

North Star Computers, Inc. Product Catalog

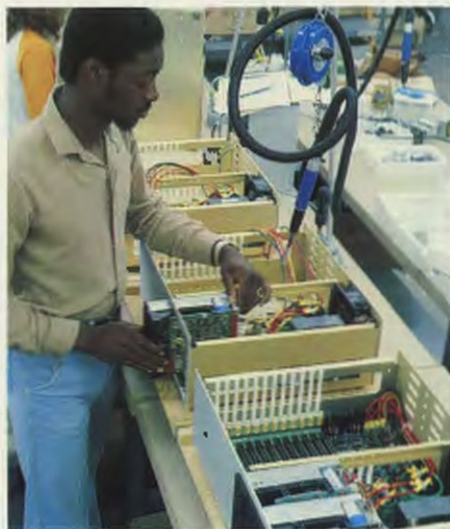
May 1980



Introduction

North Star Computers, Inc. is located in Berkeley, California, and was incorporated in June, 1976. The company offers the Horizon computer and other high-performance, high-quality microcomputer products, both hardware and software. The North Star reputation is based on the quality, performance, reliability and cost-effectiveness of its products. North Star intends to maintain its reputation for delivering well-designed microcomputer products by continuing to use only the best components available, assuring a high degree of quality control, and providing maximum service to its customers through carefully chosen, well-trained Authorized Dealers and Service Centers throughout the world.

In its relatively short corporate history, North Star has become one of the most successful enterprises in the young microcomputer industry. The company began as a small operation, manufacturing a single circuit board that would perform numerical calculations nearly 25 times faster than any other firmware or software then available. This Floating Point Board found an immediate market, and was followed by a new product which revolutionized the personal computer industry, and assured North Star's future success. This second product, the Micro-Disk System, provided an economical disk storage system that was fully integrated with a complete operating system and BASIC programming language software.



In 1978, North Star introduced the Horizon® computer. The Horizon is a high-performance microcomputer system with integrated floppy disk memory, and includes North Star BASIC and Disk Operating System (DOS) on diskette.



The Horizon was designed for a wide range of applications, and quickly became one of the most popular units in the personal computing marketplace. As the market for small computers expanded, the Horizon was put to use in ever-increasing ways: in business offices, schools and universities, research laboratories, and manufacturing plants. North Star has expanded its product line in several ways to meet our customers' growing needs. We now offer a Hard Disk System which allows users to store large amounts of information, and we provide several application software programs for a variety of business needs. These include a word processor, information management system, general ledger, accounts receivable and accounts payable programs. Other professional and business programs are being tested and evaluated to fill our customers' future needs.

North Star has enjoyed rapid growth since its beginnings. We have moved three times in as many years to accommodate increased production demand and have grown from two employees to well over a hundred. With the latest move, North Star has tripled facilities to over 50,000 square feet of manufacturing and administrative space.

As North Star grows, our commitment to technical innovation and services to our dealers and customers will grow with us.



Horizon® is a registered trademark of North Star Computers, Inc.

Z80A® is a registered trademark of ZILOG Corporation.

CP/M® is a registered trademark of Digital Research.

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Product Support

In keeping with our high standards of quality, reliability and service, North Star supports our products and customers in several ways:

1. AUTHORIZED DEALERS. North Star is represented throughout the world by its Authorized Dealers. Our dealers are carefully selected to provide our customers with high-quality products, service and support. We provide our dealers with hands-on training on all our products, both hardware and software, so they can effectively service and support the customer. Most dealers can provide you with in-warranty and extended service for both hardware and software.

2. TECHNICAL HOTLINE. North Star provides a special Technical Hotline for customer problems that dealers cannot immediately solve. Customer service engineers are available on these lines to answer technical questions about North Star Hardware and Software. The Technical Hotline number is (415) 524-9202.

3. CUSTOMER NEWSLETTER. North Star publishes a quarterly customer newsletter and sends it to all customers who fill out the subscription form included with each product.

The North Star Newsletter includes technical articles about North Star products, general information articles, listings of software available for North Star equipment, and information on North Star Users Groups.

4. SOFTWARE UPDATES. North Star is continually upgrading and improving its software products. New releases of software are made available for a nominal charge to all customers who wish to take advantage of the improvements. New software releases are announced in the North Star Newsletter, and are available through local Authorized Dealers.

5. HARDWARE UPDATES. North Star has a general policy of supporting its existing customers. When a new product makes an earlier product obsolete, we try to make upgrading convenient. Authorized Dealers have a complete list of currently available upgrade products.

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

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Systems

North Star Horizon System

The North Star Horizon Computer System is a complete, high-performance, easy-to-use microcomputer system designed to fit a wide variety of business, educational, scientific and industrial applications. The basic system includes:

HORIZON. The North Star Horizon computer is the heart of the system. The Horizon is a high-quality microcomputer with two mini disk drives and 64K RAM. Its Z80® microprocessor provides the processing power. Operating a Horizon is simple; there is only an on/off switch and a start button. Programs and data are stored on floppy diskettes.

SOFTWARE. North Star offers the widest range of application and system software of any microcomputer manufacturer. Our own Application Software and System Software are regarded as the finest available. Those whose software needs are not met by North Star's own software will find other Horizon-compatible software available through North Star dealers.

TERMINAL. The Hazeltine CRT Display Terminal is a cost-effective, full-function terminal. Standard features include a 24 line by 80 character display, addressable cursor, and a high-quality keyboard with cursor controls and numeric pad. This terminal has many features which make it easy to use with all the North Star Application Software.

