# HARRIS CORPORATION
# COMPUTER SYSTEMS DIVISION

## High Performance Super-Minicomputers

# HARRIS— unique among super-minis

Harris virtual memory computers offer a broad spectrum of system-level solutions for users in the scientific, engineering, educational and technical areas as well as in traditional data processing applications. The multiple-use, multiple-user architecture of Harris systems combines mainframe computing power with complete configuration flexibility. From an integrated entry-level system, the HARRIS 80, to a full-feature performance leader, the HARRIS 800, Harris computers are designed to solve today's problems while offering flexibility for tomorrow.

Harris CPUs are microprogrammed, general purpose computers built around a high speed multi-access central bus for maximum system performance in a multi-programming environment. All Harris processors overlap instruction sets, so programs written for any Harris system will run at full efficiency on every other system in the family. A unique characteristic of each Harris system is its ability to support from 32 to 128 interactive user terminals (depending on the system selected) without detriment to response time.

Capable of an aggregate 19MB per second transfer rate, the central system bus combines 48 data lines with 18 or 20 address lines. In one cycle, it transfers a complete memory address, together with up to 48 data bits, giving any peripheral device or subsystem direct access to as much as 3MB of main memory.

All Harris CPUs are offered in both standard and high density memory configurations. Utilizing 64K RAM chips, this new high density memory offers memory storage boards with storage densities of 1.5MB - eight times the density of standard 16K boards. Harris' new high density memory offers users significant economies in both capital expenditures as well as

space requirements, by requiring fewer boards and eliminating the need for an expansion chassis.

Programs written for one member of the Harris family can migrate up to a higher performance environment. This upward compatibility translates the full potential of powerful, high performance hardware into more economical utilization of equipment, staff and application software.

# VULCAN® virtual memory operating system

Harris high-performance hardware demands a sophisticated operating system. Field tested and constantly improved, VULCAN® is a virtual memory, resource sharing system rich in special features. All of the Harris super-minicomputers are supported by the VULCAN operating system.

Unique in the industry, VULCAN combines interactive, real-time and batch capabilities. All modes are easy to use and are available at all times. VULCAN has been developed and refined over several years to its present state of extreme reliability. Ongoing enhancements maintain its leadership among high performance operating systems.

VULCAN has three concurrently available processing modes:

- INTERACTIVE PROCESSING
  Interactive processing gives VULCAN its timesharing capability and allows up to 128 terminal operators to run compilers, application programs or utilities.
- REAL-TIME PROCESSING
  A real-time mode gives high priority control programs a fast, responsive interface to external sensors or events. Several programs that must react quickly to outside situations can share VULCAN's initialization, execution and communication services.

- BATCH PROCESSING
  At the opposite end of the response spectrum, a low priority batch mode devotes any idle system resources to background tasks submitted either interactively or via the card reader.

Six RJE subsystems are available for operation with the VULCAN operating system. Two are RJE host packages that allow communication between an RJE terminal and a Harris system, operating as a host. Four are RJE terminal emulation packages that permit communication between a Harris computer system and a foreign host system.

RJE into a Harris system is accomplished through use of a special real-time host program which will communicate with:

