 40M bytes of disk storage up to a system with 208 terminals, 6M bytes of main memory, and 2G bytes of disk storage • multiple system printers and serial printers are supported on each system.

First Announced • 4000—1973; 9000—1981; 1000—1984.

Pricing • the Series 1000 base price of $8,075 includes 512K, 10M bytes, 630K-byte floppy disk, display/keyboard, and operating system software • the basic Series 4000 package provides 128K, 128M bytes, 100-ips streamer, 8 ports, and the REALITY Data Management System for $32,600.

☐ **Microdata 7000 Series SOVERIGN System**

Type of Device • distributed data processing system using multiple 16-bit processors on high-speed, Local Area Network (LAN).

Distributed Functions • data entry, office automation, electronic mail, word processing, electronic spreadsheet, financial packages, terminal emulation, and file transfer.

Associated Systems & Networks • SOVERIGN Local Area Network, IBM BSC/SNA, batch and interactive terminal emulation, asynchronous networks (Tymnet, Western Union EASYLINK).

Communications • asynchronous, full-duplex up to 19.2K bps, RS-232C interface • IBM, BSC, batch, and interactive full-duplex up to 19.2K bps, 2- or 4-wire • IBM 2770/2780/374X/3780/ 3270 • IBM SNA full-duplex up to 19.2K bps, 3777-3 and emulating 3274 cluster controller • up to 38 logical sessions on 1 communication line • up to 26 communications lines per system network, allowing concurrent communications, under different protocol hosts or terminals • up to 208 terminals, for local or remote per system network.

Features • 1 to 32 16-bit processors, 1.2M bps LAN, 64K to 14M memory, 10M to 1G Winchester-type disk, up to 26 BSC/SNA communications lines, up to 26 150/300/600/1200-lpm line printer, up to 182 180/300/400/33-cps serial printers, up to 208 terminals.

Software • SOVERIGN operating system allows data entry, communication emulation, data and keywork dictionaries, ENGLISH, Applications Language Liberator (ALL), MEMOS, TESTPRO, REALCALC (electronic spreadsheet), ALL financials, EDITOR, and MATE to operate concurrently without degradation.

Program Development • data entry FORMATTING control input of batch data, keyBASIC, subset of BASIC II, BASIC II, ALL, COBOL, EDITOR, TEXTPRO, ENGLISH, QUICKSTART.

Ease of Use Features • all features are menu driven; ENGLISH features free form, QUICKSTART eliminates repetitive manual entry of execution commands.

Configuration Flexibility • basic configuration includes file processor, 128K-byte memory, 10M-byte disk, 1600-bpi streaming mag tape unit, terminal • maximum configuration includes 5 file processors, 14M-byte memory, 1G-byte disk, 10 1600-bpi streaming mag tape units, 208 terminals, 26 communications lines, 26 line printers, 182 serial printers.

First Announced • 1981.

Pricing • purchase price for 9-user system with 10M-byte disk, 1600-bpi MTU, 150-lpm printer is $47,293 • 65-user system with 70M-byte disk, 1600-bpi MTU, 300-lpm line printer is $139,125 • terminals and maintenance are not included.

■ NCR CORPORATION

1700 South Patterson Boulevard, Dayton, OH 45479 • 513-499-2000.

☐ **NCR I-9010 System: I-9010 Desktop Computer**

Type of Device • single-user, microprocessor-based, diskette-oriented desktop business system used in transaction-processing environment; limited communication.

Distributed Functions • direct data entry/processing and interactive and batch processing, file updating in business accounting environments using transaction processing.

Associated Systems & Networks • can operate as IBM 2780/ 3780 remote batch terminal through IDPS 2780/3780 emulation.

Communications • binary synchronous adapter, IDPS operating system, and Remote Batch Subsystem support IBM 2780/3780 terminal emulation over dedicated line or switched telephone network at data rates of 2400, 4800, 7200, or 9600 bps; point-to-point communications in half-duplex mode.

Features • entry-level system for NCR's series of interactive systems; features direct data and interactive file updating • minimum running configuration includs processor with 48K bytes of main memory, keyboard, CRT display, flexible disk, printer, and operating system.

Software • Interactive Direct Processing System (IDPS) Operating System processes 1 interactive or 1 batch job at a time; supports RBS for IBM 2780/3780 terminal emulation • IDPS/SF System Management Utilities (Small File) operates in flexible disk environment • no separate database management packages; sequential, relative, and indexed files are supported by COBOL; sequential and relative files are processed by BASIC • Remote Batch Subsystems (RBS) emulates IBM 2780/3780 terminal; does not support such IBM features as audible alarm, 2780 6-bit transcode, multipoint communication, and terminal testing; limited support provided for conversational response and end-to-end control characters.

Program Development • COBOL 74 compiler and interpreter; BASIC interpreter • Text Editor.

Ease of Use Features • operator systems include system messages that prompt operator activities; also, interactive user-interface is menu driven, allowing data to be entered by filling in display blanks.

Configuration Flexibility • minimum I-9010 configuration includes 48K-byte memory, keyboard, CRT display, flexible disk, printer, and operating system • maximum configuration supports 128K-byte memory, 3.9M-byte diskette storage on 4 drives with quad-capacity diskettes, 2 cassette drives, keyboard/CRT display workstation, and 2 printers.

First Announced • April 1981.

Pricing • purchase price is $6,320 for an I-9010 system including a processor, 48K-byte memory, integrated 1920-character CRT, integrated components, and keyboard; yearly maintenance is $478.

☐ **NCR I-9020 & I-9040 Computer Systems**

Type of Device • minicomputer.

Distributed Functions • multiple interactive applications running online from terminal workstations; remote batch communications applications running concurrent with other processing.

Associated Systems & Networks • support Multi-Channel Communications Adapter (MCCA) processor for local/remote interactive terminal operation • utility software supports collection of data from NCR 250 Electronic Cash Register • emulates IBM 2780/3780 remote batch terminal operations; supports BSC communications up to 9600 bps.

Communications • I-9020 attaches up to 26 lines: 2 synchronous and 24 asynchronous • I-9040 attaches communication lines by means of an Integrated Communications Subsystem (ICS) or 621 multiplexer • ICS synchronous data rates are 2000/2400/4800 bps, asynchronous data rates are 1200/1800/2400/4800/9600 bps • Communications Line Controller (CLC) controls single 4-line multiple line adapter (MLA); 8-bit microprocessor executes 78 instructions; 8K-byte read/write memory; with MLA, single CLC controls up to 5 communications lines; maximum of 4 CLCs permitted per subsystem for maximum 20 lines • Multiple Line Adapter (MLA) extends communications line controller; provides 4 interfaces; Line 1 and Line 2 provide EIA/CCITT or current

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loop, Line 3 EIA/CCITT only; Line 4 EIA/CCITT or Dataphone Digital Service, 4 MLAs per system maximum.

Features • I-9020 built around NCR 6082 CPU; I-9040 architecture centered around multiplexed universal base called Internal Transfer Subsystem • memory ranges from 64K to 512K bytes on I-9020-0002; 128K to 512K bytes on I-9020-0006 and -0007; 256K to 512K bytes on I-9020-0008 and 256K to 2M bytes on I-9040 • disk up to 324M bytes of fixed/removable disk storage on I-9020s; up to 16.7G bytes fixed/removable disk on I-9040 • on I-9020, I/O peripheral devices connect to processor through integrated adapters or buffered common I/O trunk; 1.2M-bps maximum; on I-9040, through 4 types of subsystem interfaces: Integrated Disk Controller, Integrated Communications Adapter, I/O Link Controller, Common Trunk subsystem of several speeds; low-speed common trunks transfer at maximum rate of 40K bps, total of 2 can be attached; high-speed trunks operate at 1.2M bps, total of 3 can be attached; buffered I/O subsystem transmits data in 2M-byte bursts, maximum of 4 • up to 24 workstation/terminals • I-9020 up to 23 asynchronous 50/70/125-lpm printers, 2 200/300/600-lpm band printers, plus direct attach matrix or slave printers to CRT • up to 32 standalone printers with speeds of 50 to 1200 lpm plus slave matrix to each CRT.