PRINTER. The NEC Spinwriter is a letter-quality printer for all your printing needs. It is especially designed for applications where typewriter quality printing is required. The Spinwriter will print up to 55 characters per second.

Additional information on each component in this system is provided in separate sections of this Catalog. Complete documentation and instruction manuals are provided with each component. You can learn as much, or as little, about the technical aspects of your system as you like. Your Authorized North Star Dealer can help you decide which available options most suit your individual needs, and can provide you with full service and support.



North Star Horizon Hard Disk System

The North Star Horizon Hard Disk System gives you greatly increased data storage capacity and data accessing speed. This system is designed for those customers who need to handle, store and retrieve larger amounts of information and data than can be maintained on floppy disk alone. This powerful, highly cost-effective system includes:

HORIZON. The North Star Horizon computer is again the heart of this system. With the addition of the hard disk, the Horizon's capabilities can be expanded to meet your growing system requirements. The Horizon's powerful controller takes full advantage of the high-performance characteristics of the hard disk drive.

SOFTWARE. Whether you use the Horizon Hard Disk System to develop your own software, or purchase a system integrated with application software, you are assured of North Star's reputation and our commitment to software excellence. More system and application software is available for North Star Systems than for any other microcomputer system.

HARD DISK. The North Star Hard Disk allows you to store up to 18 million bytes of formatted data on each disk. As your needs expand, you can add additional hard disks for up to 72 million bytes capacity. The North Star Hard Disk has a unique Incremental Backup and Recovery System which makes it convenient and inexpensive to save and restore the updated information on the disk. This system uses the Horizon's 5¼ inch floppy disk drives. In a typical installation, you backup only information which has changed during a given session, and the backup procedure will take only a few minutes.

TERMINAL. The SOROC IQ 120 is an economical CRT terminal designed for use in many applications. Standard features include a 24 line by 80 character display, addressable cursor, and keyboard with cursor controls and numeric pad.

PRINTER. The Anadex DP-8000 is an economical dot matrix printer. The Anadex prints 112 characters per second, and is capable of printing 84 lines per minute in a bi-directional mode.

Additional information on each component of this system can be found in separate sections of this Catalog. Complete, professionally prepared documentation is provided with each component. Your Authorized North Star Dealer can help you tailor this system to meet your current and future needs.



North Star Horizon

If you require an attractively packaged, disk-based computer system with high performance, reliability, and low cost, then the Horizon is for you.

The Horizon's versatility enables it to adapt to an almost unlimited number of uses. Over 15,000 Horizons are in operation throughout the world in business offices, schools and universities, research laboratories, and industrial plants. The Horizon's uses range from word processing to highly complex industrial monitoring.

Because North Star is committed to continually expanding and upgrading our entire product line, you will find the Horizon always ready to meet your present and future computer needs.

The Horizon computer is a complete, high-performance microcomputer system with integrated floppy disk memory. To begin executing a turn-key application program, or to begin programming in

North Star BASIC, merely plug in a CRT display 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.

Special features of the Horizon include:

- The North Star Z80A Processor Board with optional PROM.
- The North Star RAM memory boards, which let the Z80A execute at full speed, and include parity checking.
- The North Star Disk Controller Board, which can control up to four mini disk drives.
- Two double density or quad capacity mini disk drives. The double density system can store up to 180K bytes of information per drive; quad capacity systems can store up to 360K bytes per drive.
- The motherboard, which has slots for up to twelve S-100 circuit boards, includes the I/O circuitry and disk drive power regulation circuitry, as well as a real time clock.

- Two serial and one parallel input/output interfaces for connecting printers, terminals, modems, or hard disks.

- A power supply more than adequate to power a full complement of 12 S-100 boards. The power supply is available for both domestic and international power requirements.

- And North Star Software—BASIC, Disk Operating System (DOS), and Monitor on diskette. North Star BASIC is regarded as the best BASIC available for microcomputers. A full description of BASIC and DOS appears in a separate section of this Catalog.

- A professionally prepared manual covering operating procedures, maintenance, theory of operation, and troubleshooting for both the hardware and the software.



Expanding Your Horizon

The Horizon is designed for use in a wide range of application environments. It can be expanded and upgraded in many ways, with products from North Star as well as from other S-100 product manufacturers. Your Authorized Dealer can provide you with these additional North Star products:

- Additional RAM boards
- Hardware Floating Point Board
- Hard Disk System
- Additional mini disk drives
- 1K PROM option
- Optional metal cabinet

Application Software

The amount of application software written to operate with North Star BASIC and DOS is extensive. North Star offers its own integrated application software suitable for a wide variety of business uses. Please see the section in this Catalog on Application Software. Many independent vendors and North Star users groups also offer a wide range of application programs.

Specifications

Power Requirements:

- 115 volts, 250 watts, 60 Hz (U.S. Standard)
- 230 volts, 250 watts, 50 Hz (International)

Environmental Limits:

- Temperature: Operating 40°F to 100°F (5°C to 40°C)
- Humidity: 20% to 80%, no condensation

Dimensions:

20" x 7.25" x 17.50"

Additional Drive Cabinet

North Star also offers an Additional Drive Cabinet (ADC) which can be used to add a third and fourth drive to your Horizon computer. The ADC is available in either a wood or metal housing to match the Horizon cabinet. The built-in power supply of the ADC is capable of powering one or two drives. As with the Horizon, either double density or quad capacity drives are available. A cable for connecting the ADC to the Horizon is included.

