NCR Personal Computers
NCR PC

■ PROFILE

Operating Systems • CP/M-80 single-user by Digital Research for 8-bit processor; CP/M-80, CP/M-86 by Digital Research or MS-DOS 1.25 for dual 8-/16-bit processor; UCSD p-System by Softech.

Data Management • only MS-DOS or CP/M-86 file handling capabilities; file and database software available from third-party vendors to run under MS-DOS, CP/M-80 or CP/M-86.

Communications/Networks • NCR DECISION NET System comprised of NCR Omninet local area network (LAN) by Corvus Systems utilizing an RS-422 port and NCR MODUS File Sharer (available separately); RS-232C serial interface.

Languages • MBASIC and GW BASIC with graphics features by Microsoft.

Models • NCR PC 8-bit CPU and NCR PC 8-/16-bit CPU models.

CPU • Zilog Z80A 8-bit processor at 4MHz on 8-bit system; Zilog Z80A 4MHz and Intel 8088 5MHz, 16-bit with 8-bit data path on 8-/16-bit system.

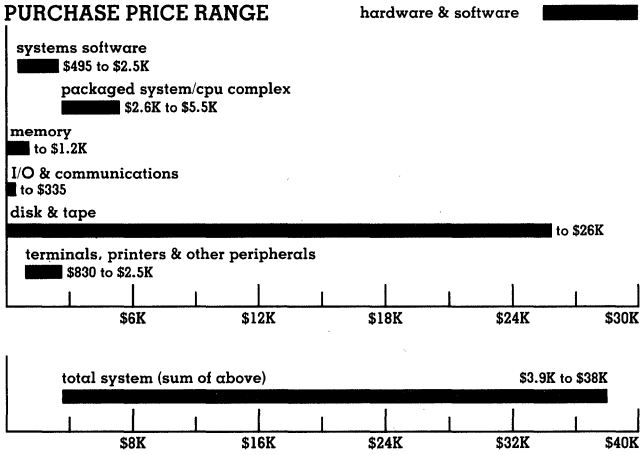
Memory • 64K bytes of RAM standard to 512K bytes; 4K bytes of ROM.

Chassis Slots • 7 NCR proprietary custom adapter slots.

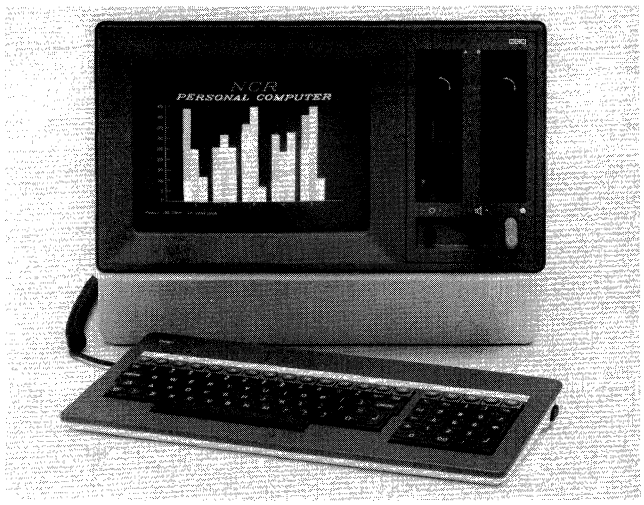
Ports • 1 RS-232C Serial, 1 Centronics-compatible parallel.

Mass Storage • NCR PC comes with 2 320K-byte floppy disk drives or a 10M-byte hard disk and a single 320K-byte floppy disk.

PURCHASE PRICE RANGE — hardware & software



NCR PERSONAL COMPUTERS PURCHASE PRICING bar graphs illustrate price ranges for small to large systems, with solid bars reflecting software/hardware purchase pricing • **SMALL SYSTEM** is based on NCR PC/8-bit/mono **packaged system** (includes monochrome NCR PC with detached keyboard, dual floppy disks, 8-bit Z-80A processor, 64K bytes of RAM, CP/M-80, and integral monitor) and the following options: WordStar word processor, a dot-matrix printer • **LARGE SYSTEM** is based on **NCR PC/8:16-bit/color/hd packaged system** (including dual-processor NCR PC with color graphics, one floppy disk drive, one 10M-byte hard disk drive, detached keyboard, and integral monitor) and the following options: MS-DOS, CP/M-86, Omninet Software, GSS Graph, InfoStar, GW-BASIC, SuperCalc, UCSD-P System, WordStar Plus, 512K RAM expanded **memory**, 20M-byte additional hard disk storage, MODUS file sharer, Omninet transporter, serial letter-quality **printer**, parallel dot-matrix **printer**, diagnostic module.



Terminals/Workstations • single-terminal system with detachable keyboard and monochrome or color display.

Printers • 120-cps, 80- or 136-character-per-line dot-matrix printers.

First Delivery • January 20, 1983.

Systems Delivered • information not available.

Comparable Systems • NCR PC competes for market share with single-user desktop and networked systems supporting CP/M-80, CP/M-86, or MS-DOS in the $2,800 to $10,000 range.

Vendor • NCR Corporation; Dayton, OH 45479 • 513-445-5000.

Canada • NCR Canada Ltd; 6865 Century Avenue, Mississauga, ONT L5N 2E2 • 416-826-9000.

Distribution • through computer dealers nationwide; NCR direct sales force Vertical Business Unit Special-Purpose Systems.

■ ANALYSIS

The NCR PC microcomputers are NCR's first entries into the multibillion dollar personal computer marketplace. NCR has departed from its well-known Migration Path Engineering in its design of its personal computer. Many of the components used are industry standard for cost and availability reasons. The operating systems are not NCR proprietary and do not offer compatibility with other NCR machines.

The NCR personal computer was originally named the Decision Mate V. Some NCR documentation still refers to the original name. NCR has indicated that NCR PC is the official name and will be used in future documentation. To agree with existing documentation and price lists both NCR PC and Decision Mate V or DM V will be used in referring to the microcomputer.

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NCR PC

The NCR PC comes in 8-bit single and 8-/16-bit dual-processor models. NCR has chosen the Zilog Z80A for its 8-bit system and added Intel's 8088 for the dual 8-/16-bit processor system. Both systems run CP/M-80, and systems with the Intel 8088 run CP/M-86 and MS-DOS.

As a standalone unit the NCR PC is a powerful system. With color resolution twice that of the IBM PC, memory capacity to 512K bytes, MS-DOS, CP/M-86, hard disk capability, and communications facilities, the DM V dual-processor system is a strong contender in the desktop PC marketplace. Additionally, a DM V Z80A 8-bit monochrome system is a low-cost alternative that can be upgraded to the maximum DM V configuration when necessary.

NCR DECISION NET, a 63-user local area network with a file and peripheral sharer called MODUS, was announced simultaneously with the DM V. A special feature making DESICION NET attractive to multiple-vendor PC environments is its ability to include popular non-NCR microcomputers in its network. Currently these include the IBM PC and compatibles, Apple II, DEC Rainbow 100, and TRS-80 Model IV.

NCR has announced a series of enhancements due sometime in the second quarter of 1984. These include an Intel 8087 co-processor, a buffered RS-232 printer interface, a real-time clock, an IEEE-488 interfqce, a mouse adapter, and a daisy-chained external hand disk system for 10, 20, or 30M bytes of online hard disk storage.

NCR is now manufacturing its microcomputers in Clemson, South Carolina, as well as Augsburg, West Germany. NCR claims this increase in production was due to an increased demand for its PC line. Recently, the DM V and many of its associated products underwent significant price reductions ranging from 14 to 43 percent.

☐ Strengths

Up to 63 NCR PC microcomputers can connect to NCR DECISION NET and MODUS file sharer. This gives each user up to 64M bytes of hard disk storage, and on-line use of all peripherals that are connected to the MODUS. It is now possible to share top-quality peripherals such as plotters and letter-quality printers without multiple purchases or continual relocations and reconnections. DECISION NET uses NCR Omninet local area network supplied to them by Corvus. Omninet is field-proven and offers an advantage in inter-connectability to many common non-NCR microcomputers. To the MIS manager this presents an immediate and effective means of unifying an "alphabet-soup" microcomputer environment.

All NCR PCs are upgradable to the maximum dual-processor color configuration. Expansion can be accomplished without opening the system unit by using the 7 chassis slots in the rear of the machine.

☐ Limitations

Though the NCR PC dual processor is an MS-DOS machine, it does not offer all the advantages of a true IBM PC-compatible. For example, only about half of the IBM PC software will run on a strictly MS-DOS machine such as the NCR PC.

Even though NCR has recently reached agreements with various third-party vendors, there is a shortage of software that takes full advantage of DM V's advanced features.

■ SOFTWARE

☐ Terms & Support

Terms • for license from NCR; this includes operating systems, DECISION NET software, and application packages distributed by NCR.

Support • NCR will support only the software distributed by NCR; provided is a toll-free number for Field Support via the CODAR system; customers wishing further support may contract Central Service for a $120 annual fee.

☐ Software Overview

CP/M-80 by Digital Research comes standard with both the single and dual-processor models and runs using the Zilog Z80A microprocessor. MS-DOS and CP/M-86 come with the dual-processor model and the upgrade to the single-processor model; both utilize the Intel 8088 microprocessor. Each of these operating systems includes various utilities, file manipulation, and backup facilities. There is a large selection of third-party software available to run under these operating systems.

NCR offers major software packages for either dual- or single-processor models. These include WordStar word processor, CalcStar electronic spreadsheet, DataStar data entry and record retrieval system, and InfoStar database, all by MicroPro. Also available are GSS-Graph by Digital Research and Supercalc by Sorcim. NCR has reached a software agreement with Supersoft to supply packages on NCR equipment. Supersoft designs and sells BASIC, FORTRAN, "C" and Ada compilers, various utilities, and business applications. MBASIC and GW BASIC by Microsoft are currently available as development languages.

The NCR PC (DM V) can tap the resources of a powerful mass storage file sharer and mixed vendor network. IBM 2780 and 3780 Binary Synchronous Communications capabilities for DECISION NET have been announced by NCR.

NCR claims the DM V can access mass storage through Omninet on the hard disk MODUS file sharer as quickly as a local online floppy disk. Conceptually this is equivalent to 64M bytes of online floppy disk storage for each microcomputer on DECISION NET. Coupled with the advantages of networking, mixed vendor compatibility, and advanced standalone capability of the DM V, the potential exists for a powerful integrated operating environment.

☐ Packaged Software

NCR does not bundle software with the NCR PC. See Application Packages section for software available for license from NCR.

☐ Operating Systems

CW D0006-0052-0 MS-DOS 1.25 • single-user, interactive and batch processing disk operating system developed by Microsoft; has its equivalent in IBM PC-DOS 1.1 • supports maximum diskette storage of 160K bytes in up to 64 different files in single-sided format and up to 320K bytes to 112 files in double-sided format; handles records from 1 to 65,535 bytes long in file transfers; executes external (disk-based) commands, giving the user ability to expand the DOS vocabulary to the limits of disk space • includes batch processing capabilities with automatic execution on power up; user commands include DATA, TIME, DISKCOPY, FORMAT, RENAME, ERASE, COMP (compare), CHKDSK (check disk) • innovations include a double File Allocation Table (disk map) with third memory resident copy for efficient disk access, a disk mapping technique which conceptualizes conventional tracks and sectors as a single dimensioned array of logical sectors, and allocation units which subdivide data section into 1, 2, 4, 8, 16, 32, 64, or 128 logical sector groups, eliminating disk external fragmentation typical of conventional track-sector mapping • MS-

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DOS is divided into 4 parts: a device-independent I/O handler, and I/O processor, reference and jump vectors in low memory, and a command processor; the device-independent I/O handler on hidden file MSDOS.SYS is the core of MS-DOS through which I/O must be directed; the I/O processor physically moves data and instructions by means of hidden file IO.SYS as commanded by MSDOS.SYS; the command processor using the COMMAND.COM program is responsible for interface between user and MS-DOS, error trapping, batch file processing, interpretting user commands, and executing file names ● MS-DOS 1.25 is predecessor of MS-DOS 2.00:

$50 lcns

CW D0006-0065-0 CP/M-86 ● 16-bit enhanced version of the 8-bit CP/M operating system designed to support the Intel 8086 or 8088 microprocessors; incorporates all the basic elements of the CP/M system but adapts these functions to the larger and faster operating environment ● consists of 4 elemental structures: Basic Input/Output System (BIOS), Basic Disk Operating System (BDOS), Command Console Processor (CCP), and a Transient Program Area (TPA) ● BIOS is the modifiable portion of the operating system enabling users to tailor CP/M systems to meet specific configurations; allows users to define all hardware-independent elements of the system by defining low-level interface and the peripheral I/O for the system ● BDOS provides all the disk management control; supports up to 16 logical drives containing up to 8M bytes each, for a maximum of 128M bytes of online storage; any one file can reach the full drive size ● CCP provides the interface between the user's console and the rest of the CP/M system; it reads, interprets, and executes commands entered from the console; commands are both built-in commands and transient commands; transient commands are loaded into the TPA and executed ● TPA is the area designated to hold programs that are loaded from disk and then executed ● standard utilities provided include: DDT-86 interactive debugger; PIP file transfer utility; SUBMIT batch control utility; ED command-oriented text editor; ASM-86 assembler; STAT system status utility; and GENCMD that processes Intel "H86" format files ● memory requirements depend on number and types of options implemented ● supports up to 1M bytes of memory; requires 56K bytes of memory and an ASCII terminal:

60

CW D0006-0000-0 UCSD p-System Operating System Runtime Version ● general-purpose disk/diskette system by Softech Microsystems supports single-user interactive and batch processing; provides for software transportability from one hardware environment to another; provides software framework for UCSD Pascal and BASIC program development/execution; manages UCSD Pascal and BASIC compilers; macro assembler, linker, file handler, and text editor ● features include: program chaining; input/output redirection; block-I/O service routines; dynamic overlays; dynamic memory allocation; runtime support routines; support for asynchronous processes concurrency primitives in Pascal configurable for use with color graphics subsystems and hard disk drives:

NA

☐ Data Management

DataStar ● by MicroPro; data entry and retrieval package, can add, change, or examine information; integrates with InfoStar.