Software • Interactive Multiprogramming Operating System (IMOS) on I-9020 systems; available in IMOS Release II and IMOS III and IMOS Release 3.0 • Interactive Resource Management (IRX) and Century Emulation Operating Software on I-9040 • data management; file structures, disk interchange utility, and flexible disk data interchange utility • ASK Information Retrieval System, interative inquiry system for nontechnical personnel • DBS/LRX DBMS conforms to CODASYL 78 standards for database structures • communications software support asynchronous communications for local/remote interactive terminal operation; emulates 2780/3780 remote batch operations • system log, activity journal; maintenance log, peripheral and online device error journal; data capture utility, captures and prints data transferred; tally table print utility records asynchronous communications link activity.

Program Development • COBOL-74 and BASIC under IMOS III, IMOS V, and IRX • COBOL-74, BASIC, FORTRAN, RPG, and NEAT 3 under NCR VOSS B1, B2, B3.

Ease of Use Features • ASK Information Retrieval Systems provides interactive inquiry system for nontechnical personnel.

Configuration Flexibility • I-9020-0002 includes 6082 processor with 64K-byte memory, 9.8M-byte fixed/removable disk drive and integrated disk controller, 29-inch cabinet, console interface cassette interface with cassette device, buffered common trunk, and multichannel communications adapted; requires display, common trunk printer • I-9020 Packaged System Maximums differ only in memory size and disk capacity • I-9020 system maximum includes 1.2M-byte-per-second I/O data rate (2.0 with I/O Link Controller), 324M bytes of fixed/removable disk storage on no more than 7 drives, 2. cassette tape drives, 2 synchronous communications channels, 24 interactive terminals, 23 asynchronous printers, 2 band printers (NCR recommends no more than 20 terminals or printers), and 2 magnetic tape subsystems • I-9040 Basic System includes 5521 CPU with 256K-byte main memory, console table, module control unit, 45-inch cabinet; requires IRX software, IRX firmware, CRT disk, and printer • I-9040 System Maximum includes 2M-byte main memory, 4 I/O subsystems selected from an 8-drive Integrated Disk Adapter (maximum 1), Low-Speed Trunk (maximum 2), Very High-Speed Common Trunk (maximum 3), and I/O Link Subsystem (maximum 4); 16 controllers attaching up to 128 devices; plus 20-line integrated communications controller or 255-line multiplexer; up to 36 CPU and I/O slots.

First Announced • 1981.

Pricing • purchase price for basic systems as outlined above are $11,775 for I-9020 and $24,785 for I-9040.

☐ NCR 9300 System

Type of Device • VLSI-based multiprogramming, interactive mainframe computer system; functions as standalone information

processing system for smaller business applications or as peer system in distributed processing networks; can operate as cluster controller in SNA network.

Distributed Functions • specifically supports business applications in distributed data processing environment; interactive transaction processing; remote batch communications.

Associated Systems & Networks • SNA connectability by emulating SNA PU Type 2 cluster controller (3274) to coordinate message exchange across network controlled from remote host • supports interprocessor communications among ITX, IRX, IMOS, and VRX systems • supports IBM 2780/3780 BSC protocols • supports ISO asynchronous, 3270 (tributary), DLC, and X.25 via T-8100 or 721 front-end processor; T-8110 SNA front-end processor supports single SNA/SDLC dedicated or switched line at 9600 bps.

Communications • up to 42 lines, front-end processors support up to 99 lines, data rates up to 9600 bps.

Features • general-purpose mainframe computer in compact unit; uses 32-bit VLSI chip technology; externally programmable central processor with 6 internal data paths; 2 independent external data paths include Processor Memory Bus and Instruction Storage Unit • consists of processor module and can add 2 communications modules if more terminal support is required; processor module consists of processor board, 1 memory board with up to 2M-byte memory (second 2M-byte memory board optional), and communications board (support for 7 lines); main processor board also contains processor memory bus, memory interface, cache, Instruction Storage Unit buffer, external registers • Instruction Storage Unit (ISU) attached to processor board on separate circuit; uses 126K-byte ROM and 2K-byte batch PROM • Processor Memory Bus and associated bus control circuits connect VLSI chips and main storage units • additional communication modules include LINK Level Communications Subsystem (LLCS), microprocessor-based controller with 32K-byte PROM and 16K-byte RAM; appear to host as communications multiplexer with asynchronous/synchronous adapter; each LLCS (1 already on main processor board) supports 7 lines; each system supports 6 LLCSs for total 42 lines • storage capacity includes fixed/removable disk providing 13M-byte fixed disk with 135M- to 540M-byte removable storage; magnetic tape units (800 bpi, 25/45 ips), 1600-bpi and 6250-bpi (200 ips) tape • CRT available with either 12-inch or 15-inch display • train, thermal, matrix, band, and letter-quality printers available • I/O for system peripherals and communication devices is through SIC (System Interface Chip) operating under control of central processor; 2 SICs used to support I/O Subsystem (IOSS) and LLCS; features 16M-bps I/O transfer rate per channel for high-speed peripherals • 9300 microcode provides efficient interface between system hardware and ITX operating system; 2 virtual machines supported to maximize general system execution (ITX Virtual Machine) and execution of COBOL (COBOL Virtual Machine).

Software • Interactive Transaction Executive (ITX) operating system supports transaction processing in interactive online/ batch multiprocessing environment • ITX supports Data Base Management System (CODASYL-78) with relational database structure • ITX telecommunications software enables the 9300 to act as terminal, satellite processor, or master processor in network configurations for program-to-program communications • Distributed Data Processing (DDP) application for interaction of applications on different host system and for shared-resource capability • Terminal Application Processing System (TAPS) provides transaction support capabilities; works with ITX to accept simultaneous terminal input and schedule concurrent execution of application programs • SNA communications interface supports system operating as IBM 3270 cluster controller; 9300 is capable of functioning in network controlled from remote host; NCR-based or mainframe-based host controls/maintains network of 9300 System; reports on SNA subsystem performance and provides local configuration and control functions • diagnostic capabilities • WORD-WISE screen-oriented word processing system.

Program Development • COBOL-74 and BASIC Pascal high-level languages • Report Program generation is through NCR PICO (Parameter Inquiry/COBOL Output) which allows custom-design report programs by entering parameters through video

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display terminal; PICO generates report from program with or without user code modification, Screen Manager Development aid in development of application-specific screens; features menu-driven screen generator • TAPS Terminal Application Processing System for development of interactive transaction processing applications • 9300 includes facilities for online, interactive program development, testing, and debugging for concurrent day-to-day operations • 9300 Query language tool for noncomputer-oriented manager.

Ease of Use Features • software tools include prompting for responses through conversation-like user interface to system; menu screens aid in function selection; query language for noncomputer-oriented management.

Configuration Flexibility • minimum system includes processor with 1M bytes of 64K-bit chip error correction memory, 4 high-speed IOSS links for peripherals, 6 low-speed IOSS links for communications, 1 LLCS board for communication with 7900, 7901, or 7910 display terminals, an IOLA and 81M-byte 6530 disk drive, and 6430 band printer; maximum system has single CPU with 4M bytes error correcting memory configured up to 2M bytes per board; 126K-byte ROM plus 2K-byte PROM, 8 I/O IOSSs, each link supporting 1 I/O Link Adapter that supports 1 printer, 4 tape drives or 8 disk drives, 6 Link Level LLCS, connecting 42 communication lines.

First Announced • March 1983.

Pricing • purchase price for a typical 9300 configuration is $22,295 for central processor with 1M-byte RAM memory, 1 LLCS which provides 7 asynchronous lines, 4 IOSS units for peripheral attachment, microcode, ITX operating system, and system utilities; processor memory can be expanded to up to 4M bytes for $10,000 per 1M-byte increment.

■ PRIME COMPUTER INCORPORATED

Prime Park, Natick, MA 01760 • 617-655-8000.

☐ **Prime Series 50: 2250, 450-II, 2550, 9650, 850, 9750 & 9950 Computer Systems**

Type of Device • standalone or distributed processors in local/remote Primenet data processing network.

Distributed Functions • business data entry processing and scientific/engineering applications; interactive online and concurrent timesharing and batch operations • office automation: word processing, communication management, text management.