Specifications

Power:

Universal power supply, which may be set for either 115 or 230 volts, and 50 or 60 Hz.

Dimensions:

9" x 8" x 13.5"



North Star 18Mb Hard Disk Drive

The North Star Hard Disk Drive allows you to greatly increase the data storage capacity and processing speed of your Horizon computer system. The North Star Hard Disk is a Winchester-technology drive that holds up to 18 million bytes of formatted data. To meet additional data storage needs, you can daisy-chain up to four hard disk drives for a total of 72 million bytes of formatted data. Features of the North Star Hard Disk Drive include:

- A unique Incremental Backup and Recovery System, which makes it easy and inexpensive to backup all information stored on the hard disk. This Backup and Recovery System uses the Horizon's mini disk drives, and allows you to save data on diskette only if you have changed the data since the last backup. In a typical installation, backup will take only a few minutes a day.
- A 14-inch, Century Data Marksman, Winchester-technology drive, enclosed in a beige metal cabinet. Century Data is a recognized leader in the manufacture of hard disk drives.
- System Software: An enhanced version of the popular North Star BASIC that will work with diskette files

as well as hard disk files; the Hard Disk Operating System (HDOS), which includes a unique File Manager responsible for maintaining the data structures necessary to support data storage and retrieval. Information on this software is included in the section on System Software.

- Application Software: Existing software is upwards compatible for use with the hard disk. The North Star Application Software is also available for the Hard Disk System. With the dramatic increase in on-line storage and speed, there will be a continually-expanding library of readily available application software.
- Documentation: A thorough instruction manual is included with each Hard Disk Drive. This manual covers operating procedures, maintenance, theory of operation, installation, and troubleshooting for both the hardware and software.
- Drive Operation:
 - Single track positioning time: 20 milliseconds
 - Average positioning time: 60 milliseconds
 - Maximum positioning time: 130 milliseconds
 - Rotational speed: 2400 rpm

Average latency time:
12.5 milliseconds
Recording density:
7545 bytes per inch
Track density:
182 tracks per inch
Data transfer rate:
960 Kilobytes per second
Recording method:
MFM
Power-on start time:
3 minutes (worst case)

