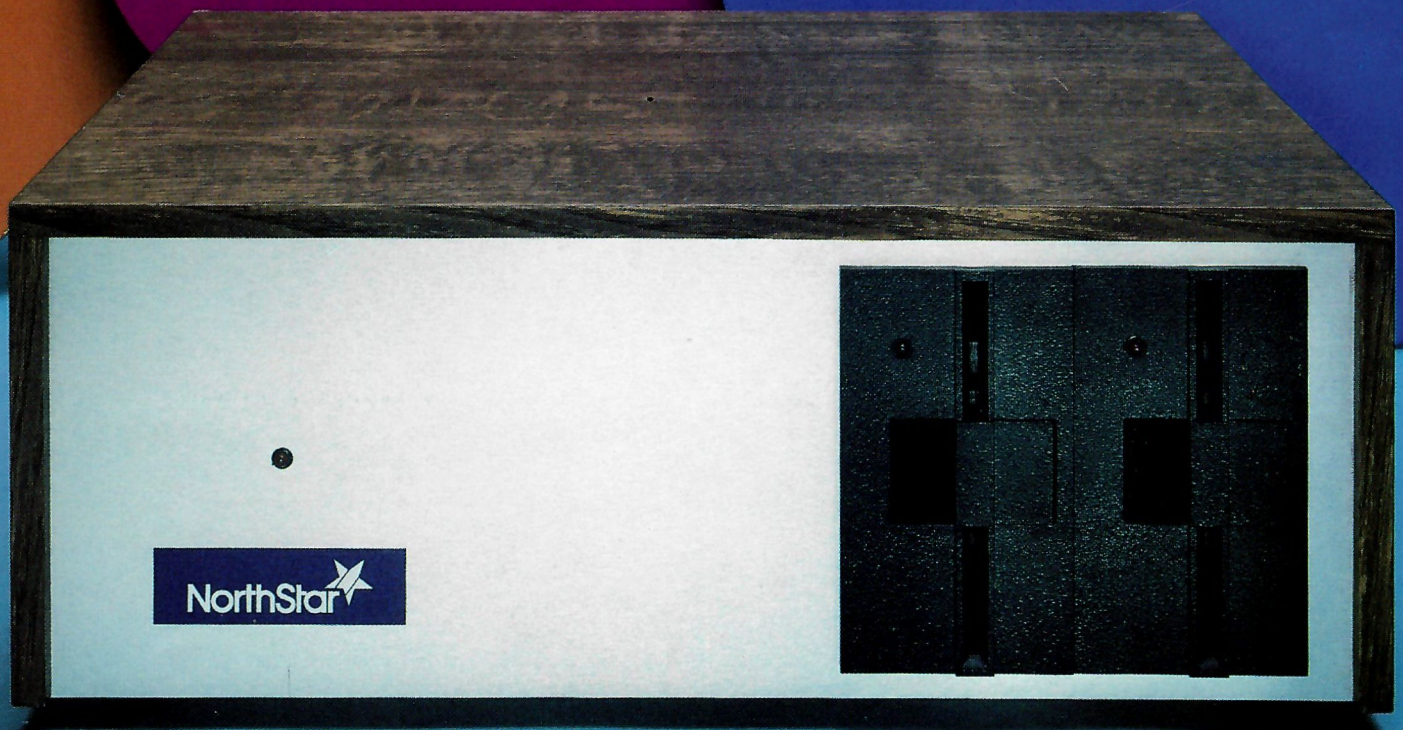


North Star Computers Product Catalog

August 1979



25025

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North Star
Computers Inc.

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Introduction

North Star Computers is located in Berkeley, California and was incorporated in June 1976. The company offers the HORIZON[®] computer and other high performance microcomputer products, both hardware and software, at low cost. The initial company products were the hardware floating point board (North Star FPB) and the complete floppy disk subsystem (North Star MICRO-DISK SYSTEM) for S-100 COMPUTERS.* The North Star MICRO-DISK SYSTEM includes a version of extended disk BASIC, developed by North Star in 1976. The North Star reputation is based on the quality, performance and reliability of both the hardware and software delivered to date.

North Star offers the HORIZON, a complete S-100 bus computer, as well as S-100 memory products (RAM-32-A and RAM-16-A), a hardware floating point board (FPB), and a Z80A[®] processor board. North Star BASIC is an integral part of the HORIZON computer and, in fact, the entire MICRO-DISK SYSTEM is contained in the HORIZON computer. Due to the wide usage of our MICRO-DISK SYSTEM and North Star BASIC, the application software available for the HORIZON is quite extensive.

All North Star products include a limited 90 day warranty, described in detail in the documentation provided with each product. North Star products are used in OEM systems and are also sold at authorized computer dealers throughout the United States and many foreign countries.

The following pages give expanded descriptions of currently available North Star products. For more information about a particular product, a documentation packet may be purchased. Documentation packets include all hardware and software documentation normally distributed with the product.

HORIZON[®] is a registered trademark of North Star Computers, Inc.

Z80A[®] is a registered trademark of ZILOG Corporation.

*S-100 bus computers are those microcomputers whose circuit boards attach to the backplane or "motherboard" with 100 connector pins and conform to standards followed by S-100 bus computer manufacturers. The wide availability of S-100 compatible products allows users many options when configuring Z80 or 8080 computer systems.

Complete HORIZON Computer With 32K RAM, Up To Four Mini Disk Drives, 4MHz Z80A Processor, Serial And Parallel I/O Ports, And Extended BASIC:

The HORIZON Computer is a complete, high-performance micro-computer system with integrated floppy disk memory. To begin programming in North Star extended disk BASIC, merely plug in a CRT or hardcopy terminal. Operating a HORIZON is simple; there is only an on/off switch and a restart button. The North Star software is automatically loaded from diskette within seconds after power-on.



Assembled or Kit

If your application requires an attractively packaged, disk-based computer system with high performance and low cost, then the HORIZON is for you—whether you purchase it assembled and tested or choose to follow our precise assembly instructions and build it from a kit. Assembly from a kit entails mechanical assembly of the chassis and power supply, and soldering of components to printed circuit boards. No disk-drive assembly is required. Use of a voltmeter is required, and an oscilloscope is recommended.

What About Performance?

The North Star Z80A processor board operates at 4 MHz—twice the speed of an 8080. Our RAM memory board lets the Z80A execute at full speed (no wait states), and includes parity checking. The disk controller board can control up to four drives. Expanded descriptions of these North Star boards are included in this catalog.

The North Star controller and disk drives set the standard for floppy disk performance and reliability. The HORIZON can load a 10K byte program in less than 2 seconds, and each double density diskette can store 180K bytes. Two-sided quad capacity disk drives are also available as an extra cost option allowing 360K bytes to be stored on each quad capacity diskette. That is a total of 1.4 million bytes of on-line storage with four drives. Double density and quad capacity drives may be mixed and matched in any system.

And Software, Too

HORIZON includes North Star extended disk BASIC, Disk Operating System (DOS) and Monitor on diskette. Our BASIC, now in widespread use, has everything you always wanted in a BASIC and more, including: strings, formatted output, disk files and a powerful line editor. Full descriptions of North Star BASIC and DOS appear in other sections of this catalog. The HORIZON software diskette includes a comprehensive monitor and memory test for hardware and software maintenance. Pascal is also available from North Star for the HORIZON and is described elsewhere in this catalog.

The amount of application software now written to operate with North Star BASIC and DOS is extensive. Many independent companies, as well as the North Star user groups, offer a wide range of application programs. FORTRAN, COBOL, editor-assembler development systems, word processing systems, business applications (payroll, mailing list, inventory and data base management, accounting and order entry), and games are available. See the North Star Newsletter for details.