CW-G5B3-0008-0 ● DataStar for CP/M-80:

$295 lcns

CW-G5B3-0029-0 ● DataStar for MS-DOS:

295

CW-G5B3-0019-0 ● DataStar for CP/M-86:

295

InfoStar ● by MicroPro; self-documenting database package includes: FORMGEN-screen generation and definition of field characteristics, DATASTAR—data entry and record retrieval, FORMSORT—high-speed sort based upon SuperSoft, RGEN—quick report generator, REDIT—general-purpose report generator allows user to run reports and perform updates.

CW-G5B3-0010-0 ● InfoStar for CP/M-80:

495

CW-G5B3-0031-0 ● InfoStar for MS-DOS:

495

CW-G5B3-0011-0 ● InfoStar for CP/M-86:

495

☐ Communications/Networks

NCR DECISION NET is comprised of Omninet local area network by Corvus and MODUS file sharer by NCR (see mass storage).

NCR Omninet ● local area network allows up to 64 connections; this conceivably can be 63 NCR PC microcomputers and one MODUS file sharer; features cache memory management, multiple I/O processors, high-efficiency I/O controlware, start-up diagnostics, error logging, and 3 levels of system security ● can connect to multiple-vendor hardware including Apple, IBM, Radio Shack and DEC personal computers; requires appropriate Transporter (see I/O and Communication under ". . . to Omninet interface").

CW-D006-0066-0 ● Omninet for NCR PC with CP/M-80:

$165 lcns

CW-D006-0067-0 ● Omninet for NCR PC with MS-DOS:

165

CW-D006-0071-0 ● Omninet for NCR PC with CP/M-86:

165

CW-D006-0068-0 ● Omninet for IBM PC with PC-DOS:

200

CW-D006-0072-0 ● Omninet for Apple II with Apple-DOS:

200

☐ Program Development/Languages

GWBASIC Interpreter ● implementation of Microsoft BASIC-86 ● provides dual-mode graphics capabilities in medium and high resolution, and drawing statements for creating lines and circles or painting the screen ● screen editor implements special function keys and multistatement lines ● allows calling of machine language subroutines, merging of multiple programs, and transferring control to specific program lines during certain events; IF THEN/ELSE constructs are supported as well as trace/notrace for easier debugging.

CW-D006-0064-1 ● GW BASIC for MS DOS:

$60 lcns

CW-D006-0064-2 ● GW BASIC for CP/M-86:

60

CW D006-0053-0 MBASIC Interpreter ● for CP/M systems; includes many of the features of GW BASIC; 4 variable types, trace facilities, extensive program editing facilities, automatic line number generation and renumbering, can call up to 10 assembly subroutines; manipulates matrices with up to 255 dimensions; supports nestable IF THEN/ELSE, Boolean operators, and random and sequential disk files:

275

☐ Application Packages

WordStar ● by MicroPro; best-selling word processing package with document design features, help menus, full search/replace and block move functions; can manipulate CalcStar files and other MicroPro software files.

CW-G5B3-0006-0 ● WordStar for CP/M-80:

$495 lcns

CW-G5B3-0027-0 ● WordStar for MS-DOS:

495

LCNS: license fee. Prices effective as of June 1983.

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CW-G5B3-0017-0 • WordStar for CP/M-86:
495

WordStar PLUS • by MicroPro; WordStar as above plus SpellStar spelling checker and MailMerge mailing list generator.

CW-G5B5-0007-0 • WordStar Plus for CP/M-80:
845

CW-G5B3-0028-0 • WordStar Plus for MS-DOS:
845

CW-G5B3-0018-0 • WordStar Plus for CP/M-86:
845

CalcStar • by MicroPro; electronic spreadsheet package; integrates with InfoStar by creating usable datafile.

CW-G5B3-0009-0 • CalcStar for CP/M-80:
145

CW-G5B3-0030-0 • CalcStar for MS-DOS:
145

CW-G5B3-0020-0 • CalcStar for CP/M-86:
145

Supercalc • by Sorcim; advanced spreadsheet package; sort, formatting, rounding, delete, insertion facilities; 16-bit version on a 256K system can have a 16,002 cell workspace, can support error and negative values in color.

CW-G5B3-0021-0 • Supercalc for CP/M-80:
250

CW-G5B3-0023-0 • Supercalc for MS-DOS:
250

CW-G5B3-0022-0 • Supercalc for CP/M-86:
250

GSS-GRAPH • by Digital Research; graphics application package facilitates display of table data in various common formats including pie and bar chart, line, step and scatter plots, text-only charts, and multiple graphs on the same page; menu-driven design to allow novice to generate presentation-quality charts on micros.

CW-G5B3-0015-0 • GSS-Graph for CP/M-80:
400

CW-G5B3-0015-1 • GSS-Graph for MS-DOS:
400

CW-G5B3-0015-2 • GSS-Graph for CP/M-86:
400

■ HARDWARE

☐ Terms, Support & Documentation

Terms • for purchase: 90-day warranty on parts and labor; maintenance contracts available for an additional fee.

Support • NCR provides a toll-free number for all customers contracting for full service (on-site); only full service or time-and-materials support is available for the NCR DECISION NET system; this includes the MODUS, TRANSPORTERS, and OMNINET.

Documentation • individually provided with application packages, operating systems, and hardware • upgrades that are user installable also come with instructions and/or documentation.

☐ Physical Specifications (H × W × D); Weight

CPU • 14.9 × 18.1 × 14.6 inches; 52.9 pounds.

Display • integrated with CPU unit.

Keyboard • 1.5 × 16.9 × 8.5 inches; 3.3 pounds.

☐ Systems Overview & Configurability

The NCR PC microcomputer comes in two models single 8-bit or dual 8-/16-bit processors. It is designed so that the lowest of the line monochrome 8-bit, 64K-byte system can be upgraded to a color 8-/16-bit, 512K-byte RAM, 30M-byte hard disk system. Maximum cost effectiveness is achieved by proper sizing at initial purchase, however.

Mass storage can be 5.25-inch floppy and hard disk. A mass storage alternative is the NCR MODUS file sharer. When used with Omninet local area network (LAN) the MODUS can provide up to 64M bytes of hard disk storage. NCR claims that accessing files in this arrangement is as fast or faster than local floppy disk devices.

Graphics is 640x400 pixels of 8-color resolution. This resolution is supported by a 96K-byte graphics processor. Because of price reductions, the effective price difference between identical monochrome or color systems is only $350, making color an attractive option.

The system unit has a small footprint and a modern-design low-profile detached keyboard. The keyboard has 20 programmable function keys and a numeric keypad.

There are 7 externally accessible chassis slots that facilitate user installation of expansion memory to 512K bytes, I/O for the Omninet Transporter and other adapters. Two communication ports are also available, 1 parallel and the other serial.

Every connection to DECISION NET requires a Transporter and the appropriate NCR Omninet software. This is also true when connecting the Apple II, IBM PC, DEC Rainbow 100, and TRS-80 Model IV. The potential for this feature alone to benefit a mixed vendor PC environment is enormous. Before considering this course of action it would be wise to check with NCR for data on a shop where this multiple-vendor DECISION NET integration is actually in use.

Maximum configurability is stated below; minimum configurations are discussed under Packaged Systems.

NCR PC System Maximums • dual 8-/16-bit CPU, color system with 512K bytes of RAM, 30M bytes of hard disk storage, 2 320K-byte floppy disk devices, MODUS file sharer interface with 64M-byte capacity, parallel and serial ports, auto-diagnostics • announced by NCR are an 8087 math coprocessor, a 2K-byte buffered RS-232 interface, real time clock, IEEE-488 interface and mouse interface to be available second quarter of 1984.

☐ Packaged Systems

AU 9000-0101-0 NCR PC/8-bit/mono • NCR PC with 8-bit processor, 12-inch monochrome display, keyboard, 64K bytes of RAM, 32K bytes of graphics RAM, 2 320K-byte 5.25-inch floppy disk drives, upgradeable to 8-/16-bit processor and 512K bytes of RAM:

$2,650 prch	$228 maint

AU 9000-0201-0 NCR PC/8-bit/mono/hd • NCR PC with 8-bit processor, 12-inch monochrome display, keyboard, 64K bytes of RAM, 32K bytes of graphics RAM, 320K-byte 5.25-inch floppy disk drive, 1 integrated 5.25-inch 10M-byte formatted Winchester hard disk drive, upgradeable to 8-/16-bit processor and 512K bytes of RAM:

4,700	460

AU 9000-0301-0 NCR PC/8:16-bit/mono • NCR PC with 8-/16-bit dual processor, 12-inch monochrome display, keyboard, 64K bytes of RAM, 32K bytes of graphics RAM, 2 320K-byte 5.25-inch floppy disk drives, upgradeable to 512K bytes of RAM:

3,090	336

AU 9000-0401-0 NCR PC/8:16-bit/mono/hd • NCR PC with 8-/16-bit processor, 12-inch monochrome display, keyboard, 64K bytes of RAM, 32K bytes of graphics RAM, 1 320K-byte 5.25-inch floppy disk drive, 1 integrated 5.25-inch 10M-byte formatted Winchester hard disk drive, upgradeable to 512K bytes of RAM:

5,140	568

AU 9000-0501-0 NCR PC 8:16-bit/color • NCR PC with 8-/16-bit dual processor, 12-inch color display, keyboard, 64K bytes of RAM,

PRCH: purchase price. MAINT: annual maintenance fee. NA: not available. Prices effective as of June 1983.

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96K-byte graphic processor, 2 320K-byte 5.25-inch floppy disk drives, upgradeable to 512K bytes of RAM:

3,440	453

AU 9000-0601-0 NCR PC/8:16-bit/color/hd • NCR PC with 8-/16-bit processor, 12-inch color display, keyboard, 96K-byte graphic processor, 32K bytes of graphics RAM, 1 320K-byte 5.25-inch floppy disk drive, 1 integrated 5.25-inch 10M-byte formatted Winchester hard disk drive, upgradeable to 512K bytes of RAM:

5,490	685

☐ CPU

Intel 8088 Processor • 8-bit data bus interface, 16-bit internal architecture, direct addressing to 1M bytes of memory; 16-bit register set with symmetrical operations; approximately 70 basic instructions with up to 30 addressing modes; 8-bit and 16-bit signed and unsigned arithmetic with binary and decimal operands, extensive string and block move facilities • powerful segmentation facilities allows memory partitioning for multitasking, concurrent or multiuser capabilities • a pseudo-superset of the Intel 8080 instruction set where translation to 8088 is straight forward • 5MHz.

Zilog Z80A Processor • 8-bit internal architecture, 8-bit data bus interface; direct addressing to 64K bytes of memory; 14 registers include 16-bit program and stack pointers, 2 index registers, and a duplicate set of an 8-bit accumulator and a 7-bit flag register; upwardly compatible with the Intel 8080 it provides binary coded decimal (BCD), arithmetic double-precision operations, multiple indexing with address registers, multiple interrupt, increment, decrement and move capabilities • in addition to being able to execute all 78 Intel 8080 instructions, 50 enhancements to the instruction set include advanced block move and search macros, relative jump and 3 types of selectable response interrupts, for a total of 128 operations • 4MHz.