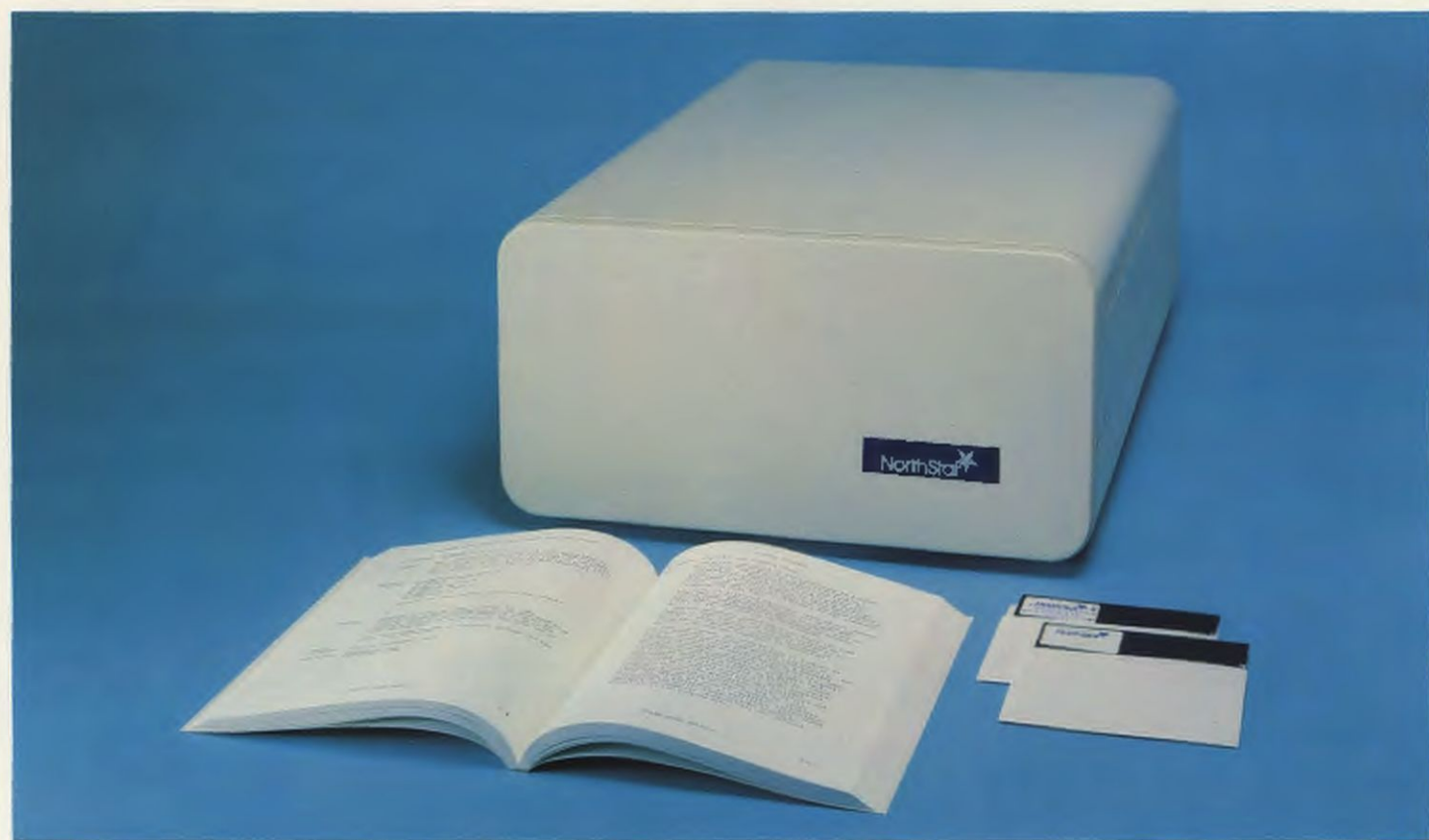
Specifications

Power Requirements:
115 volts, 60 Hz, 3.5 amps running,
12.5 amps starting (U.S. Standard)
230 volts, 50 Hz, 2 amps running,
6 amps starting (International)

Environmental Limits:
Temperature: 50°F to 95°F, with
max. gradient of 18°F/hr.
(10°C to 35°C)
Altitude: To 6000 feet
Humidity: 10% to 90%,
no condensation

Dimensions:
9" x 20" x 26"
Beige metal cabinet with beige
plastic bezel

Weight:
80 lbs.



Terminals

Hazeltine 1420

The Hazeltine 1420 Video Display Terminal is a cost-effective terminal with all the features you need to support a wide variety of applications. It is designed with a typewriter-style keyboard and a crisp display to ease adaptability and reduce operator fatigue. This terminal has special features which make it exceptionally easy to use with the North Star Application Software. Features of this terminal include:

- 24 line by 80 character non-glare screen.
- 95 displayable characters, including lower case.
- 15-Key numeric pad.
- 12 Operator functions keys.
- User-controlled video presentation (high/low intensity, blink, or non-display).
- Cursor addressing and sensing.
- Self test.
- All 128 ASCII Codes.

Specifications

Power Requirements:

- 115 volts, 60 Hz (U.S. Standard)
- 220/240 volts, 50/60 Hz (International)

Environmental Limits:

- Temperature: 50°F to 100°F (10°C to 40°C)
- Humidity: Up to 95%, no condensation

Dimensions:

- 13.5" x 15.5" x 20.5"

The Hazeltine 1420 is made available through North Star by a special agreement with Hazeltine Corporation. The two-year limited warranty is honored at Hazeltine Service Centers.



SOROC IQ 120

The SOROC IQ 120 is an economical, full-function CRT terminal suitable for use in many applications. The SOROC IQ 120 has a standard RS-232 interface compatible with the HORIZON serial port, and includes an auxiliary RS-232 port. Features of this terminal include:

- 24 line by 80 character screen.
- Upper and lower case ASCII character set.
- Addressable cursor.
- Keyboard with cursor controls and numeric pad.

Specifications

Power Requirements:

- 115 volts, 60 Hz (U.S. Standard)
- 230 volts, 50 Hz (International)

Environmental Limits:

- Temperature: 40°F to 100°F (5°C to 40°C)
- Humidity: Up to 90%, no condensation

Dimensions:

- 18" x 12.5" x 21"

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



Printers

NEC Spinwriter

The NEC Spinwriter 5510-2 is a high-quality printer designed for applications where typewriter-quality printing is desired. The Spinwriter will print up to 55 characters per second. Its unique printing thimble will last through more than 30 million impressions, and enables the Spinwriter to print in two different type styles without having to change the thimble.

Features of the Spinwriter include:

- High resolution plotting/graphing.
- Low operating noise level.
- Quick-change ribbon cartridge.
- Quick-change print thimbles.
- Prints original and up to seven copies.
- Selectable 10- or 12-pitch characters.
- Line widths up to 163 characters.

Specifications:

Power Requirements:

- 115 volts, 50/60 Hz (U.S. Standard)
- 230 volts, 50/60 Hz (International)

Environmental Limits:

- Temperature: 40°F to 100°F (5°C to 40°C)
- Humidity: 10% to 85%, no condensation
- Altitude: To 10,000 feet

Dimensions:

- 24.8" x 16.34" x 8.68"

The NEC warranty is honored at the NEC factory in Woburn, MA, or by contact with any NEC field office.

Anadex

The Anadex DP-8000 Alphanumeric Line Printer is a cost-effective, dot matrix impact printer. With a printing speed of 112 characters per second, the Anadex is capable of 84 lines per minute while printing in a bi-directional mode. The printer can be connected to the HORIZON using the parallel output port, or one of the serial I/O ports. Features of this printer include:

- Sprocket feed.
- 9 x 7 character font.
- 1000 characters of FIFO storage.
- Double width printing.
- Print head life in excess of 100 million characters.

Specifications

Power Requirements:

- 115 volts, 60 Hz (U.S. Standard)
- 230 volts, 50 Hz (International)

Environmental Limits:

- Temperature: 40°F to 110°F (5°C to 45°C)
- Humidity: Up to 85%, no condensation

Dimensions:

- 18.5" x 15" x 7"

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



Application Software

North Star offers an integrated line of application software programs to satisfy a wide variety of your business needs. This software is backed by the same high standards as North Star hardware products, so you are assured of its reliability, high quality, hardware compatibility, and cost-effectiveness. In choosing your hardware and software from a single, reliable source, you are also assuring that your computer system can be supported as a complete system.