Expand Your HORIZON

HORIZON is designed for use in a wide range of application environments. HORIZON can be expanded and upgraded in many ways, with products from North Star as well as other S-100 product manufacturers. HORIZON options available from North Star include:

- additional 32K and 16K RAM boards
- second, third and fourth disk drives
- hardware floating point arithmetic board
- 1K PROM option (on processor board)

Documentation And Support

Professionally prepared manuals are included with each HORIZON computer covering operating procedures, maintenance, theory of operation, assembly and troubleshooting for both the hardware and software. The North Star Newsletter, which describes application notes and new software releases, is periodically mailed to each registered North Star product owner. Software updates are offered for a nominal copying charge.

S-100 Compatible

HORIZON is an S-100 bus computer. The HORIZON motherboard has slots for up to twelve S-100 circuit boards. Three of these slots are used in a basic HORIZON for the Z80A processor board, the 32K RAM board, and the disk controller board. The I/O circuitry and disk drive power regulation circuitry are included on the motherboard. A real-time clock is also included on the motherboard. The serial and parallel input/output interfaces may be used for printer, second terminal, or modem requirements. The HORIZON power supply is more than adequate to power a full complement of twelve S-100 boards, with a minimum of 12 amps at 8 volts and 6 amps at ± 16 volts. Although conservatively rated, the HORIZON power supply is one of the most powerful ever offered with a microcomputer system. A universal power supply option is available for other than U.S. standard service. The assembled metal cover versions of the HORIZON computer are Underwriters Laboratories listed.

Specifications

A.C. POWER: 115 volts, 250 watts, 60 Hz (Domestic)
230 volts, 250 watts, 50 Hz (International)

Environmental Limits

TEMPERATURE—operating 40°F to 100°F (4°C to 40°C)
RELATIVE HUMIDITY—20% to 80% no condensation

Dimensions

20" x 7.25" x 17.50"

HORIZON-1-32K

HORIZON comes complete with 4 MHz Z80A processor board, 32K RAM board, disk controller board, one mini disk drive, power supply and cooling fan, motherboard with two serial I/O interfaces, an 8-bit parallel I/O interface, twelve 100-pin edge connectors, chassis, and choice of wood or blue metal cover.
HRZ-1-32K-D (DOUBLE DENSITY and 32K RAM)
HRZ-1-32K-Q (QUAD CAPACITY and 32K RAM)
HRZ-1-48K-D (DOUBLE DENSITY and 48K RAM)
HRZ-1-48K-Q (QUAD CAPACITY and 48K RAM)
HRZ-1-64K-D (DOUBLE DENSITY and 64K RAM)*
HRZ-1-64K-Q (QUAD CAPACITY and 64K RAM)*

HORIZON-2-32K

Same as HORIZON-1 with two mini disk drives included.
HRZ-2-32K-D (DOUBLE DENSITY and 32K RAM)
HRZ-2-32K-Q (QUAD CAPACITY and 32K RAM)
HRZ-2-48K-D (DOUBLE DENSITY and 48K RAM)
HRZ-2-48K-Q (QUAD CAPACITY and 48K RAM)
HRZ-2-64K-D (DOUBLE DENSITY and 64K RAM)*
HRZ-2-64K-Q (QUAD CAPACITY and 64K RAM)*

*Note that in 64K HORIZON configurations, 8K of address space is reserved for the bootstrap PROM and memory-mapped I/O.

North Star Extended BASIC

The programming language BASIC is an integral part of North Star products, although there are many uses for these products which do not involve BASIC. North Star extended BASIC will operate on both Z80 and 8080 computer systems. North Star BASIC is not available as a separate product, but is only sold for use with the HORIZON computer and MICRO-DISK SYSTEM. Versions of BASIC using the North Star Hardware Floating Point Board (FPB) execute faster and require about 700 bytes less memory.

North Star extended disk BASIC includes the following features:

- Strings and substrings (limited only by available RAM)
- String operators (concatenation and relationals)
- Multi-dimensioned arrays
- Multi-line user-defined functions
- Formatted output facility
- Multiple input/output devices
- Machine language CALL with argument passing
- Direct memory read and write
- Boolean operators (AND, OR, and NOT)
- IF-THEN-ELSE and ON-GOTO statements
- Program renumber command
- Calculator mode (direct statement) operation
- Powerful line editor
- Program load and store from disk
- Sequential and random access disk files
- Error trapping capability

The set of North Star BASIC commands includes:

RUN	LIST	SCR	REN
DEL	EDIT	PSIZE	CONT
LOAD	SAVE	BYE	APPEND
AUTO	CAT	MEMSET	NSAVE

The set of North Star BASIC statements includes:

LET	GOTO	PRINT	DIM
FOR	NEXT	INPUT	EXIT
STOP	REM	READ	DATA
RESTORE	GOSUB	INPUTI	LINE
DEF	FNEND	OUT	END
IF	ON	RETURN	FILL
CHAIN	CREATE	OPEN	CLOSE
WRITE#	DESTROY	ERRSET	READ#

Built-in functions include:

ABS	SGN	SIN	COS	ATN
RND	SGRT	LOG	EXP	FREE
INT	LEN	VAL	STR\$	CALL
EXAM	INP	CHR\$	TYP	TAB
ASC	FILE	INCHAR		

North Star BASIC was implemented for a wide range of applications. The formatted output capability is similar to the FORTRAN method. Thus, values may be printed in fixed or variable length fields, and dollar sign, commas and decimal points may be automatically included in the output.

The disk file processing features of North Star BASIC have been designed to allow a maximum of flexibility. Up to eight files on disk can be "OPEN" at one time. Both numeric and string values may be written to disk files. Also, BASIC can access individual bytes in a disk file for applications where this is necessary. Random file accessing allows the BASIC program to set a file pointer to a specified byte address within a file before reading or writing.

The number representation in North Star BASIC is binary-coded-decimal (BCD). This representation means that no invisible conversion errors occur when the values used are within the precision of BASIC. Note that this is not true of binary representation implementations of BASIC. The standard North Star BASIC has 8 digits of precision, but special orders may be made for versions of BASIC with 10, 12 or 14 digits of precision.

North Star BASIC occupies about 12K of RAM, excluding the space for the BASIC program and data. BASIC loads and executes at 2DOO hex in the standard version. Versions of BASIC with non-standard origins are available on special order.

Disk Operating System

The North Star Disk Operating System (DOS) is supplied on diskette with the HORIZON computer and with the MICRO-DISK SYSTEM. The DOS provides access to the information on diskettes either through COMMANDS typed from the computer terminal, or through SUBROUTINES called by software. The operations provided implement a named file system. That is, all files on the diskette can be referenced by the use of symbolic names of up to 8 characters. The DOS commands include:

CR	Create a file
DE	Delete a file
LI	List file directory
TY	Set file type
LF	Load file to RAM
SF	Save file from RAM
GO	Load file and execute
CF	Copy file to file
IN	Initialize diskette
DT	Disk test
CD	Copy entire diskette
CO	Compact file space
RD	Read from disk
WR	Write to disk
JP	Jump to RAM address

At power-on, the bootstrap PROM program loads DOS from the diskette into RAM. At this point the DOS awaits the typing of one of the commands. For example, typing GO BASIC will load BASIC into RAM and begin its execution. Alternately, the DOS may be set for "turnkey" start up of any specified program.

The DOS has been designed to allow convenient modification for interfacing to any computer I/O terminal configuration. 256 bytes of space have been reserved in the DOS for your I/O routines, and step-by-step instructions are included describing how to make your I/O routines part of the DOS. Of course, DOS diskettes shipped with HORIZON will be initially set up to communicate with the HORIZON serial and parallel ports. Also, several common I/O configurations have been interfaced to the DOS and are available for nominal cost (MDS-PERS).

The North Star DOS occupies 3.25K of RAM and has its origin at 2000 hex in the standard version. Versions of the DOS with non-standard origins are available on special software orders. The system is supported in both double density and quad capacity versions, and support for single density continues.