AK 9000-K231-0 External Dual Processor Upgrade • for upgrade of 8-bit system to 8-/16-bit; requires order for either CP/M-86 (CW D006-0065-0) or MS-DOS (CW D006-0052-0) and chassis slot 7:

$600 prch	$50 maint

☐ Memory

AK 9000-K200-0 64K bytes Memory • upgrades NCR PC from 64K bytes to 128K bytes:

$200 prch	NA maint

AK 9000-K202-0 192K bytes Memory • upgrades NCR PC from 64K bytes to 256K bytes:

550	NA

AK 9000-K200-0 448K bytes Memory • upgrades NCR PC from 64K bytes to 512K bytes:

1,200	NA

☐ I/O & Communications

AK 9000-K211-0 RS-232 Interface with Modem Cable • customer-installable serial RS 232C plug-in module with cable:

$150 prch	$20 maint

AK 9000-K212-0 RS-232 Interface with Peripheral Cable • customer-installable RS 232C plug-in module with printer cable for peripheral supporting serial interface:

200	20

AK 9000-K214-O I/F ADP & Bus Connector • interface board and bus connector for development of interfaces:

100	10

AK 9000-K600-0 NCR PC to Omninet Interface • NCR PC transporter board, cable and installation documentation for connection to Omninet; must be ordered with Omninet software for 1 of 3 environments, CP/M-80 or CP/M-86 by Digital Research, MS-DOS by Microsoft:

335	90

AK 9000-K700-0 IBM PC to NCR Omninet Interface • connects IBM PC running PC-DOS to NCR Omninet; includes IBM PC transporter board, cable and installation documentation; must also license Omninet IBM PC software (CW D0006-0068-0):

495	104

AK-9000-K706-0 Apple II to NCR Omninet Interface • connects Apple II/Apple DOS to NCR Omninet; includes Apple II transporter board, cable and installation documentation; must also license Omninet Apple II software (CW D006-0072-0):

495	104

AK 9000-K702-0 Omninet Tap Boxes (2) • each tap box accommodates up to 4 personal computer connections:

50	NA

AK 9000-K704-0 Omninet Repeater • for distant nodes required after first 1,000 feet of twisted-pair cable and every 1,000 feet up to 4,000 feet:

300	40

☐ Mass Storage

Floppy Disk • 5.25-inch floppy disk drive, 40 tracks, 9 512-byte sectors per track, for a 320-/360K-byte capacity; data transfer rates of 250K bits per second • included with package system.

AK 9000-K012-0 10M Hard Disk • 5.25-inch fixed disk, 612 tracks, 17 512-byte sectors per track for a 10M-byte formatted capacity; data transfer rates of 5M bits per second and an 85-millisecond access time; internally mounted:

$3,000 prch	$400 maint

AK 9000-K013-0 10M External Hard Disk • 5.25-inch fixed disk, 612 tracks, 17 512-byte sectors per track for a 10M-byte formatted capacity; transfer rates of 5M bits per second and an 85-millisecond access time; externally mounted; slave or master hard disk, 2 slave disk drives can be daisy chained to 1 master hard disk for 30M-byte capacity:

2,500	317

AU 9000-1101-0 MODUS File Sharer 12MB/Omninet • I/O processor with 64K bytes of RAM, 5.25-inch 12M-byte unformatted Winchester hard disk, 1 Omninet communication processor, and 1 5.25-inch 0.8M-byte unformatted floppy disk; supports to 2 12M- or 32M-byte Winchester disks and 1 20M-byte streamer tape; also supports up to 4 RS-232C communication processors each with 4 channels and/or 1 Omninet 64 user communication processor:

9,995	1,132

AU 9000-1201-0 MODUS File Sharer 12MB/RS-232 • I/O processor with 64K bytes of RAM, 5.25-inch 12M-byte unformatted Winchester hard disk, 1 RS-232C communication processor, and 1 5.25-inch 0.8M-byte unformatted floppy disk; supports to 2 12M- or 32M-byte Winchester disks and 1 20M-byte streamer tape; also accommodates up to 4 RS-232C communication processors each with 4 channels and/or 1 Omninet 64 user communication processor:

9,995	1,132

AU 9000-1301-0 MODUS File Sharer 32MB/Omninet • I/O processor with 64K bytes of RAM, 5.25-inch 32M unformatted Winchester hard disk, one Omninet communication processor, and 1 5.25-inch 0.8M-byte unformatted floppy disk; supports to 2 12M- or 32M-byte Winchester disks and 1 20M-byte streamer tape; supports up to 4 RS-232C communication processors each with 4 channels and/or 1 Omninet 64 user communication processor:

13,295	1,260

AU 9000-1401-0 MODUS File Sharer 32MB/RS-232 • I/O processorr with 64K bytes of RAM, 5.25-inch 32M-byte unformatted Winchester hard disk, 1 RS-232C communication processor, and 1 5.25-inch 0.8M-byte unformatted floppy disk; supports to 2 12M- or 32M-byte Winchester disks and 1 20M-byte streamer tape; also supports up to 4 RS-232C communication processors each with 4 channels and/or 1 Omninet 64 user communication processor:

13,295	1,260

AK 9000-K852-0 Hard Disk 12MB • 12M-byte second hard disk for MODUS File Sharer:

1,800	307

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AK 9000-K858-0 Hard Disk 32MB • 32M-byte second hard disk for MODUS File Sharer:

5,300	435

AK 9000-K780-0 Tape 20MB • 20M-byte streaming tape for MODUS File Sharer:

2,500	317

AK 9000-K032-0 Omninet PCB • Omninet communication processor printed circuit board for MODUS File Sharer:

2,500	317

AK 9000-K030-0 RS-232 PCB • RS-232C communication processor printed circuit board for MODUS File Sharer:

2,500	317

☐ Terminals/Workstations

Display • high-resolution 640x400 pixel, 8-color or monochrome monitor; 80-column by 25-row text; color is accompanied by a 96K-byte graphics processor, monochrome by a 32K-byte processor.

Keyboard • low profile ergonomic design; 20 programmable function keys, detached.

☐ Printer/Graphics

AU 6411-8510-7100 Dot-Matrix Printer • 80-column, 120-cps; bidirectional/position seeking, dot-matrix printer; character pitches from 5- to 12-cpi, or proportional spacing, bidirectional friction or tractor feeding:

$830 prch	$168 maint

AU 6411-1550-7100 Dot-Matrix Printer • 136-column, 120-cps, bidirectional/position seeking, dot-matrix printer; character pitches from 5- to 12-cpi, or proportional spacing, bidirectional friction or tractor feeding:

1,185	168

AK 9000-K210-0 Parallel Printer Interface with Cable • customer-installable plug-in Centronics-compatible interface:

250	25

AK 6411-K150-0 2K Buffer Option • 2K-byte buffer option for either 6411-8510 or 6411-1550 dot-matrix printers:

55	NC

AK 6411-K200-0 Replacement Print Head • for 6411-8510 or 6411-1550 dot-matrix printers:

95	NC

AK 6411-K300-0 80 Column Paper Guide • for 6411-8510 dot-matrix printer:

30	NC

AK 6411-K301-0 136 Column Paper Guide • for 6411-1550 dot-matrix printer:

35	NC

☐ Other Peripherals

AK 9000-K220-0 Diagnostic Module • plug-in diagnostic module for system diagnosis and maintenance by user:

$500 prch	NA maint

• **END**

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NEC APC
Personal Computer System

■ PROFILE

Operating Systems • CP/M-86, Concurrent CP/M-86, MS-DOS V.2.0, UCSD p-System; single-user, interactive and batch processing systems

Data Management • dBASE II database management system; Access/Manager, file access system

Communications/Networks • asynchronous, BSC 3270 and 3780, and SNA/SDLC 3270 terminal emulation • BENCHMARK Telecommunications

Languages • Microsoft BASIC, R/M COBOL, Microsoft FORTRAN, Microsoft Pascal

Models • APC-H01, monochrome unit with single floppy disk drive; APC-H02, monochrome unit with dual floppy disk drives; APC-H03, color unit with dual floppy disk drives; APC-H04, color unit with single floppy disk drive

CPU • 16-bit NEC uPD 8086 microprocessor

Memory • 128K to 640K bytes of RAM; 8K bytes of ROM; 4K bytes of CMOS RAM with battery backup

Chassis Slots • 3 open slots

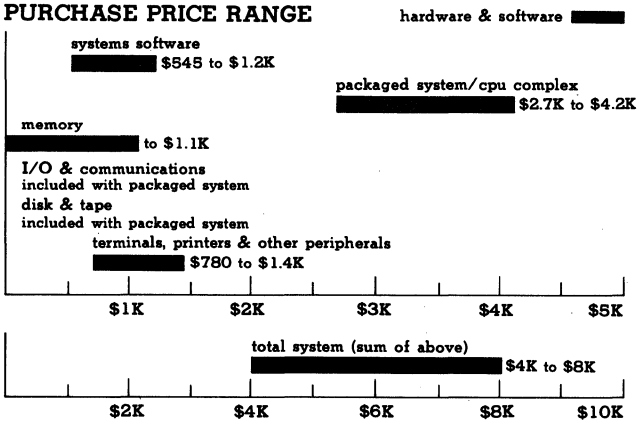
Ports • 1 serial port, 1 parallel port standard

Mass Storage • up to 2M bytes on dual floppy disk drives; up to 20M bytes of hard disk storage optional

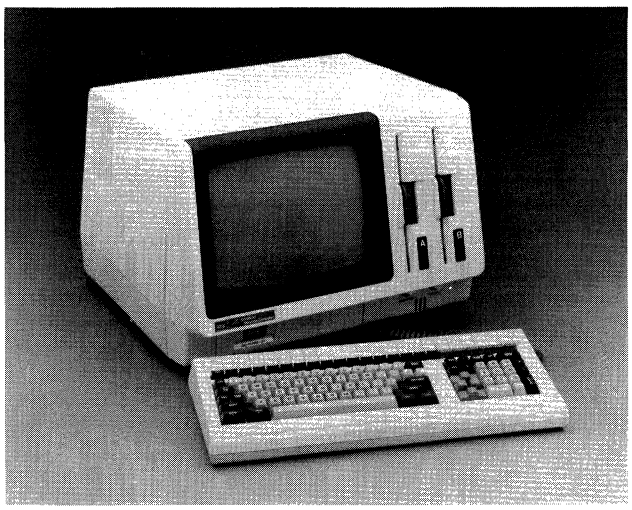
Terminals/Workstations • single-user system; no add-on terminals

Printers • a variety of dot-matrix and Spinwriter letter-quality printers available from vendor

PURCHASE PRICE RANGE



NEC APC PURCHASE PRICING bar graphs illustrate price ranges for small to large systems, with solid bars reflecting software/hardware purchase pricing • **SMALL SYSTEM** is based on **APC-H01 packaged system** (includes CPU, 128K-byte RAM, 8K-byte ROM, 4K-byte CMOS RAM, 1M-byte floppy disk drive, monochrome monitor and keyboard, RS-232C port, parallel printer port, real-time clock/calendar) and the following options: MS-DOS operating system and BASIC interpreter software; 100-cps dot-matrix printer • **LARGE SYSTEM** is based on **APC-H02 packaged system** (includes CPU, 128K-byte RAM, 8K-byte ROM, 4K-byte CMOS RAM, dual 1M-byte floppy disk drives, color monitor and keyboard, RS-232C port, parallel printer port, real-time clock/calendar) and the following options: CP/M-86 operating system, BASIC interpreter, asynchronous communications, word processor, spreadsheet software; additional 512K bytes of memory; color graphics subsystem; 100-cps dot-matrix printer.



First Delivery • July 1982 for APC-H01, APC-H02 monochrome models; November 1982 for APC-H03 color model; May 1983 for APC-H04 color model

Systems Delivered • information not available

Comparable Systems • single-user, 16-bit desktop systems typically in the $3,000 to $7,000 price range

Vendor • NEC Information Systems, Inc; 5 Militia Drive, Lexington, MA 02175 • 617-862-3120

Canada • Distributors: (for Eastern Canada) Microcomputers of Canada; 3410 Midland Avenue, Unit 4, Scarborough, ONT M1V 2N1; 416-293-3885 • (for Western Canada) Conquest Systems; 13710 N.E. 20th Street, Suite E, Bellevue, WA; 509-641-7650

Distribution • nationwide through computer stores, office equipment dealers, a direct sales force, and OEMs

■ ANALYSIS

NEC Information Systems, Inc (NECIS) is a subsidiary of Japan's NEC Corporation, a large manufacturer of a broad spectrum of products within the computer industry. NECIS itself designs and manufactures computers and peripheral equipment. One of this company's offerings to the personal computer field is the Advanced Personal Computer (APC) which was first introduced in mid 1982.

NEC presents the APC in 4 basic models, 2 with a monochrome display and two with a color display, and with either a 1M-byte single drive or 2M-byte dual drive. Additionally, the computer is presented as a word processing unit and is bundled with the operating system, a word processing software package, and a printer. The word processor software is BENCHMARK from Metasoft Corporation and is offered along with other office

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NEC APC
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automation products.

Since the system's introduction, NEC has added several new hardware and software options to make the APC more competitive. These new features include the Intel 8087 math co-processor; support for hard disk subsystems; the UCSD p-System, runtime version; Concurrent CP/M-86 and MS-DOS; several graphics packages; and SNA/SDLC communications options. The price of the system has also dropped since the initial release.

To date, NEC is one of the few Japanese companies to successfully penetrate the American marketplace with a micro system. Their most popular product in the micro field has been their Spinwriter letter-quality printer family, which is reported to be one of the best around.

☐ Strengths

The NEC APC will serve very well in a business environment, especially one where heavy emphasis is placed on graphics. NEC has stressed its graphics capabilities for the APC as evidenced not only by its optional graphics board, but also by the addition of several graphics software products. The graphics board contains the popular NEC 7220 graphics chip and its own dedicated graphics memory (128K bytes for monochrome and 384K bytes for color). Its resolution is 640 x 475 pixels on the display screen from a 1024 x 1024 pixel display image. The graphics software includes such products as a Tektronix 4010 graphics terminal emulator; GSX graphics capability with CP/M-86; 2 graphics subroutine libraries; and 4 business graphics applications packages.