All our software programs are designed for ease of use. They are written with the first-time user in mind, but they do not sacrifice the powerful features and flexibility of sophisticated programs. All the programs feature a uniformity of language and instructional guidance. Each program guides you through its operations, and tells you in easy to understand language when you have made a mistake, and how to correct it. Once you learn one of our programs, you will find the others even easier to use.

The North Star Application Software Packages are integrated. Each can stand alone, or be used in combination with the NorthWord word processor to perform an even greater variety of tasks. This eliminates the need to buy different programs from different vendors, and eliminates having to learn a whole new program for each application. These integrated programs allow you a degree of flexibility impossible to find with other application software.

Our Application Software Packages have been designed in consultation with experts in the various application fields to assure that each program completely meets your needs—in word processing, accounting, and information management. Each program has been extensively tested,

both at North Star, and at actual business sites. Each program comes with a thorough, easy to understand User's Manual which guides you step-by-step through the program's various functions.

All North Star Application Software Packages require 56K of RAM, and two double density or quad capacity drives. Versions of this software are also available for use on the North Star Hard Disk System.

The following pages give descriptions of the North Star Application Software Packages now available. Authorized North Star Dealers can provide you with more detailed information, and complete product demonstrations.



NorthWord

NorthWord is a complete word processing system designed for a wide variety of office applications. It incorporates the most sought-after word processing features: easy editing, on-screen text formatting, simultaneous document printing, and much more.

NorthWord increases office efficiency by eliminating document re-typing time and cost. You enter your text once, then make only the necessary changes or corrections. NorthWord allows you to completely control the format of your document by specifying margins, justification, spacing, page numbering, titles, and underlining. Because it is screen-oriented, your document will appear on screen just as it will be printed.

NorthWord's Activities Menu and special Keyboard Overlay eliminate the need to memorize many control functions; all the information you need to operate the program is always right in front of you.

NorthWord is also the central building block for all the North Star Application Software Packages. You can combine NorthWord with MailManager to produce large volumes of personalized correspondence. With NorthWord and InfoManager, you can also create letters or easily fill in often-used forms. NorthWord and GeneralLedger work together to produce customized financial statements and reports.

Additional features allow you to:

- Identify each document with any name or number
- Use automatic carriage return, word wraparound, and justification
- Automatically search and selectively replace words, phrases, or format statements
- Copy, move, or delete in blocks of up to 20 lines
- Merge standard paragraphs into any document

MailManager

MailManager is a flexible mail list management system which enables you to compile and maintain complete, organized mailing lists. You can keep accurate, confidential, and up-to-the-minute lists of your organization's clients, patients, subscribers, members or dealers.

You can easily enter your mailing lists through MailManager. It allows you to make changes, additions and deletions in minutes, and always keeps entries in the correct order. You can print your list on labels, individual envelopes, or in a compact summary form.

MailManager is more than a mail list system. It allows you to specify and add other information items in each individual record. You can list phone numbers, type of account, expiration dates, account status — up to 10 items which you specify to meet your needs.

MailManager can also be used with NorthWord to produce a variety of standardized letter formats — so you can do large numbers of letters that don't look like "form letters."

Additional features allow you to:

- Create several mailing lists with different characteristics for different purposes
- Locate a customer record by either name or zip code within seconds
- Print a selected group of records or a statistical sample drawn from the list
- Print one or several mailing labels across a page or on label forms
- Automatically print labels or envelopes in zip code order to take advantage of bulk postage rates

InfoManager

InfoManager can provide your business with complete and instantly accessible information records. InfoManager is list-oriented, and allows you to specify up to 50 items of information for each record in your list. You can keep highly detailed information on clients, products, patients, sales representatives, or business organizations.

InfoManager also has the ability to select and sort information before printing. You can divide your list into sub-lists to send letters to certain groups, or to print special reports on one or more sub-groups in the list.

InfoManager can also be used as a calendar management system. You can enter information about matters or projects you have to attend to on certain dates. If more than one person is using the calendar management system, you can even sort and list the projects by individual.

InfoManager's flexibility allows you to put it to use in many ways. You can adapt it to suit your individual applications, and find new uses for it as your needs grow.

Additional features allow you to:

- Create several information files with different characteristics for different purposes
- Locate any record in your information file within seconds by using either of two key items
- Specify up to five fields in a record for sorting purposes
- Do several printing runs after your information has been selected and sorted
- Delete a range of entries or group of entries that share specific characteristics

GeneralLedger

The North Star GeneralLedger and Financial Reporting Program allows you to maintain general ledger accounts based on such inputs as checks, bank deposits and journal entries. You can use the information in the general ledger to produce customized financial statements and reports.

The North Star GeneralLedger allows you to enter up to 900 tailored general ledger accounts with flexible account code definitions. It accepts entry of accounting transactions from virtually any source you wish, and lets you add new general ledger accounts or modify existing ones at any time.

Plus, GeneralLedger can automatically transfer accounting entries from the North Star AccountsReceivable and AccountsPayable Programs. You can post and list a detailed general ledger at any time, purge transactions from the system, provide a variety of printouts and reports, and automatically close income and expense accounts to retained earnings at the end of the year.

With the financial reporting feature, you can define dollar precision (rounding off to nearest dollar, etc.), use multiple columns and define column contents, define sub- and grand-totaling, and carry sub- or grand-totals forward to other statements.