Monitor

The North Star Monitor is a program which provides the user with certain maintenance and debugging functions which would normally be provided in a limited way on systems which include a control panel. The Monitor is included on diskette with each HORIZON computer. The Monitor is intended to be used in conjunction with the North Star Disk Operating System (DOS).

Commands to the Monitor are entered via the terminal using a format consistent with the DOS commands. Command editing facilities compatible with the North Star BASIC editing features are included in the Monitor.

The following list summarizes the commands available:

CM	Compare memory block contents
FM	Fill memory block
MM	Move memory block contents
SM	Search memory block
TM	Test memory block
DH	Display memory hexadecimal
DA	Display memory with ASCII interpretation
DS	Display memory and substitute values
JP	Jump to program
OS	Return control to the DOS
IL	Perform initial load from bootstrap PROM
OD	Assign output device number for the Monitor
ID	Assign input device number for the Monitor

The Monitor occupies 2.5K of RAM and is normally loaded just above the DOS at 2DOOH. Copies of the Monitor are supplied, assembled at several different origins.

North Star Pascal

Pascal, one of the most popular languages to embody the principles of structured programming, is available from North Star for use with the HORIZON and the MICRO-DISK SYSTEM.

A Complete System

North Star Pascal is a complete program development system. Pascal source programs are prepared using the screen-oriented editor. They are compiled and linked into fast-executing P-code, and executed by a simulator for an "ideal" Pascal processor called the P-machine. At run-time, compiled P-code versions of Pascal programs execute about 10 times faster than equivalent programs under typical interpreter systems.

The Pascal system available from North Star is a special version of the popular "UCSD Pascal" implementation, developed at the Institute for Information Systems at the University of California, San Diego. The language implemented is based on the Standard Pascal language.

North Star Pascal runs under its own disk operating system, and does not use the North Star DOS. However, Pascal programs may access and manipulate disk files created under DOS or BASIC.

Advanced Features

North Star Pascal features block control structure, long variable names, formatted numeric output, local variables in procedures and functions, and provision for pre-compiled library routines. The language includes a full set of operators and functions for manipulating data of the elementary data types REAL, INTEGER, BOOLEAN, and CHARACTER. Complete string-handling facilities are also provided. New data types may be defined by the programmer for special applications. Extensive data-structuring facilities in the language permit organization of data into multi-dimensional arrays, records, sets, or files. Data files on diskette may be accessed sequentially or in random fashion. The availability of special pointer variables in North Star Pascal promotes convenient manipulation of complex dynamic data structures such as trees and lists.

Internal representation of INTEGER quantities is 16-bit binary, providing an INTEGER range of -32767 to 32767. REAL numbers are stored internally in 32-bit binary floating-point form, resulting in 7.1 digit precision.

(Continued, page 17)

Other Software

BASIC, DOS, MONITOR and Pascal are only a few of the numerous software packages available to HORIZON users. A large number of other useful and entertaining software packages are available through the North Star Software Exchange (NSSE) program, and from independent software vendors. All registered HORIZON and MDS users periodically receive the North Star Newsletter, which keeps them up-to-date on newly-available software and additional HORIZON features.

The NSSE library consists of user-developed, public-domain software that has been transferred onto diskette. For a nominal copying charge of \$10.00 per diskette, these software packages are available from your North Star dealer. NSSE diskettes include utility programs, math and matrix routines, several utility packages, a PILOT system assembler source code, and many computer games.

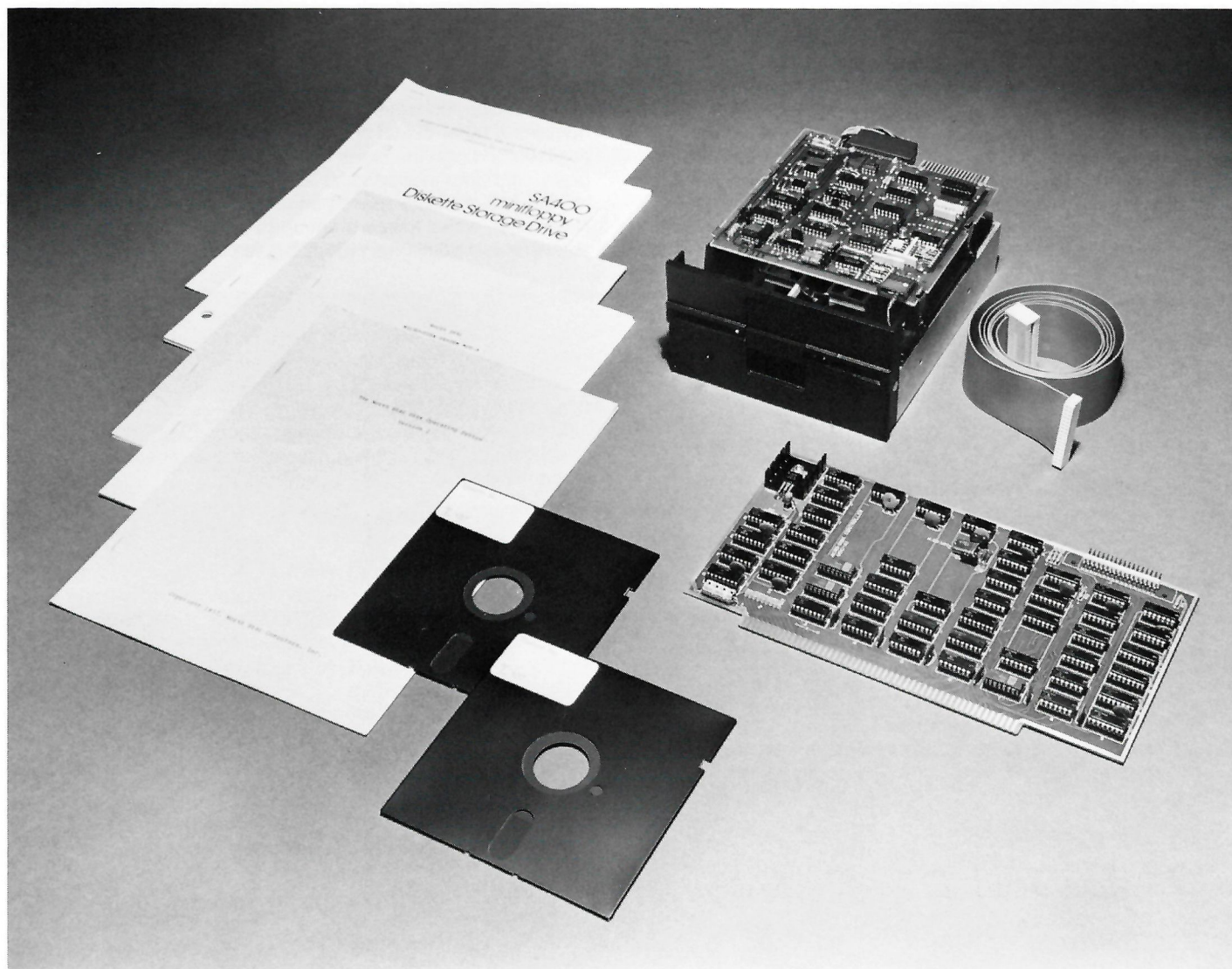
In addition to the software exchange, independent software vendors supply hundreds of useful packages which can run on a HORIZON. These include complete packages for nearly every small business computer application, as well as tax packages, stock market analysis and word processing. Time sharing systems are available through these independent vendors. Furthermore, the popular CP/M operating system is available as well as several assembly language development systems and high-level languages such as FORTRAN and COBOL.

A list of vendors marketing HORIZON-compatible software is available from North Star.

Complete Floppy Disk System For S-100 Computers

That's right, complete.