Associated Systems & Networks • interprogram communication in local/remote Primenet networks between compatible Prime systems • HDLC for CCITT X.25 packet-switching networks • communicates with host mainframes through terminal emulation: to IBM S/370-compatible processor through IBM 2780/3780 and HASP II terminal/workstation emulation or IBM 3271/3277 Display System emulation • Sperry 1100 through 1004 Remote Batch Terminal emulation • Honeywell hosts through GE-115 terminal emulation; CDC hosts through CDC UT200 terminal emulation; ICL hosts through ICL 7020 Remote Batch Terminal emulation: and another Prime system through IBM 2780/3780 terminal emulation.

Communications • 8- or 16-line Asynchronous Multiline Controller (AMLC) operates in full-duplex mode at data rates up to 9600 bps; supports RS-232C/CCITT V.24 interfaces, and Bell 403, 113, and 212 modems (or equivalent) • synchronous communication via 2 Multiple Data Link Controllers (MDLC) in half-/full-duplex modes at up to 19,200 bps; supports RS-232C/CCITT V.24 interface, Bell 201/203/208/209 modems, or DDS; IBM BSC for HASP and 2780/3780 emulations, HDLC for interfacing to CCITT X.25 packet-switching networks.

Features • Prime systems are built around 32-bit processors with MOS error correcting memory. Models 2250, 450-II, 2550, 9650, 9750, and 9950 are single processors (single instruction stream); 850 is a tightly coupled multiprocessing system which provides the ability to process 2 different instruction streams simultaneously • in all models except 2250, a cabinet chassis provides space for mounting CPU, memory, peripheral, and communications controller boards; 2250 chassis is housed in a single desk-style

unit that includes mass storage devices, with an optional expansion cabinet for additional disk and tape capability if required; exceptionally, the 2250 requires only normal office environment air conditioning and plugs into standard 120-volt wall outlets • number of open slots available is a function of individual systems; communications controller, a Virtual Control Panel (VCP), cabinet, and 120-amp power supply are included in each system; each system also includes from 2 to 32K bytes of Bipolar Cache Memory, size of which depends on the system; 2550, 9650, 9750, 850, and 9950 include a floating-point hardware unit; 2550, 9650, 850, 9750, and 9950 additionally include an Instruction Preprocessor Unit (5-stage pipeline in 9950) and Burst Mode I/O capabilities as standard features; 2250 and 2550 are designed for use outside the computer room either as a network node for distributed data processing or as a standalone unit • memory sizes are 512K to 4M bytes on the 2250; 1M to 4M bytes on the 450-II; 2M to 4M bytes on the 2550; 2M to 8M bytes on the 9650 and 850; 4M to 12M bytes on the 9750; and 4M to 16M bytes on the 9950 • I/O bandwidth is 2.5M bytes per second on the 2250 and 450-II; 5.5M bytes per second on the 2550 and 9650; and 8M bytes on the 850, 9750, and 9950 • burst mode I/O is available on all processors except the 2250 and 450-II • support 4 mass storage subsystems, 4 drives per subsystem; up to 675M bytes unformatted, 630M bytes formatted per drive; 9.6G-byte maximum formatted capacity • 4 parallel printers maximum with speeds up to 1000 lpm.

Software • PRIMOS multiprogramming, multiuser operating system supports up to 128 processes in interactive and batch mode, and up to 128 interactive terminals online concurrently; Distributed Processing Terminal Executive (DPTX) for communication networks using IBM 3271/3277 Display Station protocols supports access to information in IBM S/370 remote host; RJE modules emulate IBM 2780/3780 terminals and HASP II workstations, CDC UT200, ICL 7020, Univac 1004, and Honeywell GRTS via GE-115 terminal; supports Primenet: Database Management System (DBMS) supports multiple data structures • Multiple Index Data Access System (MIDAS) and MIDASPLUS sequential indexed disk file system • data entry facility provides interactive development for creation and maintenance of data entry screens, validation and extraction tables, and application file output • Transact is online transaction processing system for building screens, menus, defining files, and recording parameters • communication software includes Primenet local/remote network communication with Inter Program Communication Facility (IPCF), Interactive Terminal Support (ITS) facility, and File Access Manager (FAM); Distributed Processing Terminal Executive (DPTX) constructs communication network with Prime and IBM; conforms to IBM 3271/3277 Display System protocols; can be integrated into new or existing networks containing IBM mainframes and terminal controllers without application code or access method changes; compatible with IBM IMS/VS and CICS/VS and BTAM, TCAM, VTAM • DPTX/Terminal Support Facility (TSF) provides connection of IBM 3271/3277 Display System to Prime computers and supports timesharing and data entry modes: supports up to 32 display stations using up to 4 multipoint communication lines • DPTX Data Stream Compatibility (DSC) allows Prime system to share multidrop communication line with IBM 3271 controller; DPTX/Transparent Connect Facility combines TSF/DSC capabilities to allow IBM 3277 user to reach programs on IBM mainframe • Remote Job Entry (RJE) emulates IBM, CDC, Univac, Honeywell, ICL remote job entry terminals over synchronous lines • RJE X80 emulates IBM 2780/3780 communication terminals: supports point-to-point or multipoint communication with IBM system or another Series 50 system.

Program Development • high-level languages include FORTRAN 77/66, BASIC/VM, COBOL, RPG II, Pascal, and PL/1 • Source Level Debugger for use with FORTRAN, FORTRAN 77, and PL/1 Subset G language • EMACS tailorable full-screen editor.

Ease of Use Features • Prime/Power is an English language-command system for data query and reporting • menu-driven Entry facility.

Configuration Flexibility • 2250 standard system includes the 32-bit Prime central processor (CPU), ICS1 Communications Controller, Diagnostic Processor and console cable, Disk/Tape

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controller, FCC-compliant chassis and cabinet, 120-amp power supply, and PRIMOS operating system • maximum 2250 system includes single 2-board CPU 4M bytes of noninterleaved (or 2-way interleaved for 1M bytes and over) MOS error correcting main memory; 2K-byte Bipolar cache memory desk-height unit with 8-board chassis including 3 optional board positions for adding memory or standard peripheral subsystems (expansion cabinet also available); supports 32M-byte virtual address space for each of up to 32 simultaneous users; up to 128 simultaneous active processes; ICS1 intelligent asynchronous/synchronous communications controller, diagnostic processor with VCP functionality, and Disk/Tape Controller are standard and do not use any of the optional board positions; up to 632M bytes of online disk storage (4 drives) are allowed per system; up to 2 15M-byte tape cartridge dives per system • PRIMOS operating system is also standard; packaged for multiunit purchasers requiring office environment compatibility • 450-II standard system includes the 32-bit Prime 450-II central processor (CPU), Virtual Control Panel (VCP), and console cable, FCC-compliant chassis and cabinet, 2 120-amp power supplies, and PRIMOS operating system; system is optimized for Prime INFORMATION software • maximums 450-II system includes single CPU, 4M bytes of 2-way interleaved MOS error correcting main memory; 8K-byte Bipolar cache memory; 24-board chassis with room for memory and I/O subsystem expansion; supports 32M-byte virtual address space for each of up to 64 simultaneous users; up to 128 simultaneous active processes; Virtual Control Panel, PRIMOS operating system and 2 120-amp power supplies are standard; packaged primarily for end users; up to 9.6G-byte formatted disk capacity; up to 8 tape drives per system • 2550 standard system includes the 32-bit Prime 2550 central processor (CPU), diagnostic processor, cabinet, chassis, modem, and PRIMOS operating system • maximum 2550 system includes single 2-board CPU, 4M bytes of 2-way interleaved MOS error correcting main memory; 16K-byte bipolar cache memory; 16-board chassis with CPU, (minimum memory and disk controller taking up 7 slots, leaving 9 slots for expansion), 30-inch high office environment cabinet contains power supply, board chassis, power distribution unit and cable connector bulkhead for reconfiguration of terminal and communications lines; up to 4 disk drives per controller yielding up to 2.7G bytes per system; office peripheral cabinets hold up to 2 315M-byte drives; larger disk drives available for the computer room environment; up to 2 streaming tape drives in office environment; other tape drives available for computer room environment; supports all communications controllers; ISC2 resides in a 30-inch peripheral cabinet in combination with the streaming tape in the office environment; supports 32M-byte virtual address space for up to 64 simultaneous users; up to 128 simultaneous active processes; diagnostic processor; modem; standard 9650 system includes the 32-bit 9650 central processor, diagnostic processor, FCC compliant cabinet and chassis, and the PRIMOS operating system; a modem for remote diagnostics is included • maximum 9650 system includes single 2-board CPU, 8M bytes of 2-way interleaved MOS error correcting main memory; 16K-byte bipolar cache memory; chassis for CPU and memory plus chassis for 10 I/O controllers; separate power supplies for each chassis; 53-inch high FCC compliant cabinet includes the 2 chassis, diagnostic processor with 2 diskette drives, power distribution unit, modem, Primos, and a cable bulkhead for reconfiguration of terminal and communications lines; (the basic system uses 7 slots in the 2 chassis); supports up to 9.6G bytes of formatted disk selected from a disk available in the product line; up to 8 tape drives; 32M-byte virtual address space for up to 96 simultaneous users; up to 255 simultaneous active processes; supports all communications controllers; system printer interface can be a serial asynchronous communications line or a parallel interface device used with the unit record controller • 850 standard system includes the 32-bit Prime 850 central processor (CPU), Virtual Control Panel (VCP) and console cable, FCC-compliant chassis and 2 cabinets, 5 120-amp power supplies, and PRIMOS operating system • maximum 850 system includes multistream CPU, 8M bytes of 2-way interleaved MOS error correcting main memory, 16K-byte bipolar cache memory, 32-board chassis and 2 cabinets for memory and I/O subsystem expansion; supports 32M-byte virtual address space for up to 128 simultaneous users; up to 128 simultaneous active processes distributed between streams in a timesharing manner. Virtual