Other nice features, which come standard with the unit, are a 4K-byte CMOS RAM, a 2-year life lithum battery backup, and an Automatic PowerOff which allows the system to turn itself off or be turned off by a remote host. The CMOS RAM, which can be protected against accidental writing, is used for retaining the definitions the user gives to the APC's user-definable function keys.

☐ Limitations

The APC has an interesting idiosyncrasy about it—and one that could be considered a limitation of the system. If a user wishes to put the NEC hard disk option on the APC, he/she will have to give up 128K bytes of memory. It turns out that the hard disk uses the upper 128K bytes of memory for disk addressing. This could be trouble to someone who has a floppy-based system with the maximum memory of 640K. If this user writes any programs that utilize all the memory and then decides to go to a hard disk, he/she has problems—128K bytes worth—because the program will no longer fit. Therefore, it would be wise to decide before buying how important the extra memory is versus more disk storage.

The fact that the APC display screen is completely integrated into the system unit could be discomforting to someone who spends long hours working on the machine. They do not have the benefit of adjusting the CRT to their particular eye level. An adjustable screen would correct this problem.

■ SOFTWARE

☐ Terms & Support

Terms • software available for a one-time license fee • software programs must conform to specifications supplied or refund of license fee within 30 days of acquisition will be arranged by company.

Support • APC software updates and corrections available at handling cost with registration; corrections are made at no additional charge within the warranty period.

☐ Software Overview

With the NEC APC, a user has a choice of 4 different operating systems and 4 languages plus various communications and applications packages. A DBMS is also offered for use with the system.

☐ Operating Systems

APC-S01 CP/M-86 Operating System • general-purpose single-user disk/diskette operating system • supports interactive and batch processing; provides compatibility at a source-language level with CP/M-80 software base • consists of 3 modules: Command Console Processor (CCP) intercepts, interprets, and executes user commands; Basic Disk Operating System (BDOS) performs fundamental system services, including file management; Basic Input/Output System (BIOS) serves as interface between CCP/BDOS and hardware using system-dependent input/output device handlers • utilities include: PIP for file transfer, reformatting, and concatenation; ED for creation and modification of ASCII files; ASM-86 for assembly of 8088/8086 programs; DDT-86 for program testing and debugging; SUBMIT for batch submission of multiple parametized, prototype commands; STAT for alteration and display of I/O device and file status; GEMCMD for processing object files in standard Intel hexadecimal format; LMCMD for processing object files in standard Intel executable binary format comes bundled with GSX, graphics capability • developed by Digital Research, Inc:

$150 lcns

GSX • bundled with CP/M-86 and MS-DOS • provides standard interface between APC, applications, and hardware devices • includes GDOS (Graphics Device Operating System) and GIOS (Graphic Input/Output System); allows graphics applications written for other microcomputers under GSX to be transported to APC.

APC-S02 MS-DOS Operating System Version 2.0 • general-purpose 16-bit disk/diskette operating system • supports single-user, single-task interactive and batch processing; Version 2.0 provides hierarchical filing structures, installable device drivers, I/O redirection; configured for use with APC's graphics subsystem through use of SIGGRAPH protocol • developed by Microsoft, Inc:

150

APC-S04 UCSD p-System Operating System Runtime Version • general-purpose disk/diskette system supports single-user interactive and batch processing; provides for software transportability from one hardware environment to another; provides software framework for UCSD Pascal and BASIC program development/execution; manages UCSD Pascal and BASIC compilers; macro assembler, linker, file handler, and text editor • features include: program chaining; input/output redirection; block-I/O service routines; dynamic overlays; dynamic memory allocation; runtime support routines; support for asynchronous processes; concurrency primitives in Pascal configured for use with APC color graphics subsystem and hard disk drive • marketed by SofTech Microsystems:

100

Concurrent CP/M-86 • a single user, multitasking operating system that is compatible with CP/M-86 and MP/M-86 operating

LCNS: one-time license fee. NA: information not available. Prices effective as of November 1983.

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systems; provides a virtual console environment where each virtual console can be performing its own task; one virtual console is always mapped to the physical console and is the foreground console, with all other virtual consoles being background consoles; switching a virtual console to the physical console is accomplished through the use of function keys (typical installations use from 4 to 10 function keys for this process) • supports up to 1M bytes of memory, multiple list devices, and up to 16 logical disk drives, each containing up to 512M bytes of storage for a maximum of 8G bytes of online storage • features include: Real-Time Monitor providing process control and dispatching, as well as queue, flag, and clock management; allows processes to share reentrant code; file management with date and time stamping; and protection of user files and directories through the use of optionally assigned passwords • requires an Intel 8086/8088 microprocessor, 256K bytes of memory (recommended), a console device, disk storage, and a real-time clock • developed by Digital Research, Inc.:

150

Utilities

APC-S45 Filetran • IBM 3741 compatible conversion facility • for converting EBCDIC 8-inch diskettes from mainframes or minis using the standard IBM 3741 format to ASCII CP/M-86 format:

$100 lcns

☐ Data Management

APC-S35 dBASE II • data management tool for constructing and manipulating numeric and character information files • relational database management system written in assembly language • requires 48K bytes of memory and runs on CP/M operating system • handles 65,535 records per database file; 32 fields per record maximum, 1,000 characters per record maximum, and 254 characters per field maximum • available for CP/M-86 and MS-DOS:

$695 lcns

☐ Communications/Networks

APC-S40 ASYNC-86 • runs under CP/M-86 operating system • enables APC computers to communicate with each other and other computer systems • allows asynchronous transmission and receipt of messages and files; supports sending and receiving of text and binary files; directs data to disk files or to printer; performs translation, reformatting, padding:

$245 lcns

APC-S41 BISYNC-86/3780 • provides RJE console support • allows user-supplied data records to be transmitted to the host and data records received from host to be processed • available for CP/M-86 and MS-DOS:

990

APC-S42 BISYNC-86/3270 • IBM 3270 terminal emulator; provides for communication with transaction-oriented IBM systems; supports transmitting and receiving video display screens of data in IBM 3270 format • available for CP/M-86 and MS-DOS:

990

GSS-4010 • graphics terminal emulation package; capable of emulating Tektronix 4010 series graphics terminals; turns APC into Tektronic PLOT 10-compatible terminal; accesses PLOT 10-compatible software:

NA

APC-S21 BENCHMARK Telecommunicator • enables transfer of files via telephone modems or direct cable to other APC word processors • available for CP/M-86 and MS-DOS:

95

☐ Program Development/Languages

Microsoft BASIC Interpreter • allows calling of machine language subroutines, merging of multiple programs, and transferring control to specific program lines during certain events; IF THEN/ELSE constructs are supported as well as trace/no-trace for easier debugging • screen editor implements special function keys and multistatement lines:

$395 lcns

Microsoft BASIC Compiler • single pass compiler; supports almost all features of the latest release of Microsoft BASIC; also supports double precision transcendental functions • programs or subroutines written in FORTRAN can be loaded and linked together with BASIC; provides formatted listing of the machine code:

350

RM/COBOL • a high-level implementation of the ANSI-74 COBOL (X3.23-1974) standard • features include Level 2 sequential, relative, and indexed file access methods; full arithmetic capability; standard DISPLAY and COMPUTATIONAL data type support, extended to include binary as well as packed decimals; extended ACCEPT DISPLAY operations for CRT control; interactive debug at the source statement level; undermarked errors with self-explanatory messages; cross-reference listing; single-pass compilation; segmentation at the source language level; and built-in security features for source language library control • developed by Ryan/McFarland:

795

Microsoft FORTRAN • implementation of FORTRAN-77; meets 1977 ANSI standard requirements at the subset level • supports Intel 8087 floating-point coprocessor; handles double-precision calculations to 14 digits; uses IEEE standard floating-point arithmetic; provides several precision levels for integers and logicals; supports interactive application programs • permits modules written in 8086 macro assembly language, MS Pascal, and MS FORTRAN to be linked together into one program:

495

Microsoft Pascal • generally conforms to ISO proposed standard (level O) • generates native machine code; provides low-level escapes to the machine level; supports 8087 coprocessor and provides 8087-emulation software if the system does not have an 8087 chip • allows modules written in 8086 macro assembly language, MS-FORTRAN, and MS-Pascal to be linked together • offers program development features such as: address types, constants and function of ARRAY and RECORD types, SUPER ARRAYs, control flow features, separately compiled UNITs, variable length strings:

495

☐ Applications Packages

APC-S20 BENCHMARK Word Processor • screen-oriented word processing system • includes vertical, horizontal scrolling, automatic page numbering, on-screen centering, right justification, arithmetic operations, column control, footnoting, edit marking, block move and copy, "widow" and "orphan" control; options for search and replace, append routines, graphics, indexing • available for CP/M-86 and MS-DOS:

$495 lcns

APC-S22 BENCHMARK Mailing List Manager • provides fields of reference for retaining records; data may be merged into letters or forms; provides special techniques for retrieval of specific names to be displayed on screen • available for CP/M-86 and MS-DOS:

195

☐ Applications Packages

APC-S25 MicroPlan Business Planner • modeling tool for creation of tax tables, depreciation schedules, loan programs; computes cash flows, rates of return • permits users to create command stacks, eliminating need for retyping of repeated routines • available for CP/M-86 and MS-DOS:

$495 lcns

APC-S26 MicroPlan Spreadsheet-to-Planner Upgrade • upgrade package to provide Business Planner capabilities to Spreadsheet user • available for CM/M-86 and MS-DOS:

350

APC-S28 MicroPlan Consolidator • module permitting

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consolidation of divisioned reports into corporate reports or to extract and merge key parts of several models • available for CP/M-86 and MS-DOS:

295

APC-S30 MicroPlan Spreadsheet • enables design and manipulation of worksheets; size is 50 rows x 20 columns, variable up to 4,000 cells; random addressability; supports correlation of time with either rows or columns, or may eliminate it as factor • built-in commands include standard mathematical operations, growing and incrementing commands, formatting routines, printing and reporting commands; menu-visible selection of commands • available for CP/M-86 and MS-DOS:

195

APC-S29 GraphPlan • integrated system combining spreadsheets and business graphics • edits data, performs mathematical and statistical computations, does "what-if" analysis, and handles numerical ranking of data and alphabetic sorting of rows and columns • fully compatible with MicroPlan • runs under CP/M-86:

295

APC-S10 Accounting Plus—General Ledger • base module of integrated general accounting system, menu driven; provides user with financial reports • prerequisite for any of the Accounting Plus modules:

695

APC-S11 Accounting Plus—Accounts Receivable • provides user with accessibility to customer's credit position; includes online invoicing, automatic updating:

695

APC-S12 Accounting Plus—Accounts Payable • provides user with accessibility to cash flow position; automatically posts debits, credits to vendor invoices:

695

APC-S13 Accounting Plus—Inventory Control • provides interaction with Point-of-Sale System, Sales Order Entry, and Purchase Order Entry System; maintains quantity listings:

695

APC-S14 Accounting Plus—Sales Order Entry • enables entering and tracking of open sales orders for inventoried, non-inventoried items; prints open sales order status reports:

695

APC-S15 Accounting Plus—Purchase Order Entry • allows user to order inventoried or non-inventoried products from vendors maintained by Accounts Payable:

695

APC-S16 Accounting Plus—Payroll • allows preparation of periodic payroll; maintains user-defined tax tables; automatically prints checks; handles report preparation:

695

Context MBA • integrated system combining spreadsheet analysis and modeling, graphs, database management, and word processing • runs under p-System:

695

APC-S48 MILESTONE • programming tool for project management and time scheduling; schedules using "critical" path network analysis • runs under CP/M-86:

295

APC-S70 VIDEOGRAPH • artist-oriented illustration and animation presentation graphics system for video and slide graphics; utilizes electronic pad and stylus • based upon SIGGRAPH CORE standard protocol • runs under p-System operating system:

695

APC-S62 Graphwriter • graphics management tool; allows creation of presentation graphics • runs under p-System operating system:

395

■ HARDWARE

☐ Terms, Support & Documentation

Terms • available for purchase; 90-day warranty.

Support • service plans for on-site and mail/carry-in maintenance available from dealers or through Sorbus Inc; sales through a nationwide network of 600 dealers as well as through NECIS national accounts sales organization.

Documentation • APC Systems Reference Guide, Operator's Guide, and Maintenance Manual included with system.

☐ Physical Specifications (H x W x D); Weight

CPU • 13.8 x 19.7 x 18.1 inches; 52.8 pounds (with monochrome monitor); 74.8 pounds (with color monitor).

Display • integrated with CPU unit.

Keyboard • 2.2 x 18.9 x 8.5 inches; 5.1 pounds.

☐ Systems Overview & Configurability

The APC system is a desktop unit built around the NEC uPD 8086 16-bit microprocessor. It accesses 3 types of semiconductor memory: 128K bytes of RAM which serves as the main memory; 8K bytes of ROM for bootstrapping and performance of system diagnostics; and 4K bytes of CMOS RAM. The CMOS RAM is backed up with a battery for protection against accidental writing when the system is removed from its AC power source. Main memory may be expanded to either 512K bytes or 640K bytes depending on the disk storage. On systems with a hard disk, the disk interface uses the upper 128K bytes of memory for disk addressing. Therefore, those systems offer only 512K bytes of memory to the user.