The North Star MICRO-DISK SYSTEM is a complete floppy disk system for Z80 or 8080 computer systems which follow the S-100 bus conventions. For a disk-oriented computer system which can execute BASIC or Pascal, all that is needed is the computer, memory, an I/O terminal, and the North Star MICRO-DISK SYSTEM. Just turn on the power and begin executing our extended disk BASIC within seconds.



The Drives:

Double Density

North Star is established as the leader in micro computer floppy disk systems. The double density drive is hard-sectored for 512 byte records. Each diskette can store 180K bytes of information, formatted as 35 tracks with 10 sectors per track. Track-to-track access is 40ms and latency is 100ms. The data transfer rate is 250K bits per second. These figures mean that 16K bytes of data can be transferred in less than one second, and that a single diskette can hold over 100 typical BASIC programs. The drive comes assembled and tested, even in systems purchased in kit form.

Quad Capacity

The quad capacity drive is compatible with the double density drive and operates with the same controller. The drive uses both sides and is therefore formatted as 70 tracks with 10 sectors per track. The DOS determines the side selection automatically. Track-to-track access has been enhanced to 5ms with all other specifications remaining the same as its double density counterpart.

The Controller

The North Star MICRO-DISK controller board interfaces the disk drive to the computer system. The controller is a single PC board that plugs directly into the S-100 bus. Commands and data are transferred under software control by the technique of memory-mapped I/O (no I/O ports or DMA are used). Up to four double density or quad capacity drives can be controlled, with or without interrupts. The controller allows transfer of between one and ten 512 byte blocks of data between the diskette and RAM in a single revolution. Cyclic redundancy error checking is done for each block read from disk. The controller automatically turns the drives on and off to minimize head and diskette wear.

Basic, DOS And Monitor

The North Star Disk Operating System, Monitor and extended disk BASIC are included on diskette with the MICRO-DISK SYSTEM. See the sections on software for expanded descriptions of DOS, Monitor and BASIC.

Bootstrap PROM

The controller includes on-board PROM memory, pre-programmed to permit power-on start-up of the computer. The PROM program loads the DOS from drive number 1 into memory and then branches to the loaded DOS. The on-board PROM and the memory-mapped I/O together use 1K of the computer address space, starting at E800 hex in the standard version. Non-standard origins are available on special orders.

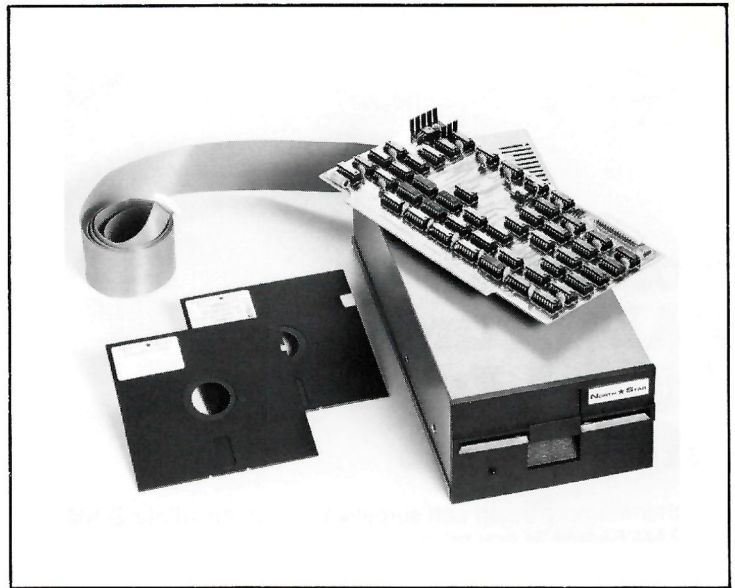
Power

CONTROLLER: .7 amp @ +8 volts
DRIVE: .5 amp (typ) @ +5 volts, .7 amp (max)
.9 amp (motor on) @ +12 volts, 1.6 amps (motor start-up)

Each drive is supplied with a power regulation PC card that mounts to the back of the drive. (Note: In HORIZON systems, the power regulation is done with circuitry supplied on the motherboard.) The drive can be powered by tapping unregulated power from the computer. The North Star MICRO-DISK Power Supply is included in the MDS cabinet and requires standard 115V AC power. One power supply will provide power for one drive.

Mounting

The controller occupies a single slot on the computer motherboard. The drive itself measures 5.75" x 3.25" x 8" and may be mounted horizontally or vertically. If external mounting is preferred, the single drive cabinet (MDS-CAB-PS) is available. The drives may also be mounted in the Additional Drive Cabinet.



Micro-Disk System

MDS-A-D (DOUBLE DENSITY)

MDS-A-Q (QUAD CAPACITY)

MDS-CAB-PS (Blue metal cabinet for one drive with power supply)

Additional Drive Cabinet

An additional drive cabinet (ADC) may be ordered which can be used to add the third and fourth drives to a HORIZON system or MDS. The ADC is compatible with the HORIZON cabinet and comes with a built-in power supply capable of powering one or two drives. An ADC-0 may be used to house previously acquired drives (MDS-DRV). The cabinet comes in a wood or blue metal cover, with dimensions of 9" x 8" x 13.5". The ADC comes with a universal power supply and may be set for either 115 or 230 volts, 50 or 60 Hz.

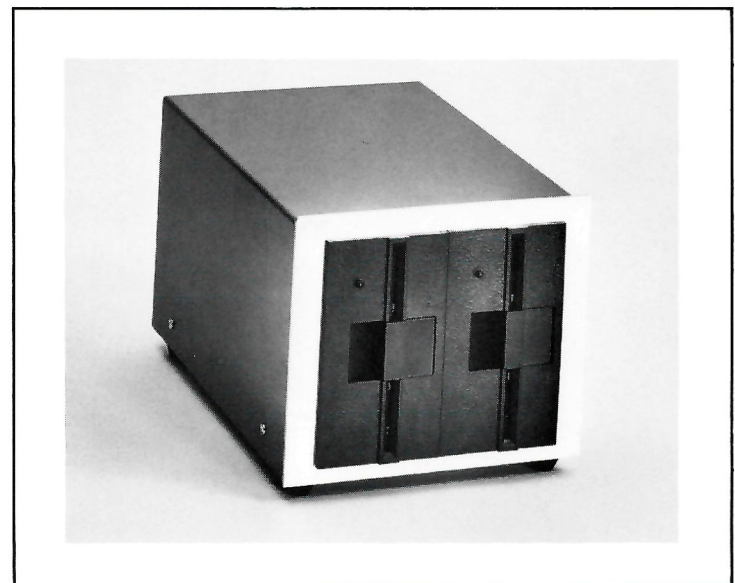
ADC-1-D (with one double density drive)

ADC-2-D (with two double density drives)

ADC-1-Q (with one quad capacity drive)

ADC-2-Q (with two quad capacity drives)

ADC-0 (kit version with no drives)



North Star RAM Boards Offer A Full Set Of Features

No other memory board can surpass the features of our S-100 bus RAM boards at any price.

High Speed

The North Star RAM boards (RAM-16-A and RAM-32-A) are designed using prime, 200ns dynamic RAM chips. This means that the processor can compute at full speed, even when it is a 4MHz Z80A. Of course, the North Star RAM will also operate with 8080 processor boards as well. The dynamic memory refresh is done by on-board electronics making refresh invisible to the processor.

Parity Error Checking

True system integrity is achieved with the North Star parity checking circuitry. Parity checking is a valuable feature for applications where maximum reliability is required. If a memory error occurs, a status flip/flop is set and an interrupt can inform the processor immediately. The error status light is also lit.

Addressability

The RAM board address is selected with an on-board DIP switch to start on any 8K boundary in the address space.