- IBM 2780 compatible terminals
- HASP Multi-leaving terminals

The RJE terminal emulation packages provide the communications line support and general file utility functions necessary to provide RJE capabilities into foreign computer systems. RJE subsystems include the following terminal emulation packages:
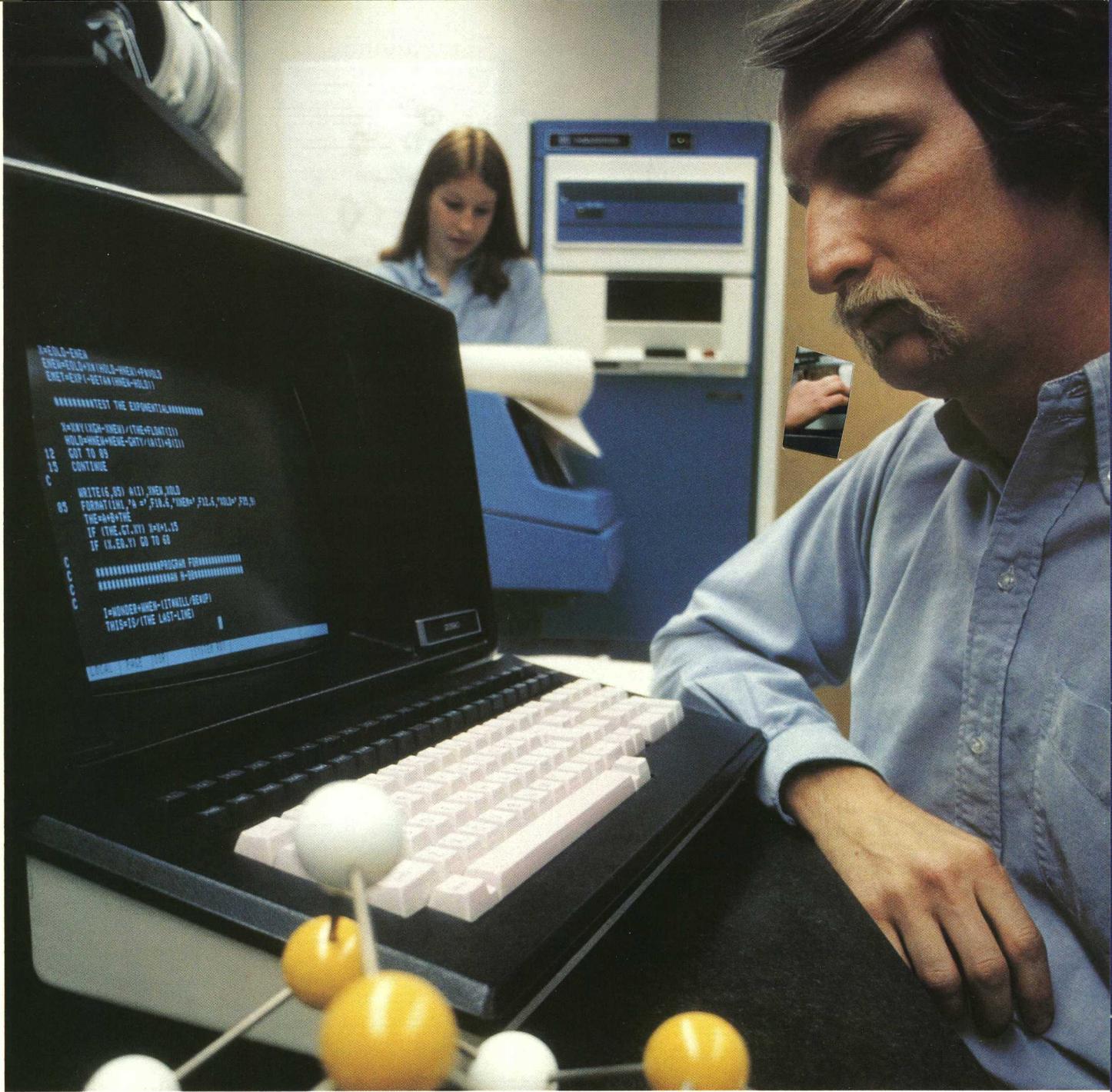
- IBM 2780/3780
- IBM HASP Workstation
- UNIVAC 1004
- CDC UT-200

Any VULCAN terminal user is permitted to transmit and receive messages consistent with the host system's protocol.

VULCAN's user ID and password system prevents unauthorized access to programs or data. It also reduces use of excessive computer time or inordinate use of storage.

Dynamic resource allocation gives each operator as much power and capability as possible without hampering system operation. Commensurate with priority, each operator, process, or program receives a fair share of available computer time and resources.

VULCAN® is a registered trademark of Harris Corporation

# H80 — More than the ordinary entry-level system

The HARRIS 80 is a low-cost, packaged computer system that integrates a high-capacity Winchester disk and a complete magnetic tape subsystem in a single cabinet. Its 192 KB of error correcting memory expand to as much as 768K directly addressable bytes.

Up to 32 interactive user terminals augment the standard operator console. Full hardware support for a 6 MB virtual memory space assures program performance, and all programs are upward compatible with other Harris computers.

A mini module disk drive incorporated into the HARRIS 80 cabinet uses environmentally sealed modules as random access storage media. Each sealed module contains a spindle, 80 MB of recording surface, rotary actuator, and heads. Fixed media design improves reliability by protecting the critical disk subsystem from external contaminants and eliminating costly head alignments. Although the recording medium is sealed, all circuitry remains accessible for fast troubleshooting. Users may add up to seven separate disk drives to the HARRIS 80 without additional controllers.

