

DATA COMMUNICATIONS



Also: April foolishness, data independence, and structured symbols...

The First Family in Cartridge Systems. An Official Portrait.

Being the first has become a habit with the Kennedy Company — a habit we can't kick. For instance, our Model 380 was the first to utilize 3M's new one-quarter inch cartridge. We designed it to be fully bi-directional at 25 ips normal speed, with a data transfer rate of 40,000 bits/second at 1600 bpi recording density, and includes features such as CRC generation and checking, error detection and gap generation.

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