The proprietary bus structure supports a parallel printer port and a serial interface with half- or full-duplex transmission in synchronous or asynchronous modes. An additional serial interface is optional. Mass storage is handled by single or dual floppy disk drives; optional Winchester hard disks may be added. NEC offers 3 printers for use on the APC, one a dot matrix and the other 2 letter quality. A monochrome or color display is available as part of the standard configuration; a graphics subsystem is optional. Other standard system features include an audio component for music, an alarm, an auto-power off, and a real-time clock/calendar.

Maximum configurability is stated below; minimum configurations are discussed under Packaged Systems.

System Maximums • 512K-byte user RAM; 8K-byte ROM; 4K-byte CMOS RAM; 2M-byte diskette storage; 20M-byte hard disk storage; 1 parallel printer port; 2 serial ports.

☐ Packaged Systems

NEC offers a variety of configurations for their APC systems, plus word processing systems bundled with printer and appropriate software.

APC-H01 • 16-bit NEC uPD 8086 microprocessor; 128K-byte RAM, 8K-byte ROM, 4K-byte CMOS RAM with battery backup, 1M-byte floppy disk drive, 12-inch monochrome monitor, keyboard, RS-232C serial interface, parallel printer port, auto-power off, real-time clock/calendar:

$2,748 prch

APC-H02 • same as APC-H01 except dual 1M-byte floppy disk drives:

3,448

APC-H03 • same as APC-H02 except color monitor:

4,198

APC-H04 • same as APC-H01 except color monitor:

3,498

PRCH: purchase price. Prices effective as of November 1983.

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APC-WPS1 • APC-H02, Spinwriter 3530 and cable, CP/M-86 operating system and BENCHMARK word processing system:
6,148

APC-WPS2 • APC-H03, Spinwriter 3530 and cable, CP/M-86 operating system, and BENCHMARK word processing system:
6,798

APC-WPS3 • APC-H02, Spinwriter 7730 and cable, CP/M-86 operating system and BENCHMARK word processing system:
6,748

APC-WPS4 • APC-H03, Spinwriter 7730 and cable, CP/M-86 operating system and BENCHMARK word processing system:
7,398

☐ CPUs

The NEC APC is based on the NEC uPD 8086 microprocessor. The Intel 8087 Numeric Data Processor is optional.

NEC uPD 8086 • 16-bit word length, 16-bit wide registers and data paths, 1M-byte address space; operates at 5 MHz; includes DMA controller • compatible with Intel 8086.

APC-H13 Intel 8087 Numeric Data Processor (NDP) • coprocessor for the 8086; supported by APC for arithmetic and comparison operations • decodes instructions automatically in parallel with CPU:
$395 prch

APC-H30 Board • development printed circuit board for hardware options:
100

☐ Memory

Standard Memory • 128K bytes of RAM expandable to 512K bytes on a system with a hard disk; expandable to 640K bytes on diskette-based systems; 200-nanosecond access time • 8K bytes of ROM for bootstrapping and diagnostics • 4K-byte CMOS RAM with battery backup; protected against accidental writing.

APC-H31 Memory Expansion • 128K-byte add-on memory board; expands to 512K bytes by adding APC-H32; occupies 1 I/O slot:
$540 prch

APC-H32 Additional 128K-Byte Increment • adds 128K bytes in 64K-bit RAM chips to the APC-H31:
200

☐ I/O & Communications

All NEC APC systems utilize a proprietary bus structure and contain 1 serial port, 1 parallel port, and 3 open expansion slots.

Standard Input/Output • 1 serial RS-232C port, supporting both asynchronous and synchronous communications; built around the NEC 8251A communications controller; speeds up to 19,200 bps • 1 Centronics parallel port built around parallel printer controller.

APC-H14 Communications Controller/Serial Interface • additional communications controller/serial interface; includes cable:
$335 prch

APC-H20 RS-232C Cable • for accessing the standard serial interface:
85

APC-COM1 SNA/SDLC 3270 Emulator Subsystem • for emulating an IBM 3276 control unit and an IBM 3278 display station via modem connection • includes printed circuit board, cable, software • requires CP/M-86, serial port:
795

APC-COM2 COAXXSYS Subsystem • for emulating an IBM 3278 display station via direct coaxial cable connection • includes printed circuit board, cable, software • requires CP/M-86, serial port:
1,295

☐ Mass Storage

Standard Diskette Storage • 1 integrated NEC half-height 8-inch 1M-byte floppy disk drive on APC-H01 and APC-H04; dual 1M-byte drives on APC-H02 and APC-H03 • drives are 500K bytes per side double-density (243K bytes single density); rotation rate of 360 rpm; head loading time, 50 milliseconds; seek settling time, 15 milliseconds; track-to-track time, 5 milliseconds; data transfer rate 62.5K bytes per second • IBM 3740-compatible format.

APC-H07 • additional 8-inch floppy disk drive for APC-H01 or APC-H04:
$800 prch

APC-H26 Optional Disk Storage • 5.25-inch 10M-byte formatted Winchester fixed hard disk and controller; 85-millisecond seek time • occupies 1 I/O slot • requires system with 256K bytes of memory; upper 128K used for disk addressing:
2,698

APC-H27 • additional 5.25-inch 10M-byte hard disk • requires system with 1 APC-H26:
2,398

☐ Terminals/Workstations

The APC is a single-user system that comes with an integrated display and detached keyboard. A user has a choice of a monochrome (green/black) or color monitor.

Display • 12-inch diagonal; 80 characters x 25 lines plus system status line; 8 x 19 pixel matrix; 640 x 475 pixel screen resolution; predefined and user-definable character sets available; includes 250 graphics symbols; functions include reverse video, blinking, secret (hidden field), highlighting, scrolling, and 4K-character screen buffer • utilizes NEC's 7220 GDC (Graphics Display Controller) chip • 8 colors available on color model.

Keyboard • detached, typewriter-style; attaches by 5-foot coiled cable • 86 keys include 22 dual-mode user-definable function keys; 25-key numeric pad; full set of cursor control keys.

APC-H09 Monochrome Graphics Subsystem • bit-mapped, based on NEC 7220 Graphics Display Controller • enables display screen to become movable window with 1024 x 1024 pixel image; includes its own dedicated memory of 128K-byte RAM for monochrome models, 384K bytes for color models; graphics and character display may appear simultaneously; provides capability for drawing of lines, circles, rectangles, area fill-in, and panning; 800 nanoseconds per pixel drawing rate; for use on APC-H01 or APC-H02:
$448 prch

APC-H10 Color Graphics Subsystem • same as APC-H09 except color • for use with APC-H03 or APC-H04:
648

APC-H11 Monochrome Graphics Subsystem • same as APC-H09 except with additional 128K bytes of user RAM for APC-H01 and APC-H02:
598

APC-H12 Color Graphics Subsystem • same as APC-H10 except with additional 128K bytes of user RAM for APC-H03:
798

☐ Printer/Graphics

The NEC APC will support a variety of NEC dot-matrix and letter-quality printers. A 100-cps dot-matrix printer is available directly from the APC Division as well as 2 Spinwriter printers when purchased as part of a word processing package.

APC-H16 Dot-Matrix Printer • 100-cps, 80-column, bidirectional; upper- and lower-case characters; 7x9 and 8x8 dot matrices for character formation; characters available in 6 sizes, from 5 to 17 characters per inch, proportional width characters available • self-test mechanism • requires optional cable:
$695 prch

3530 Spinwriter • letter-quality, 35-cps, 132-column; provides 10-, 12-, and 15-pitch, proportionally-spaced, fonts, superscript,

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NEC APC
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subscript, bold face, shadow printing, margin justification, centering • requires optional cable • bundled with APC-WPS1 and WPS2 packages.

7730 Spinwriter • same as 3530 except 55 cps • bundled with APC-WPS3 and WPS4 packages.

APC-H21 • cable for dot-matrix printer and Spinwriters: **85**

• END

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North Star Advantage & Horizon

Advantage, Advantage 8/16, Horizon & Horizon 8/16

■ PROFILE

Operating Systems • Advantage and Advantage 8/16 supported operating systems include: Graphics CP/M, Total Business Solutions (TBS O/S), and Graphics DOS/BASIC; Advantage 8/16 also supports Graphics MS-DOS (16-bit) and North Net O/S; Horizon and Horizon 8/16 support CP/M 2.2, multiuser TSS/A (for TBS applications), multiuser TSS/C (for CP/M applications); Horizon 8/16 also supports TurboDOS (for 8- and 16-bit CP/M applications).

Data Management • Info Manager provides list management; dBase II relational database management.

Communications/Networks • operating systems provide fundamental asynchronous support • 2780/3780 bisynchronous communications • North Net local area network supported on Advantage Systems.

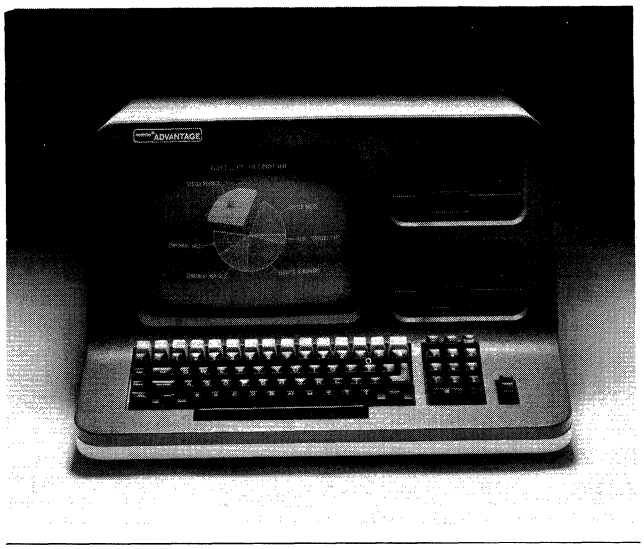
Languages • North Star's BASIC; Microsoft's COBOL, COBOL-16, FORTRAN, FORTRAN-16, Pascal, Pascal-16, BASIC-16, and BASIC-16 Compiler.

Models • Advantage, Advantage 8/16, Horizon, Horizon 8/16.

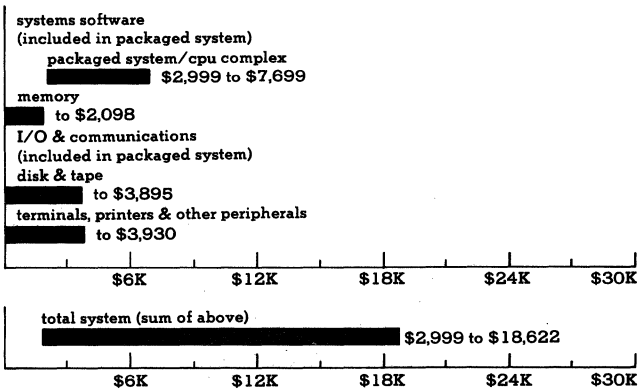
CPU • all models include Zilog Z80A microprocessor operating at 4 MHz; Advantage 8/16 and Horizon 8/16 also include Intel 8088 microprocessor operating at 8 MHz.

Memory • Advantage up to 64K bytes of memory; Advantage 8/16 64K bytes of 8-bit memory and up to 256K bytes of 16-bit memory; Horizon up to 352K bytes of memory; and Horizon 8/16 up to 2M bytes of memory.

Chassis Slots • Advantage and Advantage 8/16 6 available expansion slots; Horizon and Horizon 8/16 12 available expansion slots.



PURCHASE PRICE RANGE hardware & software



NORTH STAR ADVANTAGE AND HORIZON PURCHASE PRICING • bar graphs illustrate price ranges for small to large systems, with solid bars reflecting software/hardware purchase pricing, and open bars reflecting 5-year service/maintenance fees associated with large system • **SMALL SYSTEM** is based on Advantage **packaged system** (includes 8 bit Zilog Z80A microprocessor, 64K bytes of RAM, 20K bytes of display RAM, 2K bytes of boot PROM, integrated CRT and keyboard dual 360K-byte floppy disk drives, 6-slot chassis, RS-232 serial port and operating system, and 2 application packages)• **LARGE SYSTEM** is based on **Horizon 8/16 packaged system** (includes 3 8-bit Zilog Z80A microprocessors, 64K bytes of RAM each, 30M-byte Winchester disk drive, 12-slot chassis, 2 RS-232 serial ports, a parallel port, DOS/BASIC operating system, and 3 application packages) and the following options: 16-bit Intel 8088 **microprocessor**, 512K bytes of **RAM**, tape backup system, a **terminal**, and a printer.

Ports • Advantage and Advantage 8/16 include an RS-232 serial port standard and up to 5 serial or parallel ports optional; Horizon and Horizon 8/16 include 2 RS-232 serial ports and a parallel port standard with up to 5 additional serial ports on Horizon and up to 8 additional on Horizon 8/16.

Mass Storage • up to 720K bytes of diskette storage on all models; up to 15M bytes of hard disk storage on Advantage and Advantage 8/16; up to 72M bytes of hard disk storage on Horizon and Horizon 8/16; 13.4M-byte cartridge tape available on Horizon and Horizon 8/16.