New technology and a low-profile design make the HARRIS 80 micro-streamer tape drive ideal for data backup, archiving, and online tape I/O. Tape loading is fully automatic once a reel has been inserted horizontally into the drive unit. Because low-profile drives do not use vacuum columns for tape buffering, they eliminate a common source of tape wear. Up to four drives can share a single controller to increase tape storage capacity.

# H100 Multi-use power for diverse organizations

The HARRIS 100 is a general purpose super-mini for multi-use, multiple user environments. It is designed specifically to support concurrent processing tasks using a mixture of high level languages and run -- individually or multiprogrammed -- in a shared real-time environment. Hundreds of users have found the HARRIS 100 to be the total system solution when scientific, engineering and business applications compete for on-line computer resources.

The HARRIS 100 combines all of the HARRIS 80 processing power with a flexible I/O structure for interfacing bulk storage devices and other peripherals to its fast system bus.

The HARRIS 100 supports up to 24 logical I/O channels for unprecedented configuration flexibility that translates this performance directly into speed, throughput, and quick response. It also offers a full range of I/O channel types including the XBC, a specialized channel for nonstandard or customized peripheral devices.

Up to 32 interactive terminals distribute the HARRIS 100 processing power among remote and local workstations. A comprehensive software library offers each terminal operator a choice of nine progamming languages, five support programs, job control language, RJE packages, data management systems or utilities. Combined with its unmatched configuration flexibility, this range of software gives the HARRIS 100 true multi-purpose power to meet the processing needs of a multi-discipline organization.

# H300 Unique blend of performance and economy

The HARRIS 300 is ideal in fast changing user environments that combine scientific, engineering, and business applications with interactive program development, computer graphics, or other especially demanding tasks.

This newest member of the Harris family blends the performance of a small mainframe computer with the size and economy of a super-mini. It excels in dynamic environments where user population, job mix, and work load can change dramatically, where physical space is at a premium, and where excess or reserve capacity is needed at modest cost.

A 12MB virtual memory space and a main memory size of up to 3MB give the HARRIS 300 more than double the HARRIS 100 capacity, and the HARRIS 300 supports up to 48 interactive terminals. Options expand its 16 levels of external interrupt to a maximum of 48 levels, again doubling the HARRIS 100 capacity and assuring optimum sensitivity to real-time events.

Offered as a packaged system housing integral disk and tape in a single cabinet, the HARRIS 300 occupies less than half the space of comparable systems. For select applications, the HARRIS 300 is often configured to use a full range of specialized peripherals, including high speed printers, plotters and color graphics terminals.

In complex multi-user environments, where other mini-computers often fail to survive benchmarking, the HARRIS 300 excels. Its unique synergy of hardware and software assures this performance, particularly when intensive computation must alternate with tasks that demand fast response or especially high throughput.

# H500 A versatile and reliable performer

The HARRIS 500 is the field-tested and proven super-mini that consistently matches or outperforms other systems in its class. Up to 64 interactive terminals give users fast, responsive access allowing high performance computation and analysis. Interactive program development, timesharing, and real-time control tasks run in parallel with scientific number crunching and still leave excess capacity for multiple RJE and multi-stream batch.

The HARRIS 500 includes 6KB of high-speed, bipolar cache memory, enough to assure a 90 percent hit ratio. Bipolar cache holds 3K bytes of instructions and 3K bytes of operand data, and it reads or writes a full 48 bits in each cycle. Special cache hardware monitors writes to main memory, reducing cache overhead and monitoring the validity of cache data.

Up to 3MB of directly addressable semiconductor memory and a 12MB virtual memory space give the HARRIS 500 all the main storage most applications will ever need. In networks where multiple processors must communicate or address common data, a shared memory system lets up to six computers read and write shared data at memory speed. The HARRIS 500 memory architecture guarantees high throughput by transferring a full 48 bits of data across the system bus to the processor, cache, and many I/O devices.

The HARRIS 500 offers proven capability when design and development, scientific analysis, and commercial timesharing team up to demand more than the usual super-mini performance. It gives fast response in a diversified, high-throughput environment. Its cost effective blend of scientific, engineering, and commercial capabilities mixes local and remote operations with real-time control and batch processing in a versatile and reliable total system solution.

# H800 Innovative, yet field proven

Perhaps the most powerful super-mini available, the HARRIS 800 is the field proven 48-bit system that the 32-bit industry is trying to match.

