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MAGNETIC STORAGE (p. 29). “Throughout the history of the computer industry, electromechanical peripheral equipments have been hard pressed to keep pace with advances in internal logic and memory. However, continued development of simpler mechanisms and increases in bit density on magnetic storage media have tended to provide lower-cost, higher-capacity secondary storage media to complement lower-cost processors. In most cases, a reasonable system balance is possible now for minicomputers; but microprocessors (including several thousand bytes of storage) priced in the few-hundred-dollar range put new pressures on peripheral equipment development. In many cases the total cost of peripheral memory devices is the major criterion rather than the cost per bit. Hence, very low cost storage devices such as magnetic tape cassettes and floppy disks take on added importance for smaller equipments and systems.”

[L.C. Hobbs, “Low-Cost Tape Devices,” pp. 21-29.]

ROTATING STORAGE (p. 30). “The first six years of the seventies have been a period of rapid developments in the field of rotating memory. Innovation has dominated the gamut of disk drive applications. For example, substantial inroads have been made by flexible disks into the low-entry-cost area where rotating memory was previously not competitive. Cartridge disk drives have gained dramatically in capacity and performance while prices have remained relatively steady. The announcement of the IBM 3340, Winchester, brought to the marketplace the concept of a pack with its own captive heads in order to obtain large capacity at modest cost by increased surface storage density. The IBM System 32 brought the concept of the ‘disk enclosure’ which treats a substantial part of a disk system as a field replaceable component. ...”

[A.J. Kolk, Jr., “Low-Cost Rotating Memories: Status and Future,” pp. 30-34.]

BUBBLE MEMORIES (p. 36). “The furious pace of semiconductor memory activities in our industry leaves us little time to notice other memory techniques. Magnetic bubble domain memories are courteously mentioned in any broad survey of memories, alongside with holographic, ferroelectric, electron beam, amorphous, optical, cryogenic and what have you—only to quickly return to our two favorite topics: the funeral of cores and the unstoppable march of MOS.

“Could it be—just maybe—that that there is something else; and if so, could it be bubbles; and if so, what role may they play?”

[J.M. Salzer, “Bubble Memories—Where Do We Stand?,” pp. 36-41.]

CYCLIC MEMORIES (p. 50). “Three modifications of electronic cyclic memories appear to be useful and

feasible for increasing the effectiveness of these memories when used as auxiliary memories of computers. ...

“Of the three modifications, start-stop behavior is the most desirable because it is at least as powerful as dual-speed behavior and is fully compatible with bidirectional behavior. Charge-coupled device technology may not be able to support start-stop behavior, but there is still much to be gained from dual-speed behavior, which is quite likely to be possible. The availability of memories with any or all of these characteristics may have a strong influence on algorithm design, for certainly the tape and drum memories of past and present computers have stimulated the development of many specialized algorithms.”

[H.S. Stone, “Special Tutorial: The Organization of Electronic Cyclic Memories,” pp. 45-50.]

CRAY SUPERCOMPUTER (p. 53). “Cray Research, Inc. has announced a new computer system, the Cray-1. According to Seymour R. Cray, architect of the system and president of the corporation, the Cray-1 is designed for scientific applications.

“The \$7.5 million computer features extremely dense circuit packaging—1,048,576 64-bit words of 50-nano-second bipolar LSI random access memory, requiring only 70 square feet of floor space for its installation, including power supplies.”

[New Products: “CRAY-1: The Smaller Supercomputer.”]

DATA CARTRIDGE (p. 57). “A compact data cartridge system with many capabilities of larger systems has been announced by 3M Company for use in point-of-sale terminals, electronic calculators, microcomputers, automated typing systems, and similar devices.”

“The average data capacity of one DC100A cartridge is 100,000 8-bit bytes, with an average transfer rate of 2530 bytes per second. Tape speed is 30 ips (76.2 cm/s) forward and reverse, but 60 ips (152.3 cm/s) reverse speed can be specially ordered. The mechanism has 27-millisecond start delay and 5-millisecond stop delay.”

[New Products: “Compact Data Cartridge System Offered by 3M.”]