Terminals/Workstations • Advantage and Advantage 8/16 are single-user systems; Horizon supports up to 5 users and Horizon 8/16 supports up to 8 users.

Printers • Advantage and Advantage 8/16 support up to 3 printers; Horizon and Horizon 8/16 support up to 2 • none available from vendor.

First Delivery • Advantage 1981; Advantage 8/16 1982; Horizon 1978; Horizon 8/16 1983.

Systems Delivered • information not available.

Comparable Systems • Advantage: any single-user, 8-bit system in the $3,000 to $6,000 range, such as Eagle IIe, and Televideo TS802; Advantage 8/16: single-user, dual, 8-bit and 16-bit processor systems in the $3,400 to $6,400 range, such as Zenith 100 Series systems; Horizon: multiuser, 8-bit systems in the $4,500 to $7,000 range, such as SKS 1000 and Vector 4 Series; Horizon 8/16: multiuser, dual, 8-bit and 16-bit processor systems in the $5,200 to $7,700 range such as Xitex System 13, Columbia MPC.

Vendor • North Star Computers Inc; 14440 Catalina Street, San Leandro, CA 94577 • 415-357-8500.

Canada • Canadian sales handled through TRW; 10880 Wilshire Boulevard, Los Angeles, CA 90024 • 213-475-9861.

Distribution • available from approximately 500 dealers worldwide; OEMs and system integrators.

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North Star Advantage & Horizon

Advantage, Advantage 8/16, Horizon & Horizon 8/16

■ ANALYSIS

North Star, which was established in 1976, introduced a system in 1977 called the North Star Micro Disk System, which was one of the first systems to incorporate 5.25-inch floppy disks. The Horizon system was introduced in 1978, first as a kit and then later as a complete system. It was based on Zilog 8-bit Z80A microprocessors and the S-100 bus structure. Kit sales have since been discontinued. In 1981, the Horizon computers were upgraded to multiuser capability (up to 5 users) and were supported with 2 software systems: TSS/A, which is a multiuser operating system built around North Star's proprietary set of accounting and word processing applications, and TSS/C, which is a multiuser superset of CP/M. In 1983, the Horizon was again upgraded to support both 8-bit Zilog Z80A processors and 16-bit Intel 8088 processors, with up to 8 users on the system utilizing either processor. With the Horizon 8/16 series each user has their own dedicated CPU, memory storage and terminal. TurboDOS was also introduced to support the Horizon 8/16 systems. The 16-bit Intel 8088 users can have up to 512K bytes of memory. The Horizon and Horizon 8/16 systems can be configured with 2 360K-byte floppy disk drives, a single 360K-byte floppy drive and a 5M-byte, 15M-byte, 18M-byte or 30M-byte hard disk drive. If the 18M-byte drive is on the system, up to 4 can be daisy chained for a total of 72M bytes of hard disk storage.

The North Star Advantage was first introduced in 1981 as a completely integrated desktop microcomputer that included high-resolution graphics on a 12-inch CRT display, integrated floppy or hard disk drives, an 87-key Selectric-type keyboard, and North Star's proprietary operating system or the industry standard CP/M. The Advantage systems were based on 8-bit Zilog Z80A processors. In 1982, the Advantage was upgraded to also support both an 8-bit Zilog Z80A microprocessor and a 16-bit Intel 8088 processor. Along with this, North Star also introduced North Net, a low-cost local area network which allows up to 64 Advantage users to be linked together for file or printer sharing. The primary operating system on the 16-bit processor of the Advantage 8/16 is the industry standard MS-DOS. The bus structure on the Advantage systems is a proprietary mini-bus. Advantage and Advantage 8/16 systems are available with 2 360K-byte floppy drives or a single 360K-byte floppy drive and a 5M-byte or 15M-byte hard disk.

With each new upgrade of the Advantage or Horizon systems, North Star has provided additional operating systems to handle the upgrade as well as languages for program/system development. There are also various North Star developed word processing packages and general business and financial packages available for both Advantage and Horizon systems. This is also in addition to the 8-bit CP/M compatible and 16-bit MS-DOS compatible applications available.

North Star was one of a few companies that supported a multiuser environment when the Horizon was introduced in 1977. This led North Star to have more than 30,000 Horizon systems installed by the end of 1981 and have a leading position in this market. During this time, North Star did not work on upgrading to 16-bit systems as many other vendors were doing. Not until 1982, when the Advantage was upgraded to be able to include a 16-bit processor, did they get into this marketplace. The Horizon has since also been upgraded to support a 16-bit processor, but both of these upgrades are based on older, 8-bit systems rather than introducing new, state-of-the-art equipment. In November of 1983, North Star did announce the IBM PC-compatible multiuser Dimension system. The Dimension will be covered in a separate report.

☐ Strengths

One of the major pluses in both the Advantage and Horizon systems is the industry-standard processors and operating systems they are based on. This standardization provides the user with great flexibility in purchasing applications to be run on the systems. With CP/M being the main operating system on the 8-bit portions of the systems, and MS-DOS or TurboDOS the 16-bit operating systems, the application programs which are supported are almost unlimited. In addition, North Star provides an adequate amount of applications themselves. The 72M-byte hard disk capacity supported on the Horizon systems can also be considered a positive feature, in that this is much greater than the maximum available on many other micros. Also, the tape cartridge backup system is a plus.

The hardware and software graphics capabilities of the Advantage and Advantage 8/16 are quite extensive and easy to use. Graphics CP/M, a superset of CP/M, allows users to utilize Advantage's graphics capabilities as well as being able to run CP/M-compatible software. North Star's BASIC includes a set of statements to handle Advantage's graphics capabilities.

The number of different languages available on both Advantage and Horizon systems for program/system development should prove adequate for just about any level of developer.

Pricing, especially on the multiuser Horizon 8/16 systems, is very competitive.

☐ Limitations

Even though both the Advantage series and Horizon series now support 16-bit processors, the bus structures are based on the North Star minibus and the older S-100 bus, neither of which allow for the attachment of the many new 16-bit boards that are being produced. This is especially true for IBM PC-compatible boards.

It was not until 1983 that North Star produced any communications support for the Advantage and Horizon series. The 2780/3780 bisynchronous communications support is currently the only product available. The North Net local area network is a proprietary network to attach only Advantage systems. With industry talk of trying to develop a communications standard, North Net could become a limitation. Other communications protocols are being worked on by North Star but to date, none have been announced.

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North Star Advantage & Horizon

Advantage, Advantage 8/16, Horizon & Horizon 8/16

■ SOFTWARE

☐ Terms & Support

Terms • North Star provides an operating system and 2 applications in the purchase price of any system that includes dual floppy disk drives or a floppy disk and a 5M-byte hard disk; an operating system and 3 applications are included in the purchase price of any system with a floppy disk drive and a 15M-, 18M-, or 30M-byte hard disk • other optional software products are available on a one-time license fee basis.

Support • software updates/corrections are available on an annual contract basis.

☐ Software Overview

North Star bundles an operating system (user's choice) with all of its systems and 2 or 3 user's choice applications packages depending on the amount of disks purchased with the system. All Advantage systems support Graphics CP/M (8-bit), Total Business Solutions (TBS) O/S (8-bit), and Graphics DOS/BASIC (8-bit) operating systems. The Advantage 8/16 also supports Graphics MS-DOS (16-bit) operating system. All of the Horizon systems will support single-user CP/M 2.2, multiuser TSS/A (TBS applications) and multiuser TSS/C (CP/M applications). The Horizon 8/16 also supports TurboDOS (for 8- and 16-bit CP/M applications) operating system.

Program and system development, on Advantage and Horizon systems, can be accomplished using North Star BASIC, FORTRAN, and Pascal for 8-bit applications, and with BASIC-16, FORTRAN-16, Pascal-16 and COBOL-16 for 16-bit applications. North Star's Info Manager II provides data management, while Ashton-Tate's dBase II is available to provide relational database management facilities.

North Star has developed what they call a Total Business Solutions Family of applications for both Advantage and Horizon systems. The applications available include: General Ledger, Accounts Receivable, Accounts Payable, Inventory Control, Order Entry & Invoicing, and Payroll. North Star's PROPAC is a 3 module set of programs that supports business professionals that bill by the hour.

Word processing facilities are provided for Advantage and Horizon systems, by North Star's North Word I, Enhanced Word Star, Spell Star, and Mail Merge programs. Advantage and Advantage 8/16 systems also support North Star's North Word II and North Spell II.

Graphics capabilities are provided by Image Maker and Busi Graph II packages. The Advantage systems also have graphics library facilities. A 2780/3780 bisynchronous communications facility is available for all systems, while the Advantage also supports North Star's North Net local area networking facility.

☐ Operating Systems

Advantage and Advantage 8/16 support 8-bit operating systems including Graphics CP/M, Total Business Solutions (TBS) O/S, and Graphics DOS/BASIC. The Advantage 8/16 also supports Graphics MS-DOS (16-bit) and North Net O/S. Horizon and Horizon 8/16 support 8-bit operating systems including single-user CP/M 2.2, multiuser TSS/A for TBS applications, and multiuser TSS/C for CP/M applications. Horizon 8/16 also supports TurboDOS for 8- and 16-bit CP/M applications.

Graphics DOS/BASIC • a proprietary operating system that supports the bit mapped graphics features of the Advantage:
$149 lcns

Graphics CP/M • a superset of CP/M which supports the extensive graphics capabilities of the Advantage system • supports program development using North Star's BASIC, COBOL, FORTRAN and Pascal • available for Advantage systems:
149

Graphics MS-DOS • a superset of MS-DOS which supports the extensive graphics capabilities of the Advantage 8/16 system • supports reading of IBM PC diskettes • supports program development using BASIC-16, BASIC-16 Compiler, FORTRAN-16, COBOL-16, and Pascal-16 • available for Advantage 8/16 systems:
149

Graphics O/S Package • provides both Graphics MS-DOS plus Graphics CP/M for a price which is less than the cost of both individual packages:
249

Total Business Solutions (TBS) O/S • a high-performance operating system which is totally integrated with North Star's proprietary word processing, financial, and general business applications allowing all applications to interact with every other one • available for Advantage systems:
149

North Net O/S • a network executive operating system which controls access, configuration, and communications for Advantage and Advantage 8/16 systems when operating in North Net local area network mode • includes Graphics CP/M:
349

CP/M (2.2) • single-user, single-tasking, general-purpose operating system designed to support the Intel and Zilog families of 8-bit processors; features and facilities of this basic system are all upward compatible and are present in all other versions of CP/M; consists of 4 elemental structures: Basic I/O System (BIOS), Basic Disk Operating System (BDOS), Console Command Processor (CCP), and a Transient Program Area (TPA) • BIOS is the modifiable portion of the operating system enabling users to tailor CP/M systems to meet specific configurations; allows users to define all hardware-independent elements of the system by defining low-level interface and the peripheral I/O for the system • BDOS provides all the disk management control; supports up to 16 logical devices, containing up to 65,536 records, with up to 8M-byte capacity • CCP provides the interface between the user's console and the rest of the CP/M system; it reads, interprets, and executes commands entered from the console; commands are both built-in commands and transient commands; transient commands are loaded into TPA and executed • TPA is the area designated to hold programs that are loaded from disk and then executed • standard utilities provided include: DDT interactive debugger; PIP file transfer utility; DUMP utility; SUBMIT/XSUB batch control utilities; ED command-oriented text editor; ASM assembler; and STAT system status utility • memory requirements depend on number and types of options implemented; basic system requires 20K bytes of memory and an ASCII terminal • used on Horizon systems:
149

TurboDOS • multiprocessing, multitasking, multiuser, operating system supporting up to 8 users with 512K bytes of 16-bit memory each • supports both 8-bit and 16-bit software and microprocessors • provides networking facilities for file and record locking, printer spooling, and communications; CP/M compatible • used on Horizon 8/16 systems:
549

Multiuser TSS/A • a multiuser version of North Star's proprietary Total Business Solution (TBS) O/S • interacts with North Star's applications including: word processing, data management/inquiry, mailing list processing, small business accounting and financial reporting, order entry/invoicing, inventory control, payroll and professional accounting and billing • used on Horizon:
349

Multiuser TSS/C • a multiuser, multitasking version of CP/M • facilitates running programs originally written for the single-user environment by resolving conflicts that otherwise would occur in the multiuser environment • provides an identification/password system that controls user access to both files and programs; supports spooling of 2 printers; provides file protection so that simultaneous access to the same file from different programs is managed while maintaining file integrity • used on

LCNS: one-time fee for license purchase. NA: not available. Prices effective as of October 15, 1983.