Additional features allow you to:

- Store and report the net balance of transactions for every account for each of 24 months
- Enter up to 50 separate transaction batches at one time
- Let the program do extensive error detection and validation of data, with easy to understand reporting of errors found
- Use a special provision to post transactions to the previous fiscal year after it has been closed

AccountsReceivable

With the North Star AccountsReceivable Program, you can establish up to 1500 customer accounts with flexible account maintenance. AccountsReceivable allows you to define your customer accounts as balance forward or open item. It answers inquiries about account details using your video screen, and automatically charges interest on accounts and aging categories you specify.

AccountsReceivable also lets you retain credit limits, year-to-date sales, last year's sales, date and amount of last invoice and payment, and number of outstanding transactions for each customer account. You can automatically transfer entries to the North Star GeneralLedger Program.

You can print a variety of reports with AccountsReceivable: summaries of detailed aged trial balances with completely flexible aging calculations; summary reports about one or more customers; and, journals of interest charges.

Additional features allow you to:

- Detect errors with mandatory edit listings and complete audit control
- Maintain full retention of transactions for monthly statement printing
- Define statement format, including information placement, aging reminders, and over-credit-limit reminders
- Print reminders or advertising letters to customers, as well as customer mailing labels

AccountsPayable

The North Star AccountsPayable Program allows you to establish up to 1500 vendor accounts and maintain them on an open item basis. It has easy-to-use addition, modification, and deletion of vendor accounts, and a flexible alphabetic or numeric vendor account code format.

AccountsPayable has many powerful features. It accepts payment-due date data and/or maximum amounts to be paid. It also accepts discount terms with the invoice, or standard discount terms can be stored in each vendor's account. It can let you request a pre-payment register to ensure automatic payments are proper, or defer payments to a specified date or make partial payments by invoice. You can automatically transfer accounting distributions from AccountsPayable to the North Star GeneralLedger Program.

The printing controls give you flexible printing specifications for checks and remittance notices. You can automatically print checks and remittance notices for amounts due for payment. Checks are automatically numbered, and several invoices can be printed on each check. You can also print detailed aged trial balances, lists of past due invoices, and vendor lists either alphabetically or by account code.

Additional features allow you to:

- Detect errors with mandatory edit listings and complete audit control
- Easily handle addition, modification and deletion of vendor accounts
- Print lists of invoices which are past payment-due date
- Retain for each vendor the invoices outstanding, total purchases and discounts taken during the current and previous year, date and amount of last payment, number of outstanding transactions, and outstanding balance

North Star BASIC, the Disk Operating System (DOS), and Monitor programs are included on diskette with every Horizon computer or Micro-Disk System. They are not available as separate products. General descriptions of these programs follow. These programs are extensively documented in the North Star System Software Manual, which is also included with the Horizon and Micro-Disk System. The North Star System Software Manual is available separately through Authorized North Star Dealers.

North Star BASIC

North Star BASIC is a popular programming language that is an integral part of North Star products, although there are many uses for these products which do not involve BASIC.

North Star BASIC, now in widespread use, was implemented for a broad range of applications. The formatted output capability is similar to the FORTRAN method, allowing values to be printed in fixed or variable length fields. Dollar signs, commas and decimal points may automatically be 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. BASIC can also access individual bytes in a disk file if 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 means that no invisible conversion errors occur when the values used are within the precision of BASIC. The standard North Star BASIC has 8 digits of precision. You may order special versions of BASIC with 10, 12, or 14 digits of precision through Authorized North Star Dealers.

North Star BASIC occupies about 12K of RAM, excluding the space for the user's BASIC program and data.

Versions of BASIC which use the North Star Hardware Floating Point Board (FPB) execute faster and require about 700 bytes less memory.

North Star BASIC includes the following features:

- Strings and substrings (size limited only by available RAM)
- String operators (concatenation and relational)
- Multi-dimensional 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	INPUT	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		

Disk Operating System

The North Star Disk Operating System (DOS) provides access to the information stored on diskettes either through COMMANDS typed from the computer terminal, or through SUBROUTINES called by software. The operations provided implement a named file system; all files on diskette can be referenced by the use of symbolic names of up to 8 characters.

The DOS has been designed to allow convenient modification for interfacing to any computer I/O terminal configuration. DOS diskettes shipped with the Horizon computer will be initially set up to communicate with the Horizon serial and parallel ports.

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

The North Star DOS occupies 3.25K of RAM. Versions of the DOS with non-standard origins are available as special orders.

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

Monitor

The North Star Monitor is a program which provides you with maintenance and debugging functions. The Monitor is intended to be used in conjunction with the North Star Disk Operating System.

Commands to the Monitor are entered via the terminal using a format consistent with the DOS commands. The Monitor's command editing facilities are compatible with the editing features of North Star BASIC.

The Monitor occupies 2.5K of RAM. Copies of the Monitor are supplied assembled at different origins.

The North Star Monitor commands include:

- 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

Hard Disk System Software

An enhanced version of North Star BASIC, a Hard Disk Operating System, and Backup and Recovery System are included on diskettes with the North Star Hard Disk. These programs offer all the features of the floppy-disk-based North Star System Software, with the addition of many new features designed for the special capabilities of the hard disk. These programs are extensively documented in the Hard Disk System User's Manual, which is also available separately through Authorized North Star Dealers.