Control Panel, 5 120-amp power supplies, and PRIMOS operating system; up to 9.6G-byte formatted disk capacity; up to 8 tape drives per system; system printer interface can be a serial asynchronous communications line or a parallel interface device used with the unit record controller • 9750 standard system includes the 9750 32-bit central processor, diagnostic processor, FCC compliant cabinet and chassis and the PRIMOS operating system; a modem for remote diagnostics is included maximum 9750 system includes single CPU, 12M bytes of 2-way interleaved MOS error correcting main memory, 16K-byte bipolar cache memory; large chassis and 2 FCC compliant cabinets for memory and I/O expansion; supports 32M-byte virtual address space for up to 128 simultaneous users; up to 255 simultaneous active processes; diagnostic processor with 2 diskette drives, power supplies, modem, and PRIMOS are standard; up to 9.6G bytes of formatted disk selected from any disk available in the product line; up to 8 tape drives can be configured; system printer interface can be a serial asynchronous communications line or a parallel interface device used with the unit record controller; supports all communications controllers • 9950 standard system includes the 32-bit Prime 9950 central processor, diagnostic processor, FCC-compliant cabinet and chassis, necessary power supply, and PRIMOS operating system; maximum 9950 system includes single CPU, 16M bytes of interleaved MOS error correcting main memory; 16K-byte Bipolar cache memory, large chassis and 2 cabinets for memory and I/O subsystem expansion; supports 32M-byte virtual address space for up to 128 simultaneous users; up to 255 simultaneous active processes; Remote Diagnostic Processor, power supplies and PRIMOS operating system are standard; up to 9.6G-byte formatted disk capacity; up to 8 tape drives per system; system printer interface device can be a serial asynchronous communications line or a parallel interface device used with unit record controller; supports all communications controllers.

First Announced • 850 in April 1981; 2250 in September 1982; 450-II in April 1983; 9950 in July 1983; 2550 in May 1984; 9650 and 9670 in August 1984.

Pricing • purchase price for standard systems as outlined above are: $39,000 for 2250 with 512K-byte ECC MOS memory, (1 board), 68M-byte Winchester disk and 15M-byte cartridge tape; $112,000 for 450-II with 1M-byte ECC MOS memory (2 boards), 2 80M-byte storage module disks with controllers and hard copy console; $90,500 for 2550 with 2M-byte ECC MOS memory (2 boards), 315M-byte fixed media disk subsystem and office peripheral cabinet; $145,500 for 9650 with 2M-byte ECC MOS memory (2 boards), 2 315M-byte fixed module drives with 1 controller, streaming magnetic tape subsystem, and peripheral cabinet; $278,000 for 850 with 2M-byte ECC MOS memory (2 boards), 2 315M-byte fixed media disks with controller, streaming magnetic subsystem and peripheral cabinet; $250,500 for 9750 with 4M-byte ECC MOS memory (2 boards), 2 315M-byte fixed media drives, 1 controller, streaming mag tape subsystem and peripheral cabinet; $392,000 for9550 with 4M-byte ECC MOS memory (2 boards), 2 315M-byte fixed media disks with 1 controller, streaming mag tape subsystem, and peripheral cabinet.

■ SPERRY COMPUTER SYSTEMS/Division of Sperry Corporation

P.O. Box 500, Blue Bell, PA 19424 • 215-542-4011.

☐ Sperry System 80: Models 4, 6 & 8 Computer Systems

Type of Device • distributed and standalone processing; small business computer system.

Distributed Functions • multiuser, interactive and batch, transaction-oriented processing in standalone, host computer, and distributed network environments.

Associated Systems & Networks • DCA communications network with other System 80s and with IBM 3270 terminals; looks like 3271 controller • can operate host • interface with IBM systems as multileaving workstation using BSC protocol or as 3270 terminal • access to Canadian DATAPAC packet-switched public data networks, Japanese DDX circuit-switched public data networks, German DATEX-L circuit-switched and

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DATEX-P packet-switched public data networks, French TRANSPAC packet-switched public data network.

Communications ● up to 28 communication lines, each supports data rates up to 9600 bps; multiplexer handles up to 16 remote workstations/terminals on each line for total support of 328 workstations/terminals ● Single Line Communication Adapters (SLCA) provide RS-232C, X.21 BIS, and MIL-186-100 interfaces and several protocols to support Sperry workstations/terminals; low-speed asynchronous support for DCT 500 and TTY protocols and ASCII code with line speeds up to 2400 bps, half-duplex mode; medium-speed synchronous support for U100/U200/U400 protocols with line speeds up to 9600 bps in half-duplex or 4800 bps in full-duplex mode; medium-speed synchronous support for UDLC protocol with line speeds from 2000 to 56K bps in full-duplex mode; supports auto-answer.

Features ● Models 4, 6, and 8 are identical in features except that Model 6 offers approximately 55% more processing power than Model 4, and Model 8 offers triple storage capacity and double processing speed of Model 6 ● CPU composed of control processor and main memory storage processor (MSP); includes 262K-byte ECC main memory expandable to 4M bytes on Models 4 and 6; and 8M bytes on Model 8; basic instruction set with 44 floating-point instructions; instruction set is microprogram controlled with cycle time of 240 nanoseconds for Model 4 and 180 nanoseconds for Model 6; main storage cycle time for Model 8 is 480 nanoseconds per 8 bytes; main storage processor performs error correction/checking for main memory ● I/O Bus is microprocessor controlled with direct memory access; all peripherals establish a connection to main memory through either the control processor or the I/O Microprocessor (IOMP); IOMP has 1 channel dedicated to communication lines and a second dedicated to peripherals; aggregate I/O data rate is 5.8M bytes per second; IOMP provides interfaces for up to 6 single line communication adapters (SLCAs) and 3 additional ports, each port supports 1 paper peripheral controller (printer, card reader/punch), 1 workstation controller, remote printer controller, or magnetic tape controller ● Model 4 Extended Channel Functionality (ECF) adds support for third through seventh SLCA, and the fifth through seventh third through eighth SLCAs, and fifth and sixth integrated controller; Model 6 ECF provides added support for Model 6 ● ECF Conversion for Model 4/6 to IOMP equivalent; supports 8 SLCAs and 7 I/O controllers ● 3.9G-byte maximum disk storage on 8 fixed disk drives and additional 4M bytes on 4 diskette drives on Models 4 and 6; maximum storage on Model 8 is more than 12G bytes ● Uniservo 10 Tape Subsystem includes controller and 9-track PE master magnetic tape unit; 25 ips, 1600 bpi, 10.5-inch reels; data transfer rate is 40K bytes per second; supports 7 additional drives ● up to 40 locally attached workstations; 8 lines with multiplexing supports 128 remote terminals maximum; peripherals include 180/300/640-lpm band printers; 1200-lpm cartridge printer; Paper Peripheral Controller accommodates 2 printers with combined speeds of up to 1500 lpm, plus card reader (300 cpm) and card punch (75 cpm for 80-column cards; 160 cpm for 28 columns).