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North Star Advantage & Horizon

Advantage, Advantage 8/16, Horizon & Horizon 8/16

Horizon systems • requires 96K bytes of memory for the first user and 64K bytes for each additional user:

349

Multiuser TSS/C with 32K Bytes of RAM • functionally equivalent to multiuser TSS/C; 32K bytes of additional RAM provided:

549

☐ Data Management

Info Manager II • a menu-driven data management system; provides facilities to store and manipulate lists of information • supports records with up to 50 fields of information up to 30 characters each; supports up to 3 floppy disk drives per file; provides the ability to select, extract, and sort information (up to 5 keys) by multiple levels • executes in conjunction with North Word word processing package to insert information from mailing list into custom letters • available for Advantage and Horizon systems:

$499 lcns

Enhanced dBASE II • relational database management which includes its own interactive programming language • available for Advantage and Horizon systems:

700

☐ Communications/Networks

North Link 2780/3780 Bisync • provides a bisynchronous communications link to other manufacturer's mainframe and minicomputers • supports transmission of batch files • also provides the same function when used as a gateway on North Star's North Net local area network • available for both Advantage and Horizon systems:

$499 lcns

North Net • a proprietary Local Area Network • supports interconnecting up to 64 systems so they can share printers and disk files • all support software is built into North Net O/S software and hardware Workstation Pack and Server Pack • no additional software is needed • available for Advantage and Advantage 8/16 systems:

NA

☐ Program Development Languages

North Star BASIC • BASIC language interpreter • supports writing, editing, and debugging programs with interactive, line by line data entry with special editing and debugging commands • statements are entered directly into computer memory and can be run at any time • available for Advantage and Horizon systems:

$149 lcns

FORTRAN • a compiler which meets X3.9 ANSI standard for FORTRAN at the subset level including many features of the full standard • supports utilization of the 8087 floating point coprocessor to achieve numeric processing; uses standard IEEE floating point arithmetic; provides several precision levels for integers and logicals for processing when a smaller value range is acceptable • supports interactive application programs using extended I/O operations • available for Advantage and Horizon systems; available in both 8-bit and 16-bit versions:

FORTRAN for 8-Bit Processors:

499

FORTRAN-16 for 16-Bit Processors:

499

Pascal • an ISO standard compiler • supports various address types, constants, and functions of array and record types, super arrays, control flow features, separately compiled units, and variable-length strings • available for Advantage and Horizon systems; available in both 8-bit and 16-bit versions:

Pascal for 8-Bit Processors:

600

Pascal for 16-Bit Processors:

499

COBOL-16 • compiler that supports entry of data during program execution, provides advanced screen formatting capabilities, supports interactive debugging, and handles large programs • available for Advantage 8/16 and Horizon 8/16:

499

BASIC-16 • provides the same capabilities as North Star BASIC except provides 16-bit addressing • available for Advantage 8/16 and Horizon 8/16:

399

☐ Application Packages

North Word II • a menu-driven word processing package which provides a wide variety of facilities to assist in office automation • key features provided are: horizontal scrolling supporting lines 160 characters wide; automatic margin readjustment by paragraph; unlimited number of adjustable tab stops; automatic carriage return, word wraparound, and justification with manual hyphenation; and easy merging of frequently used phrases, paragraphs and mailing lists • editing facilities include horizontal or vertical, forward or reverse scrolling; global search and replace; copy, move, or delete blocks of up to 20 lines; headers and footers; automatic centering; automatic pagination; margins, indents, and justification appear on the screen exactly as they will be printed • provides capabilities for printing one document while editing another; supports boldface through multiple overstrike as well as superscript and subscript • available for Advantage and Advantage 8/16:

$499 lcns

North Word I • a subset of North Word II that provides basic word processing facilities without all the special features of North Word II • available for all Advantage and Horizon systems:

199

North Spell II • provides spelling verification for North Word II-generated documents using an 88,000-word dictionary; available on Advantage and Advantage 8/16 systems:

299

North Plan • financial spreadsheet anaylsis package • provides a complete "what if" capability supporting functions such as cash flow planning, budget preparation, sales forecasting, tax planning, and price analysis • includes a built in HELP facility which provides information on any command or function; supports up to 1,000 entries:

499

Enhanced WordStar • screen-oriented word processing system • initial text entry and revisions are displayed directly on the screen during typing as it will appear in print; editing features include automatic text justification, paragraph indent and undent, simultaneous printing and editing, and dynamic page break display; text can be inserted, deleted, moved, copied, or read from files; a word or phrase can be found and replaced with revised text; print facilities provide boldface, double strike, underline, strikeout, subscripts/superscripts, variable character pitch and variable line height • HELP messages, prompts, and menus are available as operator aids • available on Advantage and Horizon systems:

500

SpellStar • a spelling checker module designed as an optional adjunct to WordStar • used to locate spelling and typing errors in word processed documents • proofreads documents against a 20,000 word dictionary and flags each word not in the dictionary with a flashing cursor; operator can then change word, leave as is, or leave as is and add it to dictionary • available for Advantage and Horizon systems:

250

MailMerge • multipurpose, file-merging program that handles word processsing projects such as personalized form letters, invoices, mailing labels, and boilerplate legal documents; supports

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North Star Advantage & Horizon

Advantage, Advantage 8/16, Horizon & Horizon 8/16

merging data from 2 or more files at print time; supports chained and nested printing, printing of multiple copies automatically, and printing data in report format • available for Advantage and Horizon systems:

150

Enhanced Micro Plan • a high-end, financial-modeling package • provides capabilities to perform 4 different types of spreadsheet consolidations from disk • a programmable package which allows users to set up models that prompt for input • available for Advantage and Horizon systems:

399

ACCPAC Accounting System • integrated, menu-driven, accounting system consisting of 6 self-contained applications which can also be installed on an individual basis • consists of General Ledger, Accounts Receivable, Accounts Payable, Inventory Control, Order Entry & Invoicing, and Payroll • all applications provide: complete CPA-approved audit trails, fill-in-the-blank video forms are used for all data entry, and allow user design of financial report formats.

General Ledger • supports up to 900 general ledger accounts on up to 3 diskettes; maintains 24 months of transactions and 12 months of budget figures; automatic transaction batch balancing and editing of transactions; and automatic batch and transaction numbering:

599

Accounts Receivable • supports up to 1500 customer accounts on a user-defined open-item or balance forward basis; provides detail or summary aged listing with user-specific aging categories; maintains credit limits, year-to-date sales, last year's sales, date and amount of last invoice and payment, and number of outstanding transactions:

599

Accounts Payable • supports up to 1500 vendor accounts on an open-item basis; maintains and takes discount terms with an invoice with terms stored by vendor; provides an aged cash requirements report with invoice details with user-defined aging categories; prints checks and remittance advice for amounts due for payment, and automatically numbers checks and prints multiple invoices on each check:

599

Payroll • supports up to 300 employees; provides all standard payroll reporting periods as well as U.S. and local tax and deduction categories; includes 13 standard report categories; and supports hourly and salaried employee processing, special pay types such as commissions:

599

Inventory Control & Analysis • supports up to 999 inventory categories or departments; maintains inventory records with up to 50 fields; provides inventory analysis using moving-average, FIFO, or LIFO costing methods; maintains history in units, sales dollars, and cost for prior year, current-year-to-date, current period, and last four quarters; automatically updates records as goods are received:

599

Order Entry & Invoicing • new product, documentation is not currently available:

599

PROPAC • a 3-module set of programs that supports business professionals who bill by the hour • consists of Client Profiles, Client Time & Billing, and Client Receivables • Client Profiles Module analyzes billable and non-billable professional time, pinpointing problem areas; provides cross-reference reports and listings of basic client information such as contact names and addresses, finance charges, interest indicators, and work-in-progress status; and automatically maintains overtime, activity, billable productivity, and data for other reports • Client Time and Billing automatically creates finished invoices from a staff's individual time records; and maintains time measured in 10ths of hours and calculates billable time using different hourly rates • Client Receivables maintains accounts receivable on a balance forward basis by client while supporting the entry of cash payments and adjustments • modules automatically interface with other financial/business software packages from North Star:

1,499

Image Maker • provides high-quality presentation graphics capabilities • can be used in conjunction with BusiGraph II to annotate the standard graphs produced from that package, or can be used for free form generation of viewfoils and slides • features geometric figure and symbol generation with pattern fill, character font generation, figure rotation, translation, and slanting • available for Advantage systems:

299

BusiGraph II • supports both menus and a command language for generation and manipulation of business graphic displays • offers all standard graph and chart types, user-determined number of graphs per page, and 16 texture patterns for filling in the graphs • provides a split-screen format which allows users to call on help functions, menu listings, and prompts while working on a graphics project; listings appear on different segments of the screen, superimposed over the graphics • output can be on dot matrix printers or plotters • available for Advantage systems:

249

Graphics Library/Graphics Library-16 • 2 packages available, one for 8-bit and one for 16-bit systems • allows experienced programmers working in high-level languages to make calls to generate graphics, have those calls resolved at load time, and create tailored output for their application • both packages available for Advantage systems:

249

Graph Mate • provides interfaces between BusiGraph II and business application software such as Micro Plan and dBASE II as well as North Star's proprietary line of accounting packages:

NA

■ HARDWARE

☐ Terms, Support & Documentation

Terms • available on a purchase basis, and 3- and 5-year leases • available through computer stores, office equipment dealers, OEMs, system integrators, and distributors.

Support • mail/carry-in maintenance, and on-site repair service contracts available • available from manufacturer, retail dealer, and independent service organizations: Sorbus in the United States and TRW outside of the United States.

Documentation • user manuals bundled in price of packaged system.

☐ Physical Specifications (H x W x D); Weight

Advantage

System Unit • 18.75 x 20 x 12.5 inches; approximately 43 pounds.

Display • integrated with CPU.

Keyboard • integrated with CPU.

Horizon

System Unit • 19 x 7.5 x 17 inches; approximately 50 pounds.

Display • separately available display; up to 40 different third party models supported.

Keyboard • separately available keyboard.

☐ Systems Overview & Configurability

North Star's Advantage series and Horizon series are both built around an 8-bit Zilog Z80A microprocessor. The Advantage 8/

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North Star Advantage & Horizon

Advantage, Advantage 8/16, Horizon & Horizon 8/16

16 series and Horizon 8/16 series are built around both an 8-bit Zilog Z80A microprocessor and a 16-bit Intel 8088 microprocessor. All Advantage systems include an Intel 8035 microprocessor which acts as a keyboard and floppy diskette controller. The major difference in the Advantage and Horizon series is that the Horizon supports multiprocessing by accommodating the attachment of up to 8 users on the system, each of which has their own processor and memory. The Advantage meanwhile supports North Net local area network with support for up to 64 systems, and has integrated CRT while the Horizon doesn't. In addition, Horizon systems support more memory and disk capacities.

On the Advantage and Advantage 8/16, the maximum main memory is 64K bytes of RAM on the Zilog Z80A microprocessor, while the Advantage 8/16 supports up to 256K bytes on the Intel 8088 portion of the system. Both the Advantage and Advantage 8/16 provide a proprietary North Star minibus with 6 slots for plug-in boards. A single RS-232 serial interface is standard. The Advantage systems support a maximum of 2 floppy diskette drives or a single floppy diskette drive and either a 5M- or 15M-byte Winchester disk drive. All Advantage systems include an integral, 12-inch diagonal video display and an attached keyboard. The bit-mapped display supports high-resolution graphics (640x240 pixels). Any Advantage system can be attached to North Star's North Net local area network by adding an optional Workstation Board and cabling. The Workstation Board includes its own Zilog Z80A microprocessor. For the Advantage system to operate as a North Net Server, an optional Server Board can be attached to the system along with the Workstation Board.

On the Horizon, up to 5 users are supported, each of which can have its own 64K bytes of dedicated memory with 352K bytes being the maximum supported memory, while the Horizon 8/16 supports up to 8 users, each having their own 8-bit Zilog Z80A microprocessor or 16-bit Intel 8088 microprocessor. The 8-bit processors support up to 64K bytes of memory, the 16-bit processors support up to 512K bytes of memory, and the system supports up to 2M bytes of memory. Both Horizon series include an S-100 bus architecture with 12 available expansion slots; 2 RS-232C serial ports and one parallel port standard. The Horizon systems support a maximum of 2 floppy diskette drives, or a single floppy and either a 5M-, 15M-, 18M- or 30M-byte Winchester disk drive. Up to 4 of the 18M-byte Winchester drives can be daisy chained for a 72M-byte hard disk storage. A 13.4M-byte cartridge tape unit is optionally available for backup. Video terminals are not standard on the Horizon systems, but over 40 different video terminal models can be used. Both Horizon systems also support a Floating Point Arithmetic Board for 25 times faster arithmetic performance.

Maximum configurability is stated below; minimum configurations are discussed under Packaged Systems.

Advantage System Maximums • single-user, 64K bytes of memory, 20K bytes of video RAM, 2K bytes of boot Prom, 720K bytes of floppy disk storage or 360K bytes of floppy disk storage and 15M bytes of hard disk storage; 6 expansion slots.

Advantage 8/16 System Maximums • single-user, 64K bytes of memory for the 8-bit processor and up to 256K bytes of memory for the 16-bit processor, 20K bytes of video RAM, 2K bytes of boot PROM, 720K bytes of floppy disk storage or 360K bytes of floppy disk storage and 15M bytes of hard disk storage; 6 expansion slots.

Horizon System Maximums • up to 5 users with 64K bytes maximum memory per user, 352K bytes of total system memory, 720K bytes of floppy disk storage or 360K bytes of floppy disk storage and 72M bytes of hard disk storage; 12 expansion slots.