Bank Switching

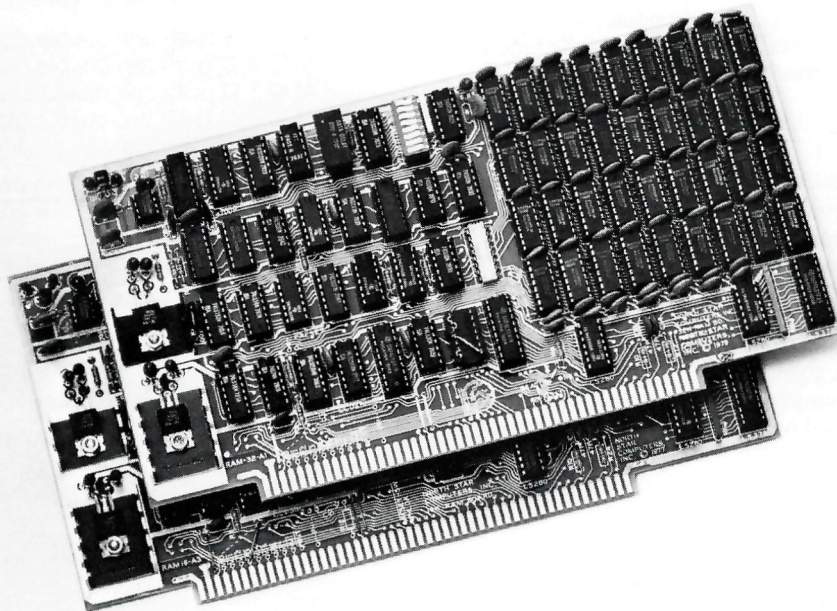
An additional feature of North Star RAM boards is the ability to perform bank switching. The bank switching capability allows expansion of the total amount of RAM in a system beyond 64K. Bank switching will also facilitate software applications such as time-sharing.

Power

- .6 amp @ +8 volts, unregulated
- .4 amp @ +16 volts, unregulated
- .1 amp @ -16 volts, unregulated

Ram Boards

- RAM-16-A
- RAM-32-A



Double Your Processing Power With the North Star Z80A Processor Board

The North Star Z80A processor board brings the 4MHz Z80A microprocessor to the S-100 bus. The Z80A runs compatible programs at least twice as fast as an 8080. Even greater speed advantages can be obtained when the extended Z80A instruction set is used. The North Star Z80A processor board (ZPB-A) can run in systems either with or without front panels. The ZPB-A is fully compatible with S-100 type front panels. An auto-jump feature permits a branch to any 16-bit address in the computer at power-on and reset. In the HORIZON computer, this feature is used to start the bootstrap disk load PROM on the disk controller board. In other systems, the feature might be used to start a PROM monitor or other bootstrap procedure.

The ZPB-A includes space to add 1K bytes of EPROM (2708 type) as an option, making it possible to permanently store programs on the board. This feature would not normally be required in a HORIZON system, but might be used to contain a monitor or bootstrap program in other applications which might require it.

The ZPB-A also implements an 8-level vectored interrupt capability, and has a jumper option for adding a wait state to all memory used in the computer.

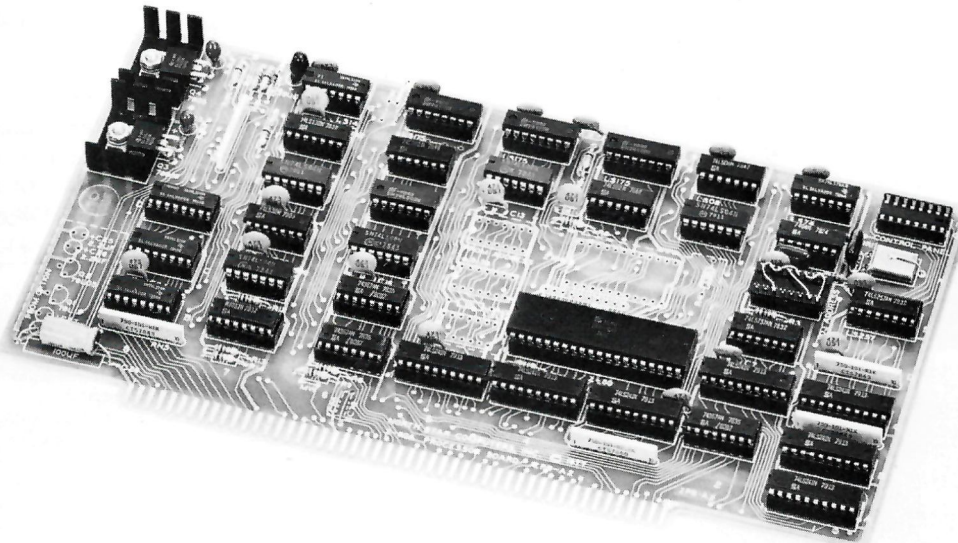
Power

.7 amp @ +8 volts, unregulated

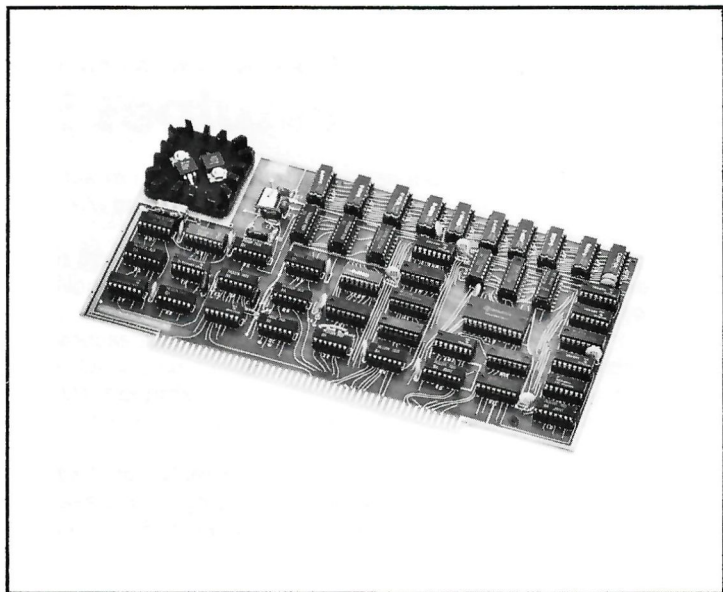
Z80A Processor Board

ZPB-A

ZPB-PROM (option)



Hardware Floating Point Board For High Speed Number Crunching



The North Star hardware floating point board (FPB-A) is a single S-100 bus circuit board which performs floating point add, subtract, multiply and divide with up to 14 digits of precision. The FPB will perform floating point operations approximately 25 times faster than the best Z80A software or firmware. A typical 10 digit multiplication, when performed by the FPB, computes in 111 microseconds. The time is 2.7 milliseconds when the same operation is performed by the best Z80A software. Number representation for arguments and results are BCD (binary-coded-decimal).

The FPB implements a high-speed microprogrammed processor specially designed to perform fast floating point arithmetic. The FPB waits for a command from the Z80A or 8080 program to start a floating point calculation. The command indicates both the operation desired and the precision. Then the FPB receives the floating point values one byte (two digits) at a time, computes the result, and returns the result along with a status byte indicating any overflow or underflow conditions. The method of communication between the FPB and computer permits values to be passed at the rate of 3 microseconds per byte using a Z80A, and proportionately slower if a lesser speed computer is used.

A version of BASIC which uses the FPB is provided with HORIZON and MICRO-DISK SYSTEMS. Use of the FPB can speed up North Star BASIC by as much as a factor of 10 when extensive mathematical calculations are being performed.

Power

1.7 amps @ +8 volts, unregulated

The following timing table gives FPB execution times for the four operations at each of the allowed precisions.