Software ● OS/3 real memory operating system supports multiuser, interactive, and batch processing in standalone, host computer, and distributed network; supports general-purpose remote business applications requiring multiple online workstations ● Information Management System (IMS) provides transaction management facilities; supports COBOL, RPG II, and assembly programs ● Data Base Management System (DMS) allows concurrent access to shared database by multiple users in any combination of batch, timesharing, and transaction programs ● WPS 80 word processing system ● Consolidated Data Management System provides centralized file management interface and object code interface for high-level languages and macroinstructions interfaces for assembly language ● Sort/Merge facility; SORT 3-compatible IBM System/3 SORT accessible by job control; and ESCORT interactive data management and retrieval system ● Integrated Communications Access Method (ICAM) Terminal Support controls physical I/O with single-line communication adapters (SLCAs), single message routing to up to 255 destinations; Nine Thousand Remote (NTR) System Utility allows System 80 to function as remote batch terminal to Sperry 1100 host; Distributed Data Processing Transfer Facility controls interchange of user jobs/files among multiple OS/3-supported

computer systems ● access to public data networks (packet-switched/circuit-switched) through DATAPAC (Canadian packet-switched), DDX-C (Japanese circuit-switched), DATEX-LPDN (German circuit-switched), DATEX-P (German packet-switched), and TRANSPAC (French packet-switched) software.

Program Development ● high-level languages: BASIC, COBOL-1974, FORTRAN IV, RPG II; assembler; Editor ● UTS Facilities: UTS COBOL, UTS 400 Edit Processor; UTS 400 Load/Dump ● Screen Format Generator; Dialog Specification Language Translator ● MAPPER 80 software system.

Ease of Use Features ● ESCORT includes English-like directives to generate data files, make data inquiries, product reports, and so on; tutorial mode provides programming and teaching aid ● Screen Format Generator: interactive prompting facility for creating, modifying, and deleting screen formats; maintains format files.

Configuration Flexibility ● minimum system includes central processor, 262K-byte main memory, and dedicated microprocessor control units for 118.2M-byte integrated disk, console/workstation, diskette, and printer ● maximum configuration supports up to 8M bytes of memory; basic control storage (Model 4), HPCOS facility for increased performance (Model 6); 5.8M-byte-per-second aggregate system data rate; 12G-byte (Model 8) maximum disk storage; Model 8 supports up to 120 local workstations and single console/workstation, up to 28 data communication lines; each can support up to 16 terminals via multiplexer for a total support of 128 terminals; up to 10 printers; paper peripheral controller supports up to 2 printers, dual card readers or single card reader, and single card punch; single controller subsystem is typical support but can be expanded to 5 subsystems; up to 8 industry-standard tape units.

First Announced ● 1982.

Pricing ● purchase price is $66,082 for a Model 4 Processor package including CPU with 0.5M-byte memory, 118.2M-byte fixed disk, 1 console/workstation display, integrated controllers (support up to 7 additional drives), dedicated port for magnetic tape subsystem, 1 unused port, and interface for 2 single communication adapter; monthly maintenance is $416 ● purchase price is $94,062 for a Model 6 Processor including high-performance control storage; monthly maintenance is $468 ● purchase price is $204,056 for basic Model 8 with 1M-byte memory, a 491M-byte disk drive, diskette drive, 180-lpm printer, System Control, Extended System Software, RPG II, Editor, and ESCORT.

■ TANDEM COMPUTERS, INC

19333 Vallco Parkway, Cupertino, CA 95014 ● 408-725-6000.

☐ **Tandem NonStop Series: NonStop 1 + NonStop II & NonStop TXP Systems**

Type of Device ● distributed processing system configured in multiprocessor nodes designed for fault-tolerant transaction processing in Tandem network.

Distributed Functions ● transaction processing in multiprogramming, multiprocessor mode of operation; distributed database management functions.

Associated Systems & Networks ● node interconnected by dedicated private lines or by X.25 public packet-switched carrier ● interfaces transaction processing applications to data communication network; supports Tandem NonStop as supervisor or tributary in multipoint network and as station in point-to-point networks; supports asynchronous/bisynchronous communication using ADM-2, TINET, Burroughs, IBM SDLC, and ISO HDLC protocols ● supports IBM 2780 and 3780 emulation; interfaces up to 255 IBM 3270 terminals and printers to Tandem System; emulates 1 or more 3271 Cluster Controllers; allows terminals connected to Tandem to access IBM-compatible hosts; supports 3270 devices connected to bisynchronous multipoint communication line ● supports synchronous communication for TI6/6520 and TI6/6524 terminals in multipoint configurations ● NonStop systems can be cross connected with SNA networks ● using INFOSTAT (combined with American Satellite Corporation)

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several Tandem NonStop II systems can be connected by satellite link.

Communications • all communication supported by dual channel controllers connected to 2 processors • Byte-Synchronous Controller for 1 to 4 point-to-point or multipoint communication lines; supports up to 80K-bps data rates; supports 160K-bps aggregate transmission rate for all 4 lines • Bit-Synchronous Controller for 1 to 4 point-to-point or multipoint lines; supports up to 56K-bps transmission rate per line • asynchronous controller for 2 current loop or RS-232C devices/lines; programmable speeds from 50 bps to 19.2K bps • Terminal Patch Panel provides connection between asynchronous controllers and terminal connections; supports up to 17 terminal ports.

Features • all systems are multiprocessor configurations consisting of 2 to 16 processors per node; multiple processors at node are connected by Dynabus, dual interprocessor link • NonStop systems based on TI6/1412-1 processor; NonStop II systems based on TI6/142 processors; NonStop TXP on 1432 processor; 3 processors intermixed on GUARDIAN/EXPAND network level, but not within same node; processors are software compatible at object- and source-code levels • NonStop II and NonStop TXP are enhanced versions of original NonStop processor. NonStop II addresses up to 16M bytes of main memory (8M maximum bytes per processor); more memory can be allocated as I/O buffer space on NonStop II; 32-bit-wide data access path to main memory is used; 1G-byte virtual memory address space; NonStop TXP provides 32-bit native addressing mode, 64-bit-wide data access to main memory; processor pipeline increased from 2 to 3 stages; 64K-byte cache memory • all NonStop processors contain 2 pipelined, microcoded processing units; 1 unit operates as central processor and Dynabus controller; other unit operates as I/O processor; NonStop II and NonStop TXP also includes processing unit for control of a data transceiver for diagnostics • I/O uses DMA with throughput at 4M or 5M; I/O transfers are in burst mode; peripheral interface via dual-access controllers • I/O Processor supports 32 controllers with up to 8 devices per controller; table driven from I/O control (IOC) table in memory; 256 entries in IOC • Universal Interface supports dual channel, dual power from 2 processors; controls 2 devices with 16-line parallel interface • Tandem-to-IBM link supports high-speed communication with local IBM mainframe by emulating an IBM 3420 Model 7 tape drive; attaches to IBM 3803 Model 1 or 2 Controller on IBM mainframe and serves as first link • Tandem Hyper Link supports connection to computer systems using Network System Corporation HYPERChannel • 64M to 2G bytes per disk controller; up to 32 controllers per processor.