Two parallel but independent processors form a pipelined architecture that overlaps the execution of up to seven instructions. Integrated floating point hardware performs fast arithmetic and function evaluation and generates a full 11 digits of precision. Its 180 ns cycle time ranks the HARRIS 800 among the fastest of the super-minis. More important, such features as direct decimal arithmetic on packed operands translate its processing speed directly into high performance computing power.

A Maintenance Aid Processor replaces the system control console with a dedicated repair, diagnosis, and control sub-system. It performs all system console functions, such as register access or instruction stepping, through its own maintenance aid terminal, which doubles as a user workstation.
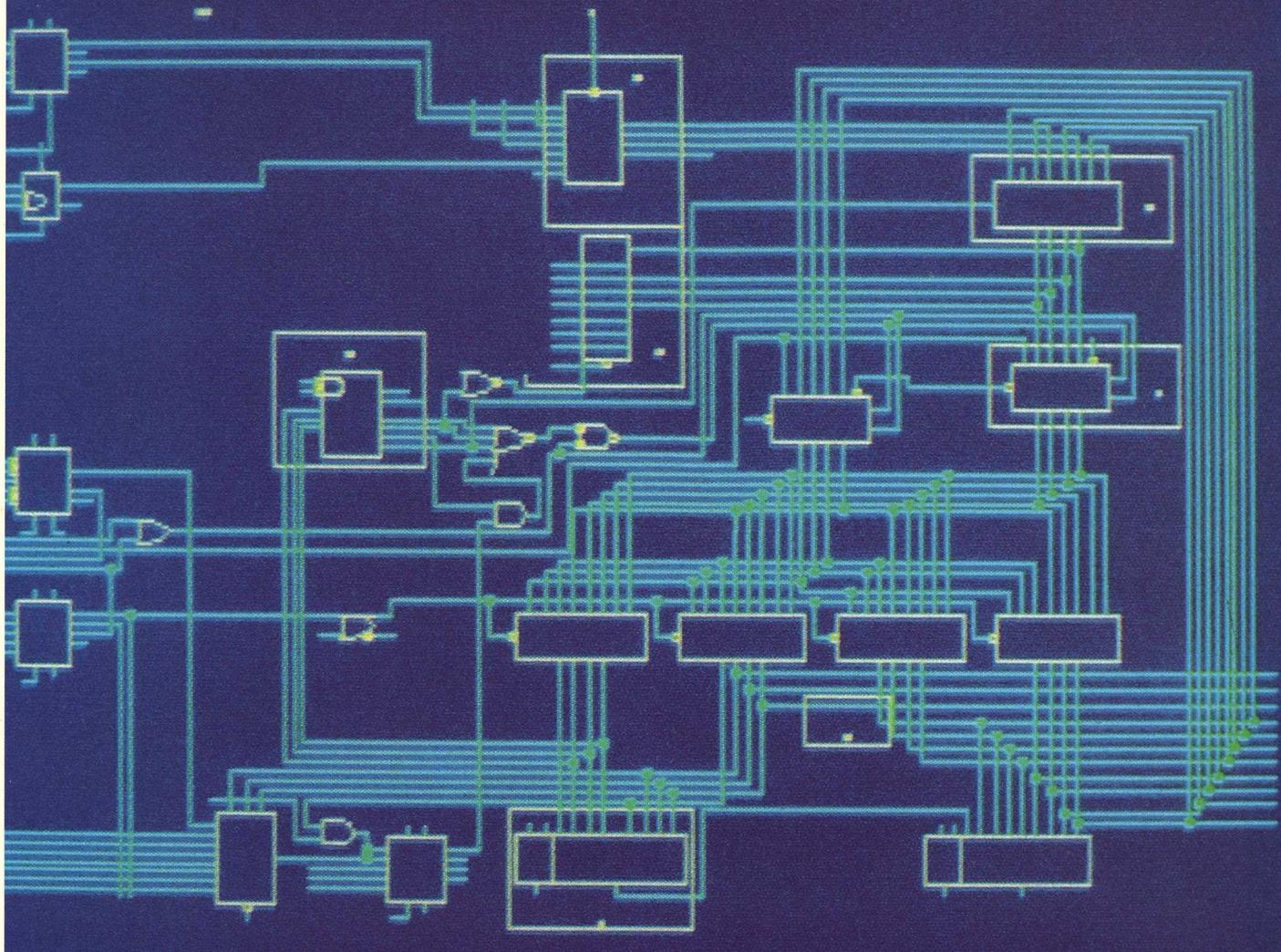
From its 48-bit word size to its 180 ns cycle time, all of the innovative, high performance HARRIS 800 features maintain full program compatibility with other Harris computers. Software developed on an entry level HARRIS 80 or midrange HARRIS 300 runs faster on the pipelined HARRIS 800, and needs no modification to use all of its high performance capability. Excess capacity, speed, and processing power combine to make more programs available to more users simultaneously in a HARRIS 800 timesharing environment.

