

# ADVANTAGE



**Integrated Desk Top Computer with 12 inch Bit-Mapped Graphics or Character Display, 64Kb RAM, 4 MHz Z80A<sup>®</sup>, Two Quad Capacity Floppy Disk Drives, Selectric<sup>®</sup> Style 87 Key Keyboard, Business Graphics Software**

The North Star ADVANTAGE™ is an interactive integrated graphics computer supplying the single user with a balanced set of Business-Data, Word, or Scientific-Data processing capabilities along with both character and graphics output. ADVANTAGE is fully supported by North Star's wide range of System and Application Software.

The ADVANTAGE contains a 4 MHz Z80A<sup>®</sup> CPU with 64Kb of 200 nsec Dynamic RAM (with parity) for program storage, a separate 20Kb 200 nsec RAM to drive the bit-mapped display, a 2Kb bootstrap PROM and an auxiliary Intel 8035 microprocessor to control the keyboard and floppy disks. The display can be operated as a 1920 (24 lines by 80 characters) character display or as a bit-mapped display (240 x 640 pixels), where each pixel is controlled by one bit in the 20Kb display RAM. The two integrated 5¼ inch floppy disks are double-sided, double-density providing storage of 360Kb per drive for a total of 720Kb. The n-key rollover Selectric style keyboard contains 49 standard typewriter keys, 9 symbol or control keys, a 14 key numeric/cursor control pad and 15 user programmable function keys.

The attractive desk top chassis contains six slots for plug-in option cards: a parallel interface for printer or

other parallel devices, a serial (RS-232C) port or a North Star Floating Point Board (FPB) for substantial computational performance increase. Sufficient power (115V or 230V, 60 or 50 Hz) is also contained within the light weight chassis.

Included with the ADVANTAGE system is a system diskette containing a Business Graphics package, a complete system diagnostic program and a Graphics Demo package.

This powerful, compact and self-sufficient computer is further enhanced by a broad selection of Systems and Application software. For the business user North Star offers proprietary Application Software modules controlled by North Star's proprietary Application Support Program (ASP). For a wide variety of commercial, scientific or industrial applications North Star's graphics version of the industry standard CP/M<sup>®</sup> is offered. For the computation-intensive or graphics-intensive application North Star's powerful G-DOS with G-BASIC provides a rich set of BASIC extensions that exploit the ADVANTAGE graphics features. The following is a more detailed description of these three system software options:

**North Star ASP and Application Modules**

The North Star Application Support Program (ASP) is a high performance operating system that includes support for the ADVANTAGE features, two Quad capacity (360Kb per diskette) floppy disk drives and a serial or parallel printer (matrix or letter quality).

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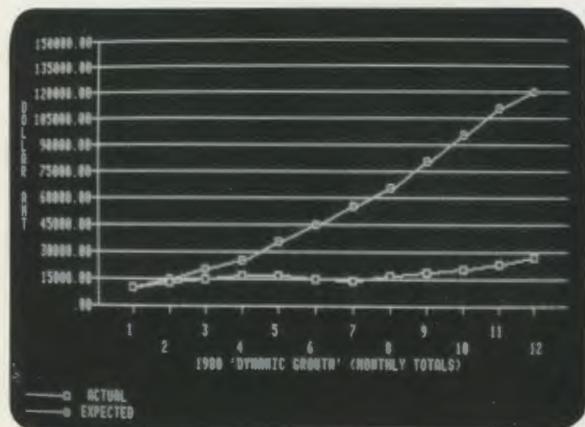
ASP manages these ADVANTAGE resources and provides an Indexed Sequential Access Method (ISAM), Sequential and Random File Management for the North Star proprietary Application Software Packages listed below:

ACCPAC™	NorthWord™	— Word Processing
OrderEntry/Invoices	MailManager™	— Mailing List Management
InventoryControl	InfoManager™	— Data Management
AccountsReceivable		
AccountsPayable		
GeneralLedger		

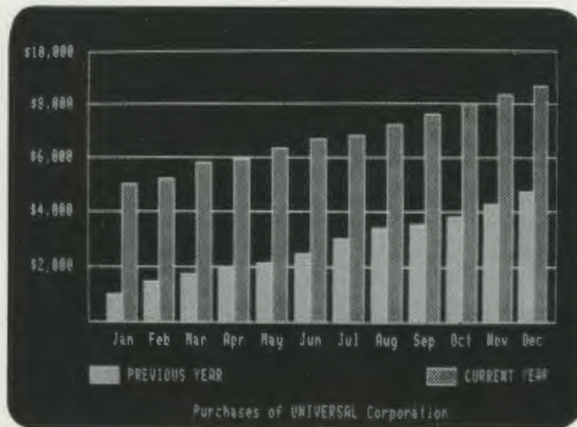
(ASP is included within each package and need not be purchased separately.)

These Application Software modules are all written in a derivative of the C programming language and include options that allow the modules to be customized. A unique Application Development System (ADS) is available for those systems developers who require facilities to develop their own additional application modules.