Software • GUARDIAN is multiprogramming, multiple-processor executive that supports interprocessor communication for transparent nonstop operations; copy in each processor runs up to 255 concurrent tasks; each copy aware of other system processors; creates user process pairs with program in 1 processor active and program in second processor passive but receiving backup messages; passive program begins execution in case of primary processor failure • GUARDIAN/EXPAND extension to GUARDIAN for networking; can support up to 255 nodes, each composed of from 2 to 16 processors for total of 4080 processors; provides end-to-end protocol and multiple communication paths between nodes; runs Network Control Process at each node for automatic routing to other nodes and for network status logging; includes Network Line Handlers • extensive database management software • ENCOMPASS is a collection of facilities: ENSCRIBE, DDL, TMF, ENFORM, and PATHWAY; provides transaction definition and application control, terminal management, and database management; supports programs written in COBOL, FORTRAN, MUMPS, and TAL (Tandem Assembler Language) • ENSCRIBE Database Record Manager can be used alone or with data definition language (DDL) for centralized database administration; key-sequenced, entry-sequenced, and relative file structures; user can allocate more memory to cache to increase system transaction rates • Data Definition Language (DDL) is single unified language for design and description of a relational database; used in interactive or batch mode to produce data dictionary with standardized data definitions for complex data structures; produces output for File Utility Program (FUP) under ENSCRIBE to create files and source statements for

language definitions to COBOL, FORTRAN, and TAL compilers • ENFORM is relational query/report writing language to retrieve records from a database as defined by DDL; features shared access to database and data dictionary, transparent access, query/report development facilities for customized application, and interactive or batch program use • Transaction Monitoring Facility (TMF) maintains consistent database during concurrent transaction processing; database can be either on 1 system or distributed over multiple nodes • PATHWAY allows user to write transaction processing application in non-stop environment; includes Terminal Control Process (TCP), Screen COBOL program, Screen Builder Utility, and PATHWAY Monitor (PATHMON); supports IBM 3270, Tandem 6520 multipage display, and Tandem 6510 terminals; PATHMON supervises and controls the transaction processing system for a single system or for a network; several independent PATHWAY systems can run simultaneously, each identified by its PATHMON process name; each system can support multiple independent user applications • extensive communication software: X.25 Access Method Line Handler manages X.25 virtual circuit; ENVOY Data Communications Manager is integral part of GUARDIAN to interface transaction processing applications to a data communication network; supports Tandem as supervisor or tributary in multipoint networks and as a station in a point-to-point network; supports BSC, bit synchronous communications using ADM-2, TINET, Burroughs, IBM SDLC and ISO HDLC protocols; synchronous controllers support AT&T 201, 208, 209, 212 modems; asynchronous controllers support AT&T 102, 113, 303, 212 modems • EXCHANGE Remote Batch Workstation is subsystem designed to support IBM 2780 and 3780 emulation; accepts batch input from any media; allows file transfer between Tandem Systems; operates in conversational, command file, and program modes • AM3270 Access Method interfaces up to 255 IBM 3270 terminals and printers to Tandem system; handles BSC communication, supports multiple controllers; each controller can interface multiple 3270 terminals; Communication Utility Program (CUP) complements TR3271 to allow pass-through access to IBM host • TR3271/Access Method emulates 1 or more 3271 Cluster Controllers; complements AM3270 access method pass-through mode; allows terminals connected to Tandem system to access IBM-compatible hosts; also supports 3270 devices connected to BSC/multipoint communication lines • AM6520 Access Method supports synchronous communications with TI6/6520 and TI/6524 terminals operating in multipoint configurations • TRANSFER Information Delivery System delivers packages of multiple items/different formats/services throughout network • TRANSFER MAIL provides TRANSFER facilities to 6520 and 6530 display terminals • TRANSFER/FAX interfaces TRANSFER to 6340 Fascimile controller • INFOSTAT connects several Tandem NonStop IIs via satellite link • SNAX allows Tandem systems and IBM SNA hosts/terminals to communicate and share applications.

Program Development • high-level languages such as FORTRAN, COBOL, MUMPS (Massachusetts General Hospital Utility Multiprogramming System), and TAL (Tandem Application Language) • ENABLE program generator driven by ENCOMPASS data dictionary, can generate complete, customized programs for retrieving and updating database records according to user requirements.

Ease of Use Features • GUARDIAN operating system simplifies user and program interface to system with command interpreter and system procedure calls • TMF facility guides operator through recovery procedure after system failure that damages 1 or more files • SCREEN BUILDER interactive screen definition utility allows user to define screen formats directly from a terminal.

Configuration Flexibility • NonStop 1+ System • includes 2 1412-1 Processors, each with 384K bytes of ECC memory, plus 7120 System Cabinet with room for 2 additional processors and 13 I/O slots for system expansion; 1 6603 printer console providing a 30-cps printing speed and 132 columns; dual DYNABUS Redundant Interprocessor links; 2 4M-byte-per-second block multiplexer channels; 6303 Dual Channel Connected Asynchronous Controller with 2 ports; 7501 Terminal Patch Panel; 3202 Magnetic Tape Controller with dual-channel connections and capacity for 2 drives; cabinet-mounted 5103 Magnetic Tape Drive, 45 ips, 800/1600 bpi; and 2 battery packs for backup of semiconductor memory; NonStop II System •

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includes 2 1421 Processors each with 1M bytes of ECC memory; 7120 System Cabinet with room for 2 additional processors and 23 slots for system expansion; 3910 Operations and Service Processor; dual DYNABUS Redundant Interprocessor links; 2 5M-byte-per-second block multiplexer channels; 3202 Magnetic Tape Controller with dual-channel connections and capacity for 2 drives; cabinet-mounted 5103 Magnetic Tape Drive, 45 ips, 800/1600 bpi; 2 battery packs for backup of semiconductor memory; and an I/O-only power supply ● NonStop TXP System includes 2 1432 Processors each with 2M bytes of ECC memory; system cabinet with room for 2 additional processors and 23 slots for system expansion; 3910 Operations and Service Processor; dual DYNABUS Redundant Interprocessor links; 2 5M-byte-per-second block multiplexer channels; 3202 Magnetic Tape Controller with dual channel connetions and capacity for 2 drives; cabinet-mounted 5103 Magnetic Tape Drive, 45 ips, 800/1600 bpi; 2 battery packs for backup of semiconductor memory and on 2 I/O only power supplies; NonStop 1+, NonStop II, and NonStop TXP System includes 16 processors; 2M-byte memory per processor for total of 32M bytes per system (NonStop), 8M bytes per processor for total of 128M bytes per system (NonStop II and TXP); 2.2G bytes per disk controller; 32 controllers per processor for all peripherals and data communication lines; all controllers are dual access for 2-processor system total of 256 controllers.

First Announced ● NonStop in May 1976; NonStop II in April 1981; NonStop TXP in November 1983.

Pricing ● purchase price for basic systems as outlined above are: $60,975 for NonStop; $142,875 for NonStop II; $239,775 for NonStop TXP.

■ TEXAS INSTRUMENTS INCORPORATED

P.O. Box 1444, Houston, TX 77001 ● 512-250-7305.

☐ Texas Instruments Business Systems Series 300, 600 & 800 Computer Systems

Type of Device ● 16-bit mini business systems.

Distributed Functions ● DX10 multiprogramming, multiuser, operating system supports interactive and batch operations concurrently.

Associated Systems & Networks ● DX10 or DNOS support Remote Terminal Subsystem software ● IBM 2780/3780 emulation supported on all systems ● IBM 3270 Interactive Communications software.

Communications ● number of lines varies depending on interface selected; data rates up to 19.2K bps ● LAN data rates to 10M bps on 600 and 800 Series.

Features ● 300 Series is based on TMS 99000 microprocessor; 600 Series on 990/10A CPU Models 661A, 671A, 672A, 680A, and 682A; 800 Series on 990/12 CPU Models 861A/B, 872A/B, 880A/B, 882A/B, 884A/B, 886A/B, 890A/B, and 891A/B ● 256K to 1M bytes of memory on 300 Series; 512K to 1M on 600 Series; 512K to 2M bytes on 800 Series ● I/O capacity up to 3M, 16-bit word transfers per second ● mass storage; 1.2M-byte diskette optional on 352 A model; hard disk drive standard on all models; types include Winchester, fixed/removable combination and disk packs with base system drive capacities from 17M to 476M bytes depending on model; maximum capacity configuration dependent ● up to 16 75-/150-cps dot matrix, 30-cps daisywheel and 300-/600-lpm printers.