| MODEL | INTEGRATED TAPE & DISK | BASIC PHYSICAL MEMORY | VIRTUAL MEMORY | CACHE MEMORY | INTEGRAL FLOATING POINT PROCESSOR | MEMORY WORD LENGTH (BITS) | LOGICAL I/O CHANNELS | MAXIMUM PRIORITY INTERRUPTS | MAXIMUM I/O THROUGHPUT RATE (MEGABYTES PER SECOND) | MAXIMUM INTERACTIVE TERMINAL USERS | WHETSTONE KIPS, SINGLE PRECISION (FLOATING PT. PROC.) | WHETSTONE KIPS, DOUBLE PRECISION (FLOATING PT. PROC.) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| H80 | yes | 192KB | 6MB | — | available | 48 | 24 | 24 | 19 | 32 | 563 | 521 |
| H80-A | yes | 768KB | 6MB | — | available | 48 | 24 | 24 | 19 | 32 | 490 | 453 |
| H100 | — | 192KB | 6MB | — | available | 48 | 24 | 24 | 19 | 32 | 563 | 521 |
| H100-A | — | 768KB | 6MB | — | available | 48 | 24 | 24 | 19 | 32 | 490 | 453 |
| H300 | yes | 192KB | 12MB | — | available | 48 | 24 | 48 | 19 | 48 | 686 | 651 |
| H300-A | yes | 768KB | 12MB | — | available | 48 | 24 | 48 | 19 | 48 | 597 | 566 |
| H300-B | yes | 1536KB* | 12MB | — | available | 48 | 24 | 48 | 19 | 48 | 597 | 566 |
| H500 | — | 384KB | 12MB | 6KB | available | 48 | 24 | 48 | 19 | 64 | 833 | 785 |
| H500-A | — | 768KB | 12MB | 6KB | available | 48 | 24 | 48 | 19 | 64 | 833 | 785 |
| H500-B | — | 1536KB* | 12MB | 6KB | available | 48 | 24 | 48 | 19 | 64 | 833 | 785 |
| H800 | — | 384KB | 12MB | 6KB | yes | 48 | 31 | 72 | 19 | 128 | 1488 | 1398 |
| H800-A | — | 768KB | 12MB | 6KB | yes | 48 | 31 | 72 | 19 | 128 | 1488 | 1398 |
| H800-B | — | 1536KB* | 12MB | 6KB | yes | 48 | 31 | 72 | 19 | 128 | 1488 | 1398 |

*can be configured with 3MB physical memory.

# HARRIS
# COMPUTER SYSTEMS
# OVERVIEW

HARRIS

# HARRIS TECHNOLOGY—
## the cornerstone of growth

Harris Corporation designs, produces and markets high-technology communications and information processing equipment and systems which are used throughout the world. A major objective of the company's strategy is to develop a competitive advantage for Harris users through innovative research and development. To this end, annual expenditures for research and engineering exceed $150 million.

Harris maintains leading-edge technological expertise in such areas as data processing, digital communications, voice and video communications, word processing, graphic sciences, semiconductor development and electro-optics.

Significant programs currently in progress include development of high-data-rate satellite communications links; new techniques to prevent the jamming or to ensure the privacy of communication and control signals; and automation of the control functions of high-speed printing presses.

The corporation's 26 operating divisions are organized into five groups:

- U.S Government Electronics Systems
- Printing Equipment
- Semiconductors
- Information Systems
- Communications

In fiscal year 1981, Harris Corporation increased sales to $1.6 billion.

Harris is headquartered in Melbourne, Florida near Cape Kennedy Space Center. Eleven of its divisions have facilities in Florida where Harris is the state's largest industrial employer. Additional Harris divisions are located throughout the United States, Canada, Mexico, Europe and Asia with total employment of 26,000.

**⊞ HARRIS**