FPB Execution Times ^{1, 2, 3}							
PRECISION DIGITS:	2	4	6	8	10	12	14
ADD							
best	1	1	1	1	1	1	1
typical	8	8	9	9	10	10	11
worst	10	10	10	11	11	12	12
SUBTRACT							
best	4	4	4	4	4	4	4
typical	8	8	9	9	10	10	11
worst	15	16	17	18	19	20	21
MULTIPLY							
best	5	5	5	5	5	5	5
typical	18	34	55	80	111	146	186
worst	51	125	228	382	527	720	933
DIVIDE							
best	7	7	7	7	7	7	7
typical	39	70	109	156	211	274	370
worst	62	139	229	340	470	621	779

1. Times given in microseconds
2. Execution times are a function of the input values
3. Times listed do not include transmission of input values and result

Floating point number representation:

- Byte 1: bit 7=(1=negative number, 0=positive number)
bits 6-0=exponent in excess 64 binary representation
bits 7-0=zero represents the zero value
- Byte 2: bits 3-0=least significant digit of value in BCD coding
bits 7-4=next least significant digit of value
- Byte N: bits 7-4=most significant digit of value in BCD coding
bits 3-0=next most significant digit of value

All values are normalized.

Floating Point Board
FPB-A

CRT Terminal From North Star

North Star offers the SOROC IQ 120 CRT Display Terminal for users who wish to purchase an entire system from North Star. The SOROC IQ 120 is widely recognized as an ideally cost-effective, full function CRT terminal. Standard features include 24 line by 80 character display with addressable cursor, upper and lower case ASCII character set, and high quality keyboard with cursor controls and numeric pad. The IQ 120 has a standard RS-232 interface compatible with the HORIZON serial port, and can communicate at standard baud rates up to 19,200 characters per second. An auxiliary RS-232 port is also included in the standard IQ 120.

The SOROC IQ 120 is made available through North Star by a special agreement with SOROC Technology, and is fully assembled and tested. The SOROC 90-day limited warranty is honored at the SOROC factory in Southern California.

Power Requirements

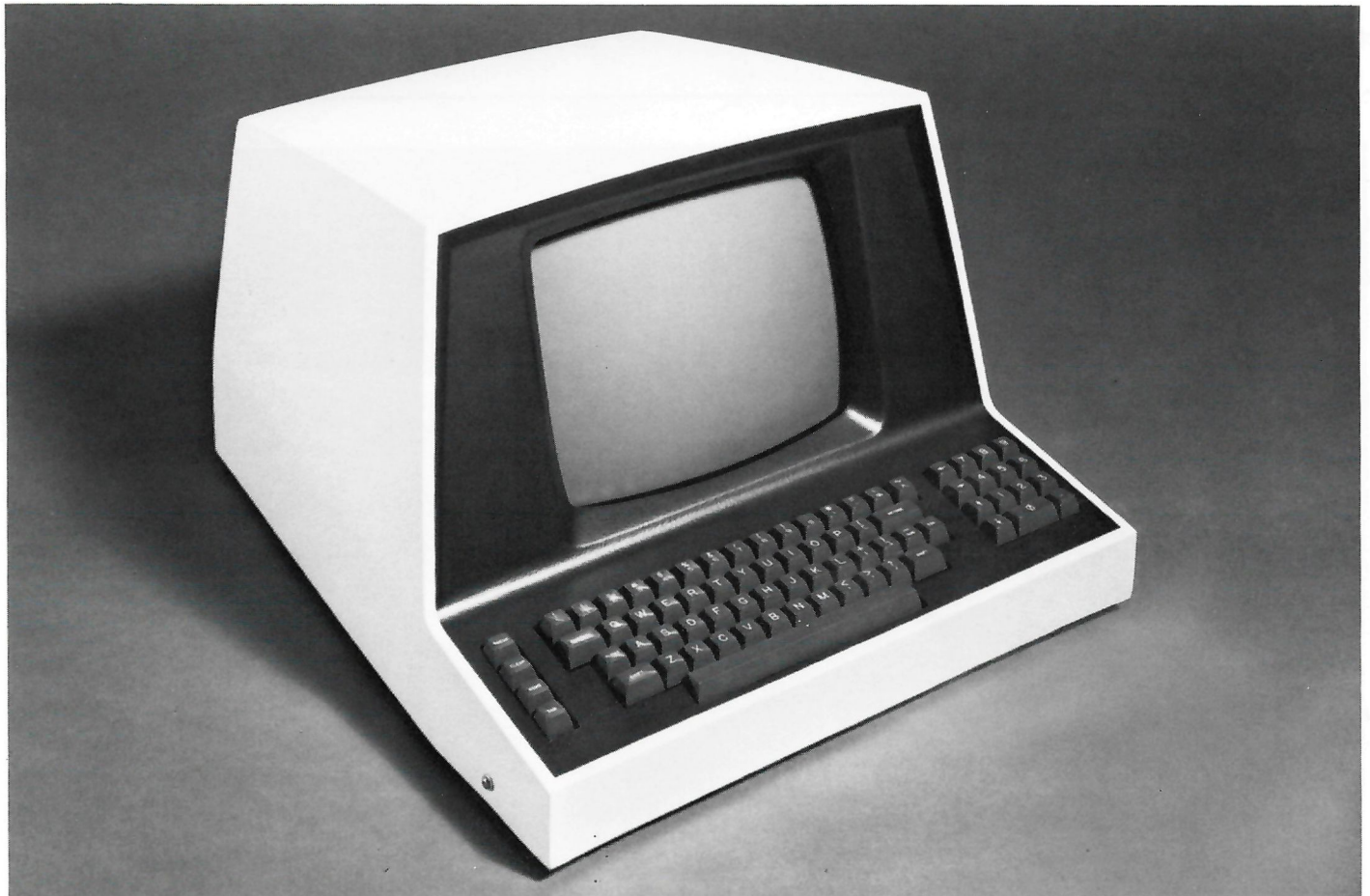
115V AC, 60 Hz, 130 watts
50 Hz and/or 230V AC available

Dimensions

18" x 12½" x 21"

SOROC CRT Terminals

SOROC
SOROC-F: (non U.S. Standard Service)
CABLE-232: (Terminal-Computer Cable)



Letter Quality Character Printer From North Star

NORTH STAR computers offers a letter-quality printer for all your printing needs. The NEC Model 5530-2 SPINWRITER is a micro-processor controlled, impact printer designed for printing applications where typewriter quality printing is required. The SPINWRITER will print up to 55 characters per second while receiving data at rates to 120 characters per second (1200 baud).

The SPINWRITER uses the most advanced technology for added durability. Reinforced plastic in the SPINWRITER's unique "thimble" print element provides normal element life of more than 30 million impressions. Faster than the "golf-ball" with better quality than the "daisy-wheel," the SPINWRITER offers the combined advantage of the thimble plus a rich and continuously increasing variety of print thimbles to enhance its ability to meet diverse user applications. The unique thimble enables the SPINWRITER to store and print in two different font styles without the need to replace one print element with another.

Name the application, and the SPINWRITER character printer has a range of standard features for it. In word processing, the SPINWRITER does a top-quality, letter-perfect job that includes selectable 10- or 12-pitch characters with line widths up to 163 characters. Optional proportional spacing can be performed under software control. For graphing and plotting the standard features of the SPINWRITER's 1/120-inch horizontal resolution and 1/48 inch vertical resolution plus incremental platen movement ensure more precise paper control during sub- or superscripting. Other features include bi-directional printing; OCR-quality registration; self-testing diagnostics; and horizontal and vertical tabbing. The SPINWRITER comes equipped with a standard 8-bit parallel interface, a standard thimble, a carbon ribbon and a forms tractor.

The SPINWRITER is supported by Release 5.1 of the DOS through the parallel output port and a parallel interface cable (CABLE-PAR).

The NEC 90-day customer warranty is honored at the NEC factory in Woburn, Mass. or by contact with any NEC field office.