Hard Disk BASIC

The popular North Star BASIC has been enhanced to work with hard disk files as well as diskette files. This means that nearly all existing North Star BASIC programs will work under North Star Hard Disk BASIC with little or no changes necessary.

An additional advantage of Hard Disk BASIC is that it allows you to expand file sizes under program control, with the maximum file size being 16Mb.

Hard Disk Operating System

The Hard Disk Operating System (HDOS) combines the functions of the floppy-disk-based North Star DOS and Monitor. The operations provided implement a named file system; all files can be referenced by the use of symbolic names of up to 14 characters.

HDOS includes low level read/write routines to drive the hard disk, utilities which provide access to floppy disk files in a manner compatible with North Star DOS, a File Manager, and a Command Processor.

The File Manager is used to maintain the data structures necessary to support storage and retrieval on the hard disk drive. File sizes on the hard disk can be changed dynamically; a file's size can be changed any time the file is open and disk space is available. File sizes can range up to 16Mb, and each hard disk may contain up to 2000 files and/or accounts. The File Manager also supports diskette files, so you can still use existing programs using diskette files.

The Command Processor is loaded from the disk when needed, and will ordinarily be overwritten when the user GOs into BASIC, or into any other language or system. The Command Processor takes commands from the console terminal and executes them in a directly interactive manner. The vocabulary of the Command Processor also includes all of the commands of the North Star DOS, including those that are supplied by North Star as separate utilities in the floppy disk system. Many new commands have also been added to take advantage of the increase in power and flexibility of the Hard Disk System.

Backup and Recovery System

North Star has provided a unique Backup and Recovery System that allows the user a convenient and inexpensive way of saving and restoring the information kept on the hard disk. North Star's unique Incremental Backup System uses the Horizon's 5¼ inch floppy disk drives, and requires no additional hardware. Information is saved on diskette only if it has been changed since the previous backup. Options are given for individual file or complete backup. In a typical installation, backup will take only a few minutes per day.

The special advantage of the recovery system is that it allows a great deal of flexibility in recovering information on the hard disk. Single files, or groups of files can be recovered to their condition at any given date.

This unique feature gives the user the readily available alternate storage media that insures the integrity of the complete computer system.

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.

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 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 North Star Pascal 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.

Features of North Star Pascal include block control structure, long variable names, formatted numeric output, local variables in procedures and functions, and provisions for pre-compiled library routines. The language also 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.

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. You may configure the system to "boot up" into a specific application program. The end-user needs only to interact with the application system. In turnkey mode, the system can run with as little as 24K of memory, depending upon the size and data storage requirements of the turnkey application package.

Other Software

A large number of other useful software packages are available through the North Star Software Exchange (NSSE) Program, and from independent vendors.

The NSSE library consists of user-developed, public domain software that has been transferred onto diskette. NSSE diskettes are available through Authorized North Star Dealers for a nominal charge. NSSE diskettes include utility programs, math and matrix routines, utility packages, a PILOT system assembler source code, many computer games, and Pascal programs. NSSE listings appear in issues of the North Star Newsletter.

Independent software vendors supply hundreds of software packages which can run on Horizon systems. These include complete packages for nearly every small business computer application. The CP/M® operating system is available for use on the Horizon, and opens up a wide range of CP/M compatible systems and application software to Horizon users. Also available are time-sharing systems, several assembly language development systems, and high-level languages such as FORTRAN and COBOL. Lists of vendors marketing Horizon-compatible software regularly appear in the North Star Newsletter.

North Star Hardware Floating Point Board

The North Star Hardware Floating Point Board (FPB) is a single S-100 bus circuit board which allows you to perform floating point add, subtract, multiply and divide with up to 14 digits of precision. The North Star FPB enables you to perform these calculations nearly 25 times faster than with any other Z80A software or firmware available. The FPB can compute a typical 10 digit multiplication in 111 microseconds; the best Z80A software takes 2.7 milliseconds to perform the same operation. Number representation for arguments and results is binary-coded decimal (BCD).

The North Star 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. The FPB then 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 the computer permits values to be passed at the rate of 3 microseconds per byte using a Z80A.

A special version of North Star BASIC which uses the FPB is provided with the Horizon computer and with Micro-Disk Systems. When you are performing extensive mathematical calculations, you can speed up North Star BASIC by as much as a factor of 10 by using the FPB. A complete reference and instruction manual is included.

Specifications

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

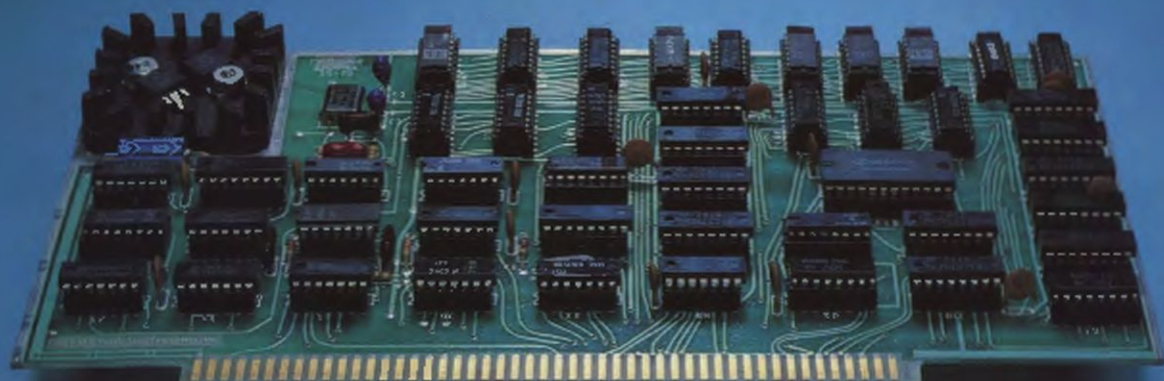
Byte 2: bits 3-0=least significant digit of value in BCD coding

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.