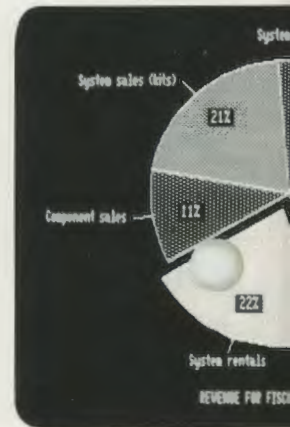
### TYPICAL SYSTEMS GRAPHICS:



LINE CHART



BAR CHART



PIE CHART

### North Star Graphics BASIC/Graphics DOS (G-BASIC/G-DOS)

G-BASIC is a superset of the well known North Star BASIC and provides a comprehensive set of statements to invoke ADVANTAGE graphics capabilities. In addition G-BASIC provides several noteworthy features over other BASIC implementations that are specifically designed to facilitate scientific, business or industrial applications programming:

- Facilities for programmed error handling.
- Automatic program sequencing (CHAINing).
- Formatted I/O.
- Sophisticated string handling.
- Sophisticated machine language sub-routine interface.
- Multiple dimension numeric arrays.
- Sequential, Random, or Byte-by-Byte file access.

G-DOS is North Star's proprietary floppy disk operating system that supports the bit mapped graphics features of ADVANTAGE. G-DOS permits a user or application

program to issue commands for maintaining and using diskette-based files, for using the ADVANTAGE optional Floating Point Board and for communications with I/O drivers (e.g. serial printer etc.) G-DOS also provides an easy to use operator interface and supports North Star's proprietary G-BASIC. G-BASIC/G-DOS support up to four Quad capacity disk drives (360Kb per drive) with up to 128 files per drive.

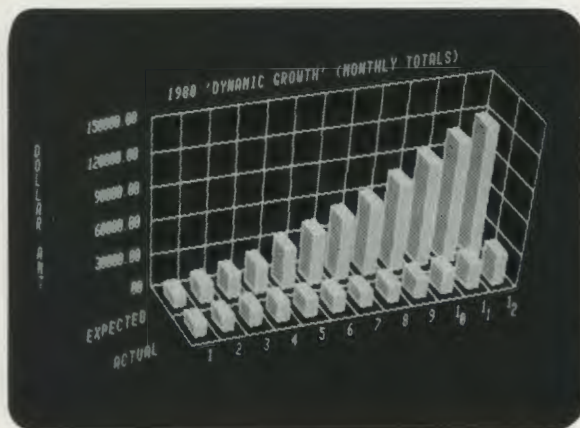
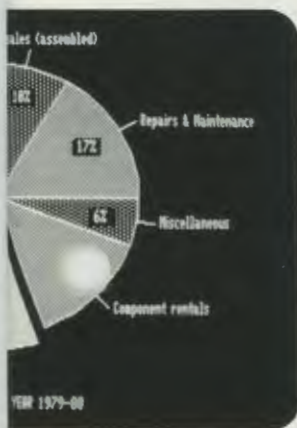
G-DOS not only provides compatibility with programs written in BASIC on the North Star HORIZON® computer but also supports the extensions in G-BASIC that permit full utilization of the graphics features of ADVANTAGE. As with Graphics CP/M, G-DOS supports both Graphics Mode and Character Mode, thus providing the same geometric and graphics support functions described above.

### North Star Graphics CP/M

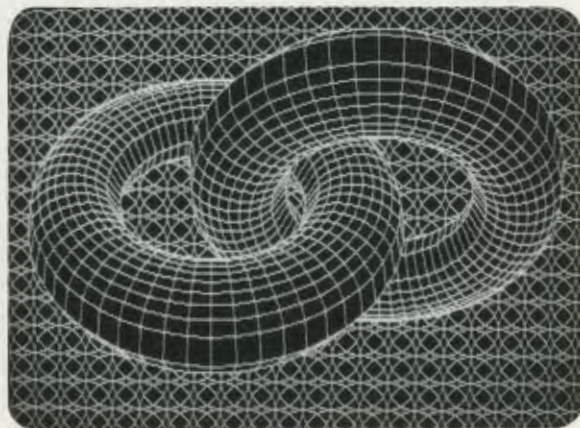
Graphics CP/M is a compatible enhancement of CP/M, the industry standard operating system for developing and executing programs on floppy disk based Z80 systems. Graphics CP/M is a powerful superset of CP/M that allows the user to not only make full use of the extensive graphics capabilities of ADVANTAGE but also to use CP/M compatible software on the ADVANTAGE. With the appropriate interpreter or compiler, programs can be run in CBASIC®, MBASIC®, FORTRAN or COBOL or any other CP/M compatible language.