Power

115 volts, 50/60 Hz, 350 watts

Dimensions

23" x 16½" x 8"

NEC Printer

NEC 5530-2 with forms tractor
CABLE-PAR (Parallel interface cable)



Cost Effective Business Printer From North Star

NORTH STAR is now offering the Anadex Model DP-8000 Alpha-numeric Line Printer: a cost effective impact printer for use with the HORIZON. The DP-8000 has features of printers costing much more without sacrificing quality or reliability. With a printing speed of 112 characters per second, the DP-8000 is capable of 84 lines per minute while printing in a bi-directional mode. The printer has an RS-232 interface, a parallel interface and a current loop interface. These features allow the printer to be connected using the HORIZON's parallel output port or one of the serial I/O ports.

Other features include:

- Sprocket Feed
- 9 x 7 Character Font
- 1000 characters of FIFO Storage
- Programmable Form Length
- Double Width Printing
- Print Head Life in excess of 100 million characters

The Anadex DP-8000 has provisions for paper feeding using either ASCII Line-Feed, Form Feed, Vertical Tab or the FEED pushbutton located on the printer front panel. The out-of-paper detector holds the printer off-line, advances the remaining paper and maintains the paper feeding mechanism so that the paper supply may be replenished.

The ANADEX printer is supported by Release 5.1 of the DOS through the parallel output port and a parallel interface cable (CABLE-PAR).

The Anadex 90-day limited warranty is honored at the Anadex factory in Southern California and at regional repair centers around the world.

Power

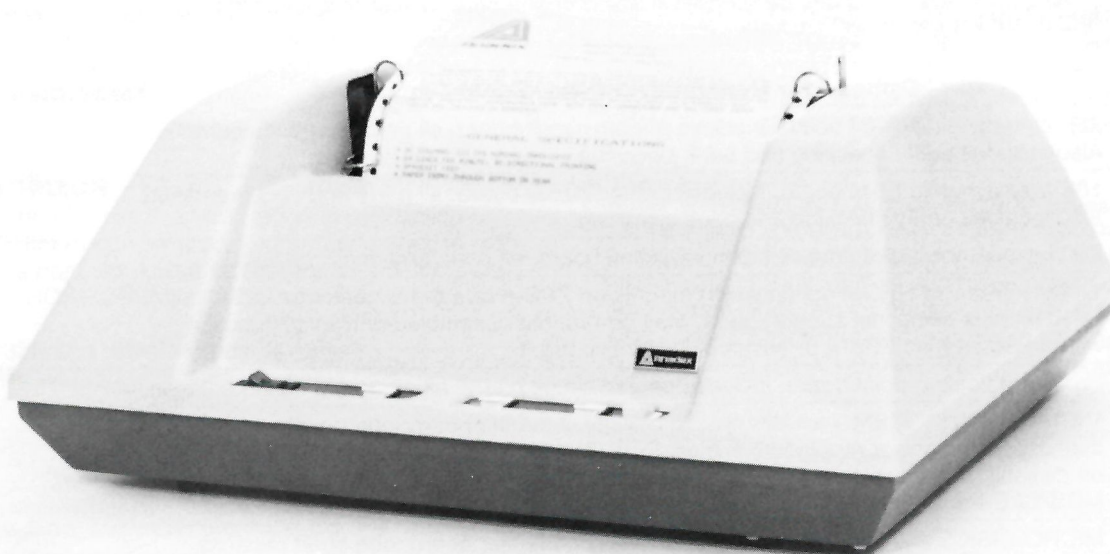
115V AC, 60 Hz, 120 watts
230V AC, 50 Hz, 120 watts (ANADEX-F)

Dimensions

18.5" x 15" x 7"

Anadex Matrix Printer

ANADEX
ANADEX-F (230V 50 Hz)
CABLE-PAR (Parallel interface cable)



Short Form Catalog and Price List

Before ordering any of the North Star microcomputer products, please read the following description carefully to determine ordering options and prices. Please note that these prices are subject to change without notification.

Horizon Computer Configurations		Assembled	Kit
HRZ-1-32K-D	The HRZ-1-32K-D includes chassis, motherboard with twelve S-100 connectors, two serial and one parallel input/output interfaces, cooling fan, power supply, Z80A processor board (ZPB-A), complete single drive double density MICRO-DISK SYSTEM (MDS), 32K RAM board with parity (RAM-32-A), DOS, Monitor, and BASIC on diskette and full documentation. Specify choice of wood or blue metal cover. For assembled systems, specify at time of order any additional RAM and/or FPB boards.		
HRZ-1-48K-D	Same as HRZ-1-32K-D except that one 16K RAM board is added.		
HRZ-1-64K-D	Same as HRZ-1-32K-D except that one 32K RAM board is added.*		
HRZ-2-32K-D	Same as HRZ-1-32K-D except that one drive is added.		
HRZ-2-48K-D	Same as HRZ-1-32K-D except that one 16K RAM board and one drive are added.		
HRZ-2-64K-D	Same as HRZ-1-32K-D except that one 32K RAM board and one drive are added.*		
HRZ-1-32K-Q	Same as HRZ-1-32K-D except that a quad capacity drive is supplied in place of a double density drive.		
HRZ-1-48K-Q	Same as HRZ-1-32K-Q except that one 16K RAM board is added.		
HRZ-1-64K-Q	Same as HRZ-1-32K-Q except that one 32K RAM board is added.*		
HRZ-2-32K-Q	Same as HRZ-2-32K-D except that quad capacity drives are supplied in place of double density drives.		
HRZ-2-48K-Q	Same as HRZ-2-32K-Q except that one 16K RAM board is added.		
HRZ-2-64K-Q	Same as HRZ-2-32K-Q except that one 32K RAM board is added.*		
*Note that in 64K HORIZON configurations 8K of address space is reserved for the bootstrap PROM and memory-mapped I/O.			
**Note that kit versions of HORIZONS with greater than 32K of RAM and/or one drive may be configured by ordering a standard HORIZON kit and additional drive and/or RAM boards as required.			

Horizon Options		Assembled	Kit
HRZ-DRV-D	The additional drive plus necessary parts to add a double density disk drive to a single drive HORIZON. Includes double density drive, cabling and connector.		
HRZ-DRV-Q	The additional drive plus necessary parts to add a quad capacity disk drive to a single drive HORIZON. Includes quad capacity drive, cabling and connector.		
HRZ-UPS	Universal power supply option. For use of HORIZON computer with 230 volts and/or 50 cycles as well as with American standard service.		
***Assembled additional drives are specified at time of original order by specifying one of the HRZ-2 products and/or ADC products.			

Options for Horizon and Other S-100 Computers		Assembled	Kit
RAM-32-A	32K byte dynamic RAM board. Includes printed circuit board, all parts and documentation. Also includes parity checking and bank switching.		
RAM-16-A	16K byte dynamic RAM board. Includes printed circuit board, all parts and documentation. Also includes parity checking and bank switching.		
ZPB-A	Z80A processor board. Includes printed circuit board, all parts and documentation.		
ZPB-PROM	1K byte erasable PROM option which mounts on ZPB-A board. Includes one 2708 EPROM plus additional support parts. May be ordered assembled only in conjunction with an assembled ZPB-A or assembled Horizon order.		
FPB-A	Hardware floating point board. Includes printed circuit board, all parts and documentation.		
MDS-A-D	MICRO-DISK SYSTEM. Includes double-density controller board, one double density mini disk drive, power regulation, cables, DOS, Monitor and extended BASIC software on diskette, and documentation. If ordered assembled, be sure to specify if ADC or MDS-CAB-PS options are desired.		
MDS-A-Q	MICRO-DISK SYSTEM. Includes double-density controller board, one quad capacity mini disk drive, power regulation, cables, DOS, Monitor and extended BASIC software on diskette, and documentation. If ordered assembled, be sure to specify if ADC or MDS-CAP-PS options are desired.		
MDS-DRV-D	Double density second, third or fourth drive for MDS-A system. Compatible with double density MDS systems as well as earlier single density systems. Includes power regulation, and connector for adding to existing cable.		