North Star Micro-Disk System

The North Star Micro-Disk System is a complete floppy disk system for Z80 or 8080 S-100 bus computer systems. All you need for a disk-oriented computer system is the computer, memory, an I/O terminal, and the North Star Micro-Disk System. You can begin executing our North Star BASIC within seconds after power-on.

The Micro-Disk System is available in several configurations, and consists of a controller board, up to four double density or quad capacity disk drives, a wood or metal cabinet with built-in power supply, and North Star BASIC, DOS, and Monitor on diskette. BASIC, DOS, and Monitor are described in the section on System Software.

The controller board is a single printed circuit board that interfaces the disk drives to the computer system. It plugs directly into the S-100 bus. Commands and data are transferred directly under software control by the technique of memory-mapped I/O (no I/O ports or DMA are used).

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.

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 one 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 through Authorized North Star Dealers on special order.

Each 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. This means that 16K bytes of data can be transferred in less than one second, and that a single double density diskette can hold over 100 typical BASIC programs.

The quad capacity drives are compatible with the double density drives, and operate with the same controller. Quad capacity drives use both sides of the diskette. The diskette is formatted as 70 tracks with 10 sectors per track, for a capacity of 360K bytes per diskette. The DOS determines the side selection automatically. Track-to-track access has been enhanced to 5ms.

Your Micro-Disk System can have a total storage capacity of 1.4Mb with four quad capacity drives.

Specifications

Power:

- Controller: .7 amp @ +8 volts
- Drive: .5 amp (typ) @ +5 volts,
.7 amp (max)
- .9 amp (motor on)
@ +12 volts, 1.6 amps



North Star RAM Boards

No other memory board can surpass the features of the North Star S-100 bus RAM boards. North Star offers a 16K and a 32K RAM board, both designed using prime 200ns dynamic RAM chips. This enables the processor to compute at full speed, even when it is a 4MHz Z80A. Special parity checking circuitry ensures a high degree of reliability.

North Star RAM boards include the following features:

- Parity checking circuitry.
- Dynamic memory refresh done by on-board electronics.
- Addressability selected with an on-board DIP switch.
- Ability to perform bank switching to expand the total amount of RAM in a system beyond 64K, and to facilitate time-sharing applications.

Specifications

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

North Star Z80A Processor Board

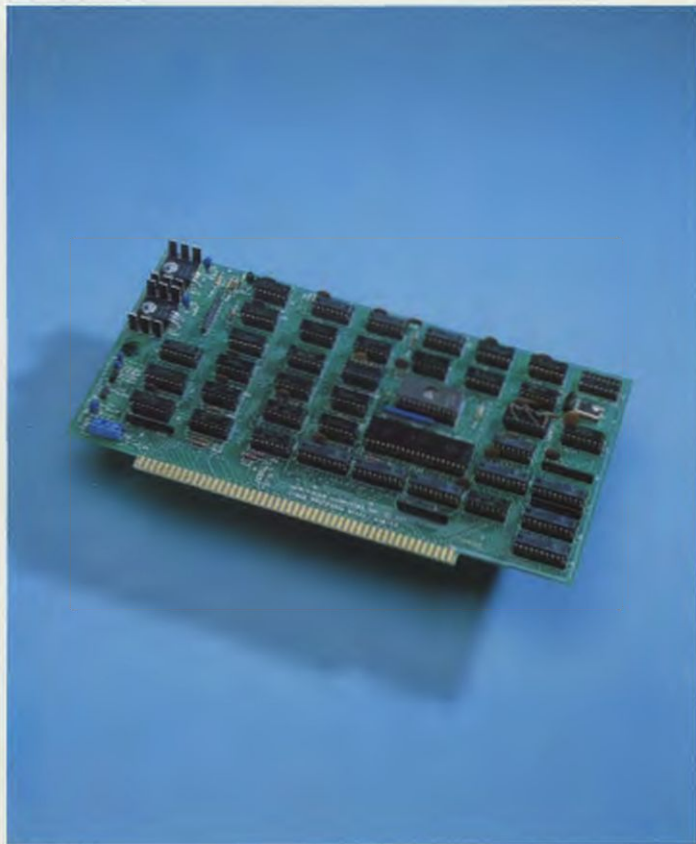
The North Star Z80A Processor Board (ZPB) brings the 4MHz Z80A microprocessor to the S-100 bus, and can also be utilized for many single-board computer applications. The Z80A runs compatible programs at least twice as fast as an 8080, and you can obtain even greater speeds if you use the extended Z80A instruction set.

Additional features of the North Star ZPB include:

- An auto-jump feature which permits a branch to any 16-bit address at power-on and reset.
- An optional ZPB-PROM, allowing space to add 1K bytes of EPROM (2708 type), making it possible to permanently store programs on the board.
- The ability to implement an 8-level vectored interrupt capability.
- A jumper option for adding a wait state to all memory used in the computer.

Specifications

Power: .7 amp @ +8 volts, unregulated.





NorthStar

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