AUTOMATED DRAFTING (p. 60). “Draftsmen in engineering graphics at the Bartlesville, Oklahoma, worldwide headquarters of Phillips Petroleum Company have tripled their output of working drawings using Autotrol’s AUTO-DRAFT design and drafting system.”

“The system utilizes the Varian 620L minicomputer as its graphics processing unit. ... The real-time capability of the Varian minicomputer allows each operator to be working in a different design/drafting discipline while the flatbed plotter is independently developing drawings in a background mode.”

[New Applications: “Automated Drafting System Triples Production.”]

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USABILITY ENGINEERING (p. 13). “The most basic elements in the usability engineering model are empirical user testing and prototyping, combined with iterative design. Because it’s nearly impossible to design a user interface right the first time, we need to test, prototype, and plan for modification by using iterative design. Under typical resource constraints, modifications will be feasible only in the prototyping stage. It is much too expensive to change a completely implemented product, especially if testing reveals the need for fundamental changes in the interface structure.”

INFORMATION SYSTEMS (p. 44). “*Mediators* are modules occupying an explicit, active layer between the user applications and the data resources. They will be accessed by application programs residing in the user workstations. ...

“Mediators form a distinct middle layer, making the user applications independent of the data resources. ...”

MULTIDATABASE SYSTEMS (p. 50). “... Multidatabases typically integrate information from preexisting heterogeneous local databases in a distributed environment and present global users with transparent methods to use the total information in the system. A key feature is the autonomy that individual databases retain to serve their existing customer set.

“Multidatabases are an important area of current research, as evidenced by the number of projects in both academia and industry. ... The next level of computerization will be distributed global systems that can share information from all participating sites. Multidatabases are a key component of this advancing technology.”

MULTIPROCESSOR (p. 63). “The Dash prototype system is the first operational machine to include a scalable cache-coherence mechanism. The prototype incorporates up to 64 high-performance RISC microprocessors to yield performance up to 1.6 billion instructions per second and 600 million scalar floating point operations per second. The design of the prototype has provided deeper insight into the architectural and implementation challenges that arise in a large-scale machine with a single address space. The prototype will also serve as a platform for studying real applications and software on a large parallel system.”

SPEECH TRANSLATION (p. 81). “Working in collaboration with Siemens, A.G., ATR (Kyoto, Japan), and the University of Karlsruhe in Germany, Carnegie Mellon’s Center for Machine Translation developed a continuous-speech translation system that was demonstrated last summer in Germany, helping English and German speakers register for a conference. Working with a 400-

word vocabulary, the Janus system translates spoken English, German, and Japanese using neural networks to achieve accuracy even when the meaning and sounds of a sentence are not clear.

“Janus operates on a standard workstation, with response time ranging from 7 to 30 seconds. ...”

NEW COMPUTERS (p. 94). “Compaq has announced two notebooks and two portables.

“The LTE Lite/20 and Lite/25 notebooks use Intel’s 20- and 25-MHz 386SL microprocessors and incorporate power-management features to give users up to 4.5 hours of battery operating time in a 6-pound computer.”

“The Portable 486c comes in two models: Model 120 with a 120-Mbyte fixed-disk drive, and a Model 210 with a 210-Mbyte drive. Both models have 4 Mbytes of system memory, a 3.5-inch 1.44-Mbyte disk drive, and a full-size detachable keyboard.”

MUSIC LESSONS (p. 96). “Warner New Media’s *The Orchestra* lets users see orchestral instruments, hear how they are played, and learn how they are played.

“Graphics highlight which instrument is playing, and an illustrated analysis explains how pieces are put together. Features include a conducting lesson, a composing lesson in which the user selects the instruments to play and hears the result, and an arcade in which the user plays such games as Name that Instrument and Music Trivia. Display features include a full-color background and multiple windows.”

ELECTRONIC MAYHEM (p. 128). “When software works for the common good, almost everyone profits; when it stops working, there is hell to pay because nothing linked to it works. Software used with criminal intent would be catastrophic. ...”

“So long as we continue to create increasingly sophisticated and powerful computer systems and the software to exploit them, the possibility of a serious and crippling assault on our electronic societal infrastructure will become more likely. A technology reduction and control treaty (TRACT) is needed to limit the spread of electronic technical threats and lower the probability of a computerized first strike. ...”

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