MDS-DRV-Q	Quad capacity second, third or fourth drive for MDS-A systems. Compatible with double density MDS systems. Includes power regulation and connector for adding to existing cable.
MDS-CAB-PS	Cabinet for a single disk drive for MDS-A or MDS-DRV. Includes power supply, blue metal cover and base.
ADC-0	Additional drive cabinet to house one or two mini disk drives. Includes a cable and power supply capable of driving both drives in this cabinet. Specify choice of wood or blue metal cover.
ADC-1-D	Same as ADC-0 with one double density disk drive included.
ADC-2-D	Same as ADC-0 with two double density disk drives included.
ADC-1-Q	Same as ADC-0 with one quad capacity disk drive included.
ADC-2-Q	Same as ADC-0 with two quad capacity disk drives included.
DISKETTE-20-D	Package of 20 blank diskettes compatible with single and double density HORIZON and MICRO-DISK SYSTEM. Includes diskettes and protective envelopes.
DISKETTE-20-Q	Package of 20 double-sided blank diskettes for use on quad capacity drives. Includes diskettes and protective envelopes.
****For kit ADC systems, order ADC-0-KIT and the appropriate MDS-DRV and/or MDS-A kits.	

Terminals — Display & Printer		Price
SOROC-120	24 line by 80 character CRT Display Terminal for use with HORIZON. Fully assembled.	
SOROC-120F	Same as SOROC-120 except for non U.S. standard service. Specify 50 or 60 Hz operation and 115 V or 230V operation at time of order. Fully assembled.	
ANADEx	118 character per second dot matrix serial line printer, for use with HORIZON. Included are RS-232, parallel and current loop interface. Fully assembled. Requires CABLE-232 to connect to serial I/O port or CABLE-PAR to connect to parallel I/O port.	
ANADEx-F	Same as Anadex except for non U.S. standard service (50 Hz 220V operation). Fully assembled.	
NEC-5530-2	55 character per second, 132 column, letter quality printer with form feed tractor, for use with HORIZON. Requires a CABLE-PAR to connect to the HORIZON. Includes NEC-THI-301 (Courier 72/Manifold) thimble and one NEC-CAR (Carbon Ribbon). Fully assembled.	
CABLE-232	Cable for connecting an RS-232 device to the HORIZON computer. Includes 5-foot ribbon cable terminated with two 25-pin male RS-232 connectors.	
CABLE-PAR	Cable for connecting either the Anadex or the NEC-5530-2 printer to the parallel interface of the HORIZON computer. Includes 8-foot cable terminated by one 15-pin and one 36-pin connector.	

Printer Support Products		Price
NEC-FAB-12	Black fabric ribbons for use with the NEC-5530-2 Spinwriter. Package of 12.	
NEC-CAR-12	Black carbon multi-strike ribbons for letterpress quality printing on the NEC-5530-2 Spinwriter. Package of 12.	
NEC-THI-301	NEC Spinwriter thimble with Courier 72 and Manifold character sets.	
ANA-P-RIB-12	Purple fabric ribbon with special inking for Anadex dot matrix printer. Package of 12.	
ANA-B-RIB-12	Black fabric ribbon with special inking for Anadex dot matrix printer. Package of 12.	

Documentation		Price
SOFT-DOC	Complete software documentation for North Star BASIC, DOS and Monitor.	
PAS-DOC	Complete Pascal software documentation.	
HRZ-DOC	Complete HORIZON documentation pack, including all hardware and software manuals.	
MDS-DOC	Complete double density MICRO-DISK SYSTEM documentation pack including hardware and software manuals.	
RAM-16-DOC	Complete RAM-16-A documentation.	
RAM-32-DOC	Complete RAM-32-A documentation.	
ZPB-DOC	Complete ZPB-A documentation.	
FPB-DOC	Complete FPB-A documentation.	

	Software	Price
PAS-PRI-DQ	North Star Pascal on diskette. Includes the complete software documentation manual (PAS-DOC). For double density or quad capacity. Licensed for use with HORIZON or MDS only.	
PAS-AUX-DQ	An auxiliary package to the PAS-PRI. Includes an 8080/Z80 assembler and other utilities. Requires PAS-PRI for operation. For double density or quad capacity. Licensed for use with HORIZON or MDS only.	
MDS-PERS-DQ	Standard versions of the DOS, Monitor and BASIC on diskette which have been I/O configured for commonly available S-100 microcomputer systems. Ask your dealer for a list of currently available versions. For double density or quad capacity. Licensed for use with HORIZON or MDS only.	
SOFT-SPEC-DQ	Special orders may be made for specifying non-standard precision (8, 10, 12 & 14 digits) for versions of BASIC, and for specifying non-standard origins for the disk controller PROM, DOS and BASIC. All such orders must be made on a "Special Order Form" which may be requested from your dealer. Special orders placed any other way will not be accepted. For double density or quad capacity. Licensed for use with HORIZON and MDS only.	
NSSE DISKS	Collection of programs in the public domain, submitted by North Star users to the North Star Software Exchange. For an up-to-date listing of available diskettes, refer to a recent North Star Newsletter.	

Pascal

(Continued from page 5)

Turnkey Operation

The system may be configured to "boot up" into a specific applications program. Thus, entire turnkey systems for business and industry may be written in Pascal. The end user needs only to interact with the applications system.

System Requirements

When used for program development, the North Star Pascal system requires at least 48K of RAM memory and at least one double-density or quad capacity drive. The processor may be a Z80, 8080, or 8085. In turnkey mode, the system can run with as little as 24K of memory, depending upon the size and data-storage requirements of the user's turnkey applications package. The user may configure the North Star Pascal system to expect system RAM beginning either at 0000H or 2000H.

Configurations

Pascal system software is available in two packages. The primary package (PAS-PRI) includes the North Star Pascal operating system, text editor, compiler, linker, P-machine simulator, bootstrap loader, and a utility package which permits the user to configure the system for different console terminals. Documentation includes the standard North Star Pascal System Reference Manual, and an Addendum which details the steps necessary to interface the system to any I/O configuration.

The Pascal auxiliary package (PAS-AUX) includes both Z80 and 8080 assemblers, and numerous utility programs. The assemblers may be used to prepare machine-code procedures and functions which may be linked into compiled Pascal programs.

Pascal

PAS-PRI-DQ	Primary Pascal system — double-density or quad-capacity
PAS-AUX-DQ	Auxiliary Pascal system — double-density or quad-capacity

Product Support

North Star supports its products and customers in several ways.

(1) Warranty. North Star offers a 90-day factory limited warranty on all products. The details of the warranty for each specific product is included in the documentation supplied with that product. For printer and terminal products, the warranty is honored at the original manufacturer's service facilities.

(2) Technical Assistance. Customer service engineers are available for consultation using our telephone "hot line" for problems which cannot be resolved by the local dealer. The hot line number for technical information is 415-549-0906 and is answered from 10 to 4 Pacific Standard Time. These lines are reserved for technical questions about North Star Hardware and Software.

(3) Customer Newsletter. North Star publishes a customer Newsletter and sends it to all customers who fill out the registration card included with each product. The Newsletter includes information on software available from independent vendors as well as North Star. Articles of technical interest about North Star products are included, as well as some general information articles.

(4) Software Updates. North Star is continually upgrading and improving its Software products. New releases of software (including single density) are made available to all customers who wish to take advantage of the improvement for a nominal charge. New Software releases are announced in the North Star Customer Newsletter and are available from your local dealer.

(5) Hardware Updates. North Star has a general policy of supporting its existing customers. When a new product obsoletes an earlier product, we try to make upgrading convenient. For a complete list of currently available upgrade products, contact your local dealer.



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