Software ● DX10 multiprogramming, multiuser operating system; supports interactive and batch operations concurrently ● DX10 Micro single-tasking version of DX10 ● DNOS (Distributed Networking Operating System) enhanced version of DX10 ● DBMS database management system hierarchical structure elements consist of files, records, lines, groups, and fields; Data Definition Language (DDL) provides means to define data elements within the database; Data Manipulation Language (DML) provides support to read, write, delete data, supports COBOL, FORTRAN, or Pascal languages; Database Generator (DBGEN) provides user

capability to configure database management system DNOS DBMS;, DX10 Query Inquiry/Report Language provides interactive data accessing and reporting using English-like commands for DBMS system; DX10/DNOS Sort/Merge provides capability to sort 1 file or merge 2 to 5 sorted files into a single file ● communications software: DX10/DNOS 3270 Interactive Communications (ICS) provides interactive remote communications with IBM host computer; supports BSC data link control for remote cluster controller over half-/full-duplex nonswitched lines up to 9600 bps; supports multipoint communications as IBM 3270 terminal ● DX10/DNOS 2780/3780 emulator provides remote job entry communications with IBM S/360/370 host or another 2780/3780 emulator-equipped 990 system; half-duplex up to 9600 bps BSC protocol; DNCS/SNA extends DNCS for IBM interaction; DNOS DNCS X.25 extends DNCS for X.25 interaction; DX10/DNOS Remote terminal subsystem allows communications with multiple remote terminals/peripherals, BSC protocol, half-duplex mode, leased or switched lines ● office automation TIPE provides word processing features.

Program Development ● FORTRAN 78, COBOL, BASIC, Pascal, RPG II ● DX10/DNOS Tiform provides capability to create screen formats using Form Description Language (FDL) interfacing with application programs written in COBOL, FORTRAN, and Pascal; DX10/DNOS COBOL Program Generator provides functions to assist interactive development of COBOL programs.

Ease of Use Features ● Query Inquiry/Report language provides English-like commands.

Configuration Flexibility ● Business System 300 packages include the TMS99000 microprocessor, 256K-byte main memory, 1 display, and either a WD500A or WD800 disk drive; WD500A disk is a 17M-byte fixed Winchester with diskette backup; WD800 is available in 2 versions, 18M bytes and 43M bytes, both with tape backup ● Maximum Business Systems 300 includes 256K-byte memory, 43M-byte disk, tape drive, and 1 display expanded to include 1M bytes of memory, additional 43M-byte disk units with tape backup, and up to 6 additional terminals ● Business System 600 packages include the 990/10A processor with 512K- or 1M-byte RAM, video display unit, printer port, WD500, WD800, CD 1400, single DS80 disk with MT1600 magnetic tape drive, or dual DS80 cartridge disk drives; CD 1400 is available in 80M-byte (67 fixed, 13 removable) formatted storage; DS80 removable disk pack drive is available as either dual drive storing 126M bytes or a single, 63M-byte drive with MT1600 magnetic tape drive; WD900 is available in either 138M-byte or 425M-byte versions ● Maximum Business System 600 includes 1M bytes of memory, 425M-byte disk, tape drive, 2 displays expanded to 2M bytes of memory; 32 additional user-available slots; for additional disks, peripherals, workstations; supports up to 16 terminals ● Business System 800 systems include the 990/12 LR processor with 512K-byte memory, dual video display terminals with dual controller, printer port, and WD800, CD1400, or DS80 and DS300 disks with or without the MT1600 magnetic tape drive; WD800 is available in a 43M-byte, 8-inch Winchester with 14.5M-byte tape cartridge version; WD900 is a 9-inch Winchester disk drive available in either a 138M-byte or 425M-byte capacity; backup device for the WD900 is the MT3200 streamer tape drive; CD1400 is available in an 80M-byte (67M-byte fixed, 13M-byte removable) cartridge disk drive version; DS80 removable disk pack subsystem is available as either a dual drive (126M byte) or single drive (63M byte) with MT1600 magnetic tape drive versions; DS300 removable pack subsystem is available as either a dual drive (476M bytes) or a single drive with MT1600 magnetic tape drive versions ● 800B systems are identical to the 800A systems except that they have an EIA/Fiber Optic with a CI404 4-channel fiber optic interface in place of the CI403 4-channel EIA communications interface used on 800A systems.

First Announced ● 1982.

Pricing ● purchase price is $9,995 for basic 300 as outlined above with 256K-byte RAM, 17M-byte WD500A; $34,800 for basic 600 as outlined above with 512K-byte RAM, 80M-byte CD1400 disk; $45,600 for basic 800 as outlined above with 512K-byte RAM, 80M-byte CD1400 disk.

Distributed Computer Systems

■ WANG LABORATORIES, INCORPORATED

One Industrial Avenue, Lowell, MA 01851 • 617-459-5000.

□ Wang Alliance 250

Type of Device • disk-based distributed processing systems used as host processor supporting various workstations in cluster configurations performing automated office applications; shared-resource capabilities in local network configuration.

Distributed Functions • perform automated office applications; integration of data/word processing, voice, networking applications.

Associated Systems & Networks • operates on broadband WangNet local area network • IBM 3270 Emulator can emulate 3271 Control Unit, Model 2; 3277 Display Station, Model 2; 3288 Printer, Model 2.

Communications • BSC Emulator supports communications over leased multipoint line from host that supports 3271 BSC protocol; use RS-232C-/V.24-compatible synchronous modem for communications, supporting BSC and synchronous communications in half-/full-duplex mode at data rates up to 9600 bps • WangNet Local Area Network; broadband cable supporting data rates over 10M bps • shared-resource configuration via WISE; connects up to 4 Alliance Systems by coaxial cable; information exchange at up to 20 pages per second.

Features • Alliance 250 system with at least 64K-byte memory allows customized cluster configurations with various disk/diskette drives supporting various models of CRT workstations and various models of printers • printers attached to Alliance 250 master processor can operate as part of Wang Inter-System Exchange (WISE); printers also function as output devices for Alliance Systems connected to WangNet; various printers available include DW-20 Series with standard, wide-carriage, twin-head, high-density matrix printers, and bidirectional matrix printers • Alliance Workstations include standard workstation with 64K-byte memory, CRT with 158-character horizontal scroll, automatic wraparound feature, operator prompts, full typewriter-style keyboard; ergonomically designed workstations include Ergo II Series, 5300 Series, archiving workstations, and audio workstations • workstations can be logically attached to 3270 BSC Emulator unit; can emulate 3288-2 printer, Model 2, providing 1920-character buffer for incoming data; as a 3271 system with menu-driven functions, formatted and unformatted displays; and as 3277-2 display stations; detached from emulator control unit, workstation can perform word processing and other Alliance activities.

Software • diskette-based CP/M operating system supports application packages and common data processing languages • optional software applications support automated office applications including Visual Memory, Calendar, Notebook, Electronic Directory, Message System, and Voice Documents • Visual Memory database application stores information in "cabinets" such as User Defined Cabinets, Editing Cabinets, Result Tests, Read, Printing, Redefining Cabinets, Formatted Output • Calendar maintains electronic appointment book • Notebook provides electronic notebook to store information in any format and related to any topic • Electronic Directory stores telephone information • Message System controls all types of message exchange including Voicegrams, word processed documents, and short messages (quick and phone messages) • Voice Document created through Audio Workstation; supports voice editor which allows authors to dictate, review, and edit with constant visual feedback on CRT • Communication Software includes 3270 BSC Emulation supports communication over leased multipoint line from host that supports 3271 binary synchronous protocol; when used for online communication with host, controller is loaded with microcode emulating IBM Model 3271-2 control unit for EBCDIC data transmission to/from host site; emulation of 3277-2 display stations and emulation of 3288 virtual printer also supported • WangNet using broadband coaxial cable and CSMA/CD access method supports Alliance systems and peripherals in local area network environment for automated office applications • Wang Inter-System Exchange (WISE) enables Wang Alliance systems (up to 4) to communicate with one another, transfer files, share peripherals between systems within 2,000 feet of WISE device;

exchange occurs through BASIC programs; logically "attaches" workstation to another remote system, facilitating remote application accessibility including word processing.

Program Development • Alliance BASIC is English-like language suited for interactive programming environment with extensive error control and debugging features; combines features of compiled language and Interpreter; Run-Only version for use on site requiring less than full program development facilities, provides runtime Interpreter that can execute precompiled programs.