Horizon 8/16 System Maximums • up to 8 users with 64K bytes maximum memory per 8-bit user or 512K bytes maximum memory per 16-bit user; 2M bytes maximum total system memory, 720K bytes of floppy disk storage or 360K bytes of floppy disk storage and 72M bytes of hard disk storage; 12 expansion slots.

☐ Packaged Systems

North Star's Advantage and Horizon systems are packaged as single 8-bit Zilog Z80A-based systems, or as dual 8-bit Zilog Z80A- and 16-bit Intel 8088- (Advantage 8/16, Horizon 8/16) based systems. Packaged systems for Advantage, Advantage 8/16, and Horizon are available with dual 360K byte floppy drives, single 360K-byte floppy drive and 5M-byte Winchester hard disk, or single 360K-byte floppy drive and 15M-byte Winchester hard disk. In addition Horizons are packaged with single 360K-byte floppy and 18M byte Winchester hard disk or single 360K-byte floppy drive and 30M-byte Winchester hard disk. Horizon multiuser (2-user) packaged systems are available for approximately $700 more than the single-user versions. A 16-bit CPU and 128K-byte memory package upgrades a Horizon to a Horizon 8/16. The dual floppy and single floppy with 5M-byte Winchester packages include a bundled operating system and 2 applications, while the other packages include a bundled operating system and 3 applications.

ADV-2Q Advantage • includes CPU, 64K bytes of RAM, 20K-byte display RAM, 2K-byte boot PROM, integrated CRT and keyboard, dual 360K-byte floppy disk drives, a 6-slot chassis, an RS-232C serial port, and a diskette containing Business Graphics demonstration and diagnostics software, an operating system, and 2 applications packages:

$2,999 prch

ADV-HD5 Advantage • includes same as ADV-2Q except has single 360K-byte floppy disk drive and 5M-byte Winchester disk drive:

4,499

ADV-HD15 Advantage • includes same as ADV-2Q except has single 360K-byte floppy disk drive and 15M-byte Winchester disk drive, and an additional application package:

5,999

ADV-2Q-8/16 Advantage • includes dual CPUs, 64K bytes of RAM for each CPU, 20K-byte display RAM, 2K-byte boot PROM, integrated CRT and keyboard, dual 360K-byte floppy disk drives, a 6-slot chassis, an RS-232C serial port, and a diskette containing Business Graphics demonstration and diagnostic software, an operating system, and 2 application packages:

3,399

ADV-HD5-8/16 Advantage • includes same as ADV-2Q-8/16 except has single 360K-byte floppy disk drive and 5M-byte Winchester disk drive:

4,899

ADV-HD15-8/16 Advantage • includes same as ADV-2Q-8/16 except has single 360K-byte floppy disk drive and 15M-byte Winchester disk drive, and one additional application package:

6,399

HRZ-2Q Horizon • includes CPU, 64K-bytes of RAM, dual 360K-byte floppy disk drives, 12-slot chassis, 2 RS-232C serial ports, a parallel port, and a diskette containing DOS/BASIC or HDOS/BASIC and diagnostic software, an operating system, and 2 application packages:

2,999

HRZ-HD5 Horizon • includes same as HRZ-2Q except has single 360K-byte floppy disk drive, and 5M-byte Winchester disk drive:

4,499

HRZ-HD15 Horizon • includes same as HRZ-2Q except has single 360K-byte floppy disk drive, and 15M-byte Winchester disk drive, and an additional application package:

5,999

HRZ-HD18 Horizon • includes same as HRZ-2Q except has single 360K-byte floppy disk drive, 18M-byte Winchester disk drive, and an additional application package:

7,999

PRCH: purchase price. Prices effective as of October 15, 1983.

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North Star Advantage & Horizon

Advantage, Advantage 8/16, Horizon & Horizon 8/16

HRZ-HD30 Horizon • includes same as HRZ-2Q except has single 360K-byte floppy disk drive, 30M-byte Winchester disk drive, and an additional application package:

6,999

HRZ-2U8-HD15 • includes same as HRZ-HD15 except includes 2 additional 8-bit user CPUs with 64K bytes of RAM each:

6,699

HRZ-2U8-HD30 • includes same as HRZ-HD30 except includes 2 additional 8-bit user CPUs with 64K bytes of RAM each:

7,699

☐ CPUs

Both the Advantage and Horizon series include an 8-bit Zilog Z80A microprocessor operating at 4 MHz, while the Advantage 8/16 and Horizon 8/16 include both an 8-bit Zilog Z80A microprocessor operating at 4 MHz and a 16-bit Intel 8088 microprocessor operating at 8 MHz. The Horizon and Horizon 8/16 also support an optional Floating Point Arithmetic Board.

Zilog Z80 Processor • 8-bit internal architecture, 8-bit data bus interface; direct addressing to 64K bytes of memory; fourteen registers include 16-bit program and stack pointers, two index registers, and a duplicate set of an 8-bit accumulator and a 7-bit flag register; upwardly compatible with the Intel 8080, it provides binary coded decimal (BCD) arithmetic, double precision operations, multiple indexing with address registers, multiple interrupt, increment, decrement, and move capabilities • in addition to being able to execute all 78 Intel 8080 instructions, 50 enhancements to the instruction set include advanced block move and search macros, relative jump and three types of selectable response interrupts, for a total of 128 operations.

Intel 8088 Processor • 8-bit data bus interface, 16-bit internal architecture, direct addressing to 1M bytes of memory, 16-bit register set with symmetrical operations, approximately 70 basic instructions with up to 30 addressing modes, 8-bit and 16-bit signed and unsigned arithmetic with binary and decimal operands, extensive string and block move facilities • powerful segmentation facilities allow memory partitioning for multitasking, concurrent, or multiuser capabilities • a pseudo superset of the Intel 8080 instruction set where translation to 8088 is straightforward • instruction set compatible with 8086.

Floating Point Board • provides up to 14 digits of precision with performances up to 25 times faster than with other Z80A software or firmware • available for Horizon systems:

$399 prch

☐ Memory

North Star's Advantage systems have a maximum of 64K bytes of memory, while the Advantage 8/16 supports up to 256K bytes of memory for the Intel 8088 microprocessor and 64K bytes for the Zilog Z80A microprocessor. All Advantage models support 20K bytes of display RAM, and 2K bytes of boot PROM. The Horizon and Horizon 8/16 series supports up to 352K bytes of Zilog Z80A RAM. Each user on the system (up to 5) has his or her own dedicated 64K bytes of memory with the remainder used by the operating system. Horizon 8/16 supports up to 2M bytes of Intel 8088 memory with individual users being supported with up to 512K bytes of memory.

8/16 RAM Board • provides 64K bytes of Intel 8088 memory • used on Advantage 8/16 only:

$349 prch

64K RAM Memory Board • provides 64K bytes of Zilog Z80A memory; includes Zilog Z80A CPU • used on Horizon only:

599

128K RAM Memory Board • provides 128K bytes of Intel 8088 RAM; includes 16-bit Intel 8088 microprocessor • used on Horizon only:

799

384K RAM Memory Board • provides 384K bytes of 16-bit Intel 8088 RAM • used on Horizon 8/16 only:

1,299

☐ I/O & Communications

North Star's Advantage and Advantage 8/16 use a proprietary minibus with 6 available expansion slots. An RS-232C serial port is standard, with up to 5 serial or parallel ports optional. The Horizon and Horizon 8/16 use the industry-standard S-100 bus with 12 available expansion slots, 2 RS-232C serial ports, and 1 parallel port standard. Up to 5 additional RS-232C ports are supported on the Horizon and up to 8 on the Horizon 8/16.

The Advantage and Advantage 8/16 support North Star's North Net local area network hardware/software, which supports the connection of up to 64 Advantage or Advantage 8/16 systems.

Serial Interface Board • RS-232C serial port or current loop option • asynchronous supports 45 bps to 19.2K bps; synchronous supports 2400 bps to 51K bps • used on Advantage systems:

$175 prch

Parallel Interface Board • 8-bit data in and out with 3 handshake lines for each port • maximum speed limited by processor • used on Advantage systems:

200

Four Port Serial I/O Board • RS-232 or current loop • used on Horizon systems:

349

North Net • proprietary baseband local area network that uses CSMA/PA (Carrier Sense Multiple Access/Positive Acknowledgment) access method; provides capabilities for interconnecting a group of Advantage and Advantage 8/16 computers so they can share printers and disk data files, as well as communicate with each other using Electronic Mail facilities; up to 64 Advantage/Advantage 8/16s can be supported • consists of 3 basic elements: a cable, workstation, and server workstations • the cable is easy to install, shielded, twisted pair; each system is connected to North Net by plugging a Workstation Board into the system and running a 15-foot cable to the North Net bus; server workstations are systems with both a Workstation Board and a Server Board as well as the printers, disks, or communication facilities to be shared • software required is North Net Network Executive Operating System which controls access, configuration, and communications, and the Graphics CP/M operating system; mail merge is optional.

North Net Workstation—8 Bit • includes 8-bit CPU, 64K bytes of RAM, 20K-byte display RAM, 2K-byte boot PROM, integrated CRT and keyboard, and installed Workstation Pack:

2,599

North Net Workstation—8/16 Bit • includes 8-bit and 16-bit CPU, 64K bytes of RAM on each, 20K-byte display RAM, 2K-byte boot PROM, integrated CRT and keyboard, and installed Workstation Pack:

2,999

Workstation Pack • includes a 4-MHz Z80A 8-bit processor, RAM, and 15-foot cable • used to connect an Advantage or Advantage 8/16 to the North Net Local Area Network:

399

Server Pack • includes 64K bytes of RAM; plugs into Advantage I/O to convert a workstation to a file server • connects to the Z80A microprocessor in the Workstation Pack:

499

☐ Mass Storage

Advantage and Advantage 8/16 both support 2 floppy disk drives or 1 floppy disk drive and either a 5M-byte or 15M-byte Winchester hard disk. The Horizon supports dual floppy disk drives or a floppy disk drive and either 5M-byte, 15M-byte, 18M-byte or 30M-byte Winchester hard disks. Up to 4 18M-byte disk drives can be daisy chained for 72M bytes of disk storage. None other than the 18M-byte drives can be daisy chained. Cartridge tape backup subsystem is available on Horizon systems.

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North Star Advantage & Horizon

Advantage, Advantage 8/16, Horizon & Horizon 8/16

Diskette Storage

Floppy Disk Drive • 5.25-inch 360K-byte formatted diskette drive; 512 bytes per sector, 10 hard sectors per track, 35 tracks per side, 2 sides per diskette • 250K-bits per second data transfer rate; 5-millisecond track-to-track access time; 100-millisecond average latency • included in package system price.

Hard Disk Storage

5M-Byte Winchester Drive • 5.25-inch nonremovable hard disk drive; 512 bytes per sector, 16 soft sectors per track; 612 tracks • 625K-bits-per-second data transfer rate; 3-millisecond track-to-track access time; 8.33-millisecond average latency • included in 5M-byte packaged system; available as an upgrade for both Advantage and Horizon:

$2,399 prch

15M-Byte Winchester Drive • 5.25-inch nonremovable hard disk drive; 512 bytes per sector, 16 soft sectors per track, 1836 tracks • 625K-bits-per-second data transfer rate; 3-millisecond track-to-track access time; 8.33-millisecond average latency • included in 15M-byte packaged system; available as an upgrade for Advantage and Horizon:

3,399

18M-Byte Winchester Drive • 14-inch nonremovable hard disk drive; 512 bytes per sector, 42 soft sectors per track, 842 tracks • 960K-bits-per-second data transfer rate; 3-millisecond track-to-track access time; 12.5-millisecond average latency • up to 4 drives can be daisy chained 18M-byte add-on drive • available for Horizon systems only:

5,374

30M-Byte Winchester Drive • 5.25-inch nonremovable hard disk drive; 512K bytes per sector, 42 soft sectors per track, 1684 tracks • 960K-bits-per-second data transfer rate; 3-millisecond track-to-track access time; 12.5-millisecond average latency:

4,399

Tape

Tape Backup System • ANSI standard X3.55-1977, 13.4M-byte 0.25-inch tape cartridge system • supports incremental or selective backup • 30-ips read/write tape speed; 90-ips bidirectional search and rewind; 24K-byte-per-second transfer rate • available for Horizon systems:

$3,895 prch

☐ Terminals/Workstations

The Advantage and Advantage 8/16 support a single integrated screen and keyboard; while the Horizon supports up to 5 CRTs available from third-party vendors.

Integrated Advantage Video • 12-inch diagonal P31 green phosphor non-glare screen; 1920-character display; 24 lines by 80 characters; 5x7 character in 8x10 dot matrix; graphics resolution of 640 pixels wide x 240 pixels high; displays upper/lowercase alphanumerics and bit addressable graphics.

Integrated Advantage Keyboard • 87 sculptured keys, Selectric-compatible keyboard; 49 standard typewriter keys, 14-key numeric pad with enter key, 15 function keys with up to 45 user-programmable functions, and 9 additional symbol/control keys; features include: N-key roll-over, special shift-lock keys, five shift modes, and auto repeat.

☐ Printers/Graphics

No printers are supplied by the vendor.

• END

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