Graphics CP/M performs necessary services for application programs such as managing diskette files, controlling peripheral devices, allocating disk space, managing the graphic display and providing an easy to use operator interface. Up to 64 files may be allocated on each of the Quad capacity diskettes (338Kb capacity per

diskette). Graphics CP/M controls any RS-232C serial printer at 300 to 19,200 baud. The graphic display is controlled in both Character Display Mode (80 characters by 24 lines) and in Graphics Mode (240 x 640 pixels). Graphics Mode includes two sets of functions: geometric functions and graphics support functions. The four geometric functions: POLYGON, RECTANGLE, ELLIPSE and SPECIAL LINE enable the drawing of points, lines and numerous two dimensional figures (circles, ellipses, rectangles, triangles, pie charts, bar charts, etc.). The three graphic support functions: CLEAR, BLOCK, and CHAR are used to control the display operation.



3-DIMENSIONAL CHART



COMPLEX 3-DIMENSIONAL FORMS

### Summary of ADVANTAGE features:

- Fast 4 MHz processor, 64Kb (200 nsec) Dynamic RAM with parity.
- Auxiliary processor (Intel 8035 type) off loads the Z80A by servicing keyboard and floppy disk drive control functions.
- 12 inch green (P31 Phosphor) display with non-glare screen operating in both Character Mode and Bit-Mapped Graphics Mode (240 x 640 pixels) driven by separate 20Kb of fast display RAM.
- Two integrated Quad capacity floppy disks provide 720Kb storage.
- Business graphics software, system self diagnostic software and graphics demo software all included with ADVANTAGE without the requirement for additional operating system software.
- 87 Key Selectric style keyboard includes 15 function keys and a 14 key numeric/cursor control keypad.

- Six I/O bus slots for serial or parallel I/O interfaces or North Star's Floating Point Board (FPB).
- All integrated into a single quiet, compact, attractive desk top enclosure.
- All fully supported by North Star's broad range of software: North Star ASP, G-BASIC/G-DOS or Graphics CP/M—each supporting both the ADVANTAGE Graphics Mode and Character Mode.

## ADVANTAGE Specifications

### Cabinet

#### Dimensions

48 cm x 51 cm x 31.5 cm  
(18¾ inch x 20 inch x 12½ inch)

Shipping Weight: Approximately 22.5 kg  
(50 pounds)

Net Weight: 19.5 kg (43 pounds)

Composition: High impact structural foam

### Power Requirements

Domestic: 115VAC, (95 to 135VAC), 50/60Hz  
International: 115/230VAC, (95 to 132VAC/187  
to 265VAC), 50/60Hz

Power 2 amps @ 115V

Consumption: 1 amp @ 230V

### Temperatures

Operating: 10°C to 40°C  
(50°F to 104°F)

Non-operating: -40°C to 60°C  
(-40°F to 140°F)

Shipping: -40°C to 52°C  
(-40°F to 125°F)

### Humidity:

Operating: 20% to 80% non-condensing

Non-operating and Shipping:  
5% to 95% non-condensing

### Processor/Memory

CPU: Z80A Microprocessor

Operating speed: 4 MHz

Intel 8035 auxiliary processor for  
keyboard and disk

Memory: 64Kb Main RAM  
20Kb Display RAM  
2Kb Boot PROM

### Video

Screen: 28 cm (12 inch) diagonal P31 phosphor  
(green)

High impact, non-glare safety shield

Standard Character Format: 1920 character  
display, 24 lines by 80 characters

5x7 character in 8x10 dot matrix

Graphics Resolution: 240 pixels high x  
640 pixels wide

Refresh Rate: 50 or 60 Hz, depending on  
line frequency

### Keyboard

Keytops: Sculptured  
11% Keyboard angle (Selectric  
compatible)

Number of Keys: 87

Key Groups: 49 Standard Typewriter Keys  
14 Key Numeric Pad with  
ENTER Key  
15 Programmable Function Keys  
9 Additional Symbol/Control  
Keys

Other features: N-key roll-over  
Full Cursor Control  
Special Shift-Lock Keys  
5 Shift Modes  
Auto Repeat

### Disk

Number of drives: Two floppy disk drives  
housed in cabinet

Diskettes: Standard 5¼ inch floppy diskettes  
512 bytes/sector, 10 (hard)  
Sectors/track, 35 tracks/side,  
2 sides/diskette

Storage capacity: Quad (double-sided,  
double-density)  
360Kb/per diskette  
(formatted)

Transfer rate: 250K bits/second

Latency: 100 ms (average)

Access Time: Track-to-Track: 5 msec

Track density: 48 tpi

Number of tracks per side: 35

Disk speed: 300 rpm ± 3.0%

### Input/Output

Slots for six plug-in boards.

Each board addressed by 16 I/O addresses.

Serial I/O: RS-232C serial port  
Current loop option  
Asynchronous: 45 baud  
to 19.2 kilobaud  
Synchronous: 2400 baud to  
51 kilobaud

Parallel I/O: 8-bit data in and out with three  
handshake lines for each port.  
Maximum speed is limited by  
the processor.

Floating Point Board (FPB): Performs high  
speed BCD float-  
ing point arith-  
metic: add,  
subtract, multiply,  
and divide.  
Up to 14 digits of  
precision  
(programmable).  
Overflow, under-  
flow, and divide  
by zero status.  
Typical 8-digit  
multiply: 80  
microseconds.  
Typical 8-digit  
divide: 156  
microseconds.

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