Ease of Use Features • customized menu structure presented in easy-to-understand manner; menu entries can be created for users writing programs using Alliance BASIC and for programs using optional CP/M operating system • Alliance BASIC is Wang's version of high-level, English-like BASIC programming language for ease of use by beginning programmers.

Configuration Flexibility • possible configurations include Master processor with 128K-byte memory, diskette drive for off-line storage, and 32 ports (maximum 24 workstations) with capability to support up to 2 internal communication boards; can expand to include up to 4 large disk drives, a mix of 80.4M-byte fixed/removable (13.4M-byte removable) and the 275M-byte removable; with up to 1 large disk drive, storage capacity can be increased by adding up to 2 10M-byte fixed/removable drives (5M-byte removable) • various CRT workstations and printers with at least 64K-byte memory • maximum configuration supports 24 workstations and 32 peripheral devices.

First Announced • 1980.

Pricing • purchase price is $38,000 for an Alliance 250-1 Master including 128K-byte memory, 32 ports, operating system, and 80.4M-byte fixed/removable disk drive; monthly maintenance is $363 • purchase price is $53,000 for Model 2 with 275M-byte drive; monthly maintenance is $396.

□ Wang VS Series: VS-15, VS-25, VS-45, VS-50, VS-80, VS-90, VS-100 & Computer Systems

Type of Device • small-to-large distributed processing systems operating in interactive and batch processing, commercial, local/remote network environment.

Distributed Functions • data entry and data/word processing; electronic mail (Mailway) applications • database management • business graphics and financial modeling.

Associated Systems & Networks • VS Series Computer Systems and IBM mainframes through terminal emulation • WangNet Local Network using broadband coaxial cable; Remote WangNet supports telecommunications processor for point-to-point/multipoint dedicated/leased line communications with remote devices • SNA 3274 Emulation emulates IBM 3274 Control Unit, 3278 Display Stations; supports up to 32 display stations and printers per emulator being run concurrently • SNA 3777 Emulation emulates IBM 3777 Remote Job Entry Communication Terminal as multiple logical units • TC 3270 Emulation supports interactive communication using BSC protocol • BSC 3270 Emulation operates like IBM 3271 control unit with 3277 displays and 3288 printers • TC batch Emulation emulates IBM 2780/3780 and communicates with IBM mainframes, terminals, and Wang systems that support BSC protocols • Remote OIS cluster supports remote clusters of Office Information Systems • Gateway to International Teletex Service that conforms to CCITT standard for Videotext transmission via TTY Emulation.

Communications • local/remote communication through Input/Output Processors (IOPs) • Communication Input/Output Processor provides 1/2/3 synchronous communication lines at data rates from 1200 to 9600 bps; supports IBM 2780/3780 and 3270 terminal emulation; the 2274V-4 Four-Port Modem Sharing Unit connects up to 4 2246R remote workstations and optionally a parallel printer • Telecommunications Processor (TCP) supports up to 4 communication lines and SNA/SDLC emulation (SNA 3274/3777) at data rates up to 9600 bps • MULTILINE 100 supports up to 16 lines with an aggregate 1.2M bps; supported on VS300 only.

Distributed Computer Systems

Features ● Virtual Storage (VS) Series are 32-bit superminicomputers offered in several models and based on single- or dual-bus design: the VS-15/25/45/90 and 300 modes use a single-bus design; the VS-50/-80 use a dual-bus design ● the VS-50 and VS-80 systems use a Main Memory Bus (MMB) and a Processor Command Bus (PCB); the 16-bit-wide MMB provides communications between the CPU and main memory, and between IOPs (input/output processors) and main memory ● the systems use single-design PCB to handle communications between CPU and IOPs ● VS-15/-90 and VS-100 systems use 64-bit data path between cache memory, main memory, and bus adapters; 32-bit-wide data path is used between CPU and cache memory ● dual-bus adapters support up to 16 IOPs; 16-bit data path used between bus adapters and peripheral devices ● intelligent IOPs control specific types of devices: on VS-50 and VS-80, the IOPs interact directly with main memory; on the VS-90 and VS-100, the 16-bit I/O structure interfaces to 64-bit system bus using bus adapter ● memory: range is 256K to 512K bytes on VS-25; 256K to 1M bytes on VS-45; 128K to 512K bytes on VS-50 and VS-80; 1M to 4M bytes on VS-90; 512K to 8M bytes on VS-100 ● disk capacity: up to 68M bytes on VS-25; up to 2.6G bytes on VS-45; up to 360M bytes on VS-50; up to 5.1G bytes on VS-80 and VS-90; up to 10.2G bytes on VS-100 ● printers include 20/25/30-cps daisywheel; 120/180/222-cps dot matrix; 40- to 192-cps high-density dot matrix; 250-/600-lpm band; and 12-page-per-minute laser printer options ● Serial IOP provides 8 serial ports for workstations and printers as well as photocomposition devices and TCP for VS-25, VS-50, VS-45, VS-80, VS-90, VS-100; Serial IOP with 16 ports for VS-80 ● terminals/workstation include serial workstation with up to 64K bytes of memory and 12-inch CRT; Archiving Workstation with display, keyboard, and up to 1.2M bytes of diskette storage; and Ergo 3 Workstation with up to 64K bytes of memory and separate electronic components.

Software ● VS/OS multiprogramming, multiuser, virtual storage operating system supports 2M-byte main memory and up to 128 interactive workstations; SNA 3274 Information Display System Emulation operating in IBM SNA mode using SDLC line discipline; supports Remote Job Entry (RJE) communication; local/remote Wang workstations supported directly working in conjunction with IOPs ● DBMS provides facilities for supporting sequential/index file organizations, interfaces to all high-level program development languages; supports integrated shared-file capabilities ● Data Management System (DMS) and Advanced Data Management Facilities are bundled in with operating system and provide sequential/indexed file support ● communication software includes SNA 3274 Emulation; TC-2780/3780 Emulation; TC-3270 Emulation; TTY Emulation; TC-Remote Workstation Protocol ● WangNet Local Network Architecture using CSMA/CD access method (see Communications); Remote WangNet Facility (see Communications) ● automated office aids: word processing and electronic mail (MAILWAY) facilities.

Program Development ● high-level languages include COBOL, FORTRAN 66 (will be replaced by ANSI 77 version with no upgrade charge), BASIC, PL/1, RPG II; also Procedure Language, which is a free-form syntax and English-like statements language, and assembler, which is highly compatible with IBM S/360/370 assembly language; FORTRAN 77 is currently run on VS-100 systems only ● symbolic debugging facility.

Ease of Use Features ● Procedure Language provides free-form syntax and English-like statements that combine the functions of a command language with a job control language ● EXFORMAT provides the ability to create data entry routines with defined screen format.

Configuration Flexibility ● VS-25 System can support up to 1M bytes of memory; single IOP with 3 device controllers in basic system; up to 60M bytes of disk/diskette storage on up to 2 drives; single diskette; single serial I/O controller for up to 16 devices including 1 tape drive, 10 concurrent terminals/workstations, and TC controllers each controlling 1 to 4 lines ● VS-100 System supports up to 8M bytes of memory and 8 IOPs; 2 can be disk drive IOPs controlling up to 10G bytes of disk storage on up to 12 drives, up to 3 serial device IOPs, and up to 3 TC Data Comm or Tape IOPs; Serial IOPs can also attach TC Data Comm Controllers ● maximum 2 128 concurrent terminals/workstations/users and 150 concurrent tasks.

First Announced ● 1977 for VS-80; 1980 for VS-50 and VS-100; 1982 for VS-25 and VS-90; and 1983 for VS-45.

Pricing ● packaged systems include the operating system, procedure language, data management facilities, choice of 1 language compiler, assembler, and systems utilities ● purchase price is $25,000 for a VS-25 packaged system including CPU, 512K-byte main memory, 34M-byte disk and controller, 1.2M-byte diskette drive, and serial device controller; monthly maintenance is $225 ● purchase price is $195,000 for a VS-100 packaged system including CPU, 8M-byte memory, 32K-byte cache memory, single I/O bus adapter, 300K-byte diskette storage with IOP, and local serial workstation; monthly maintenance is $2,138.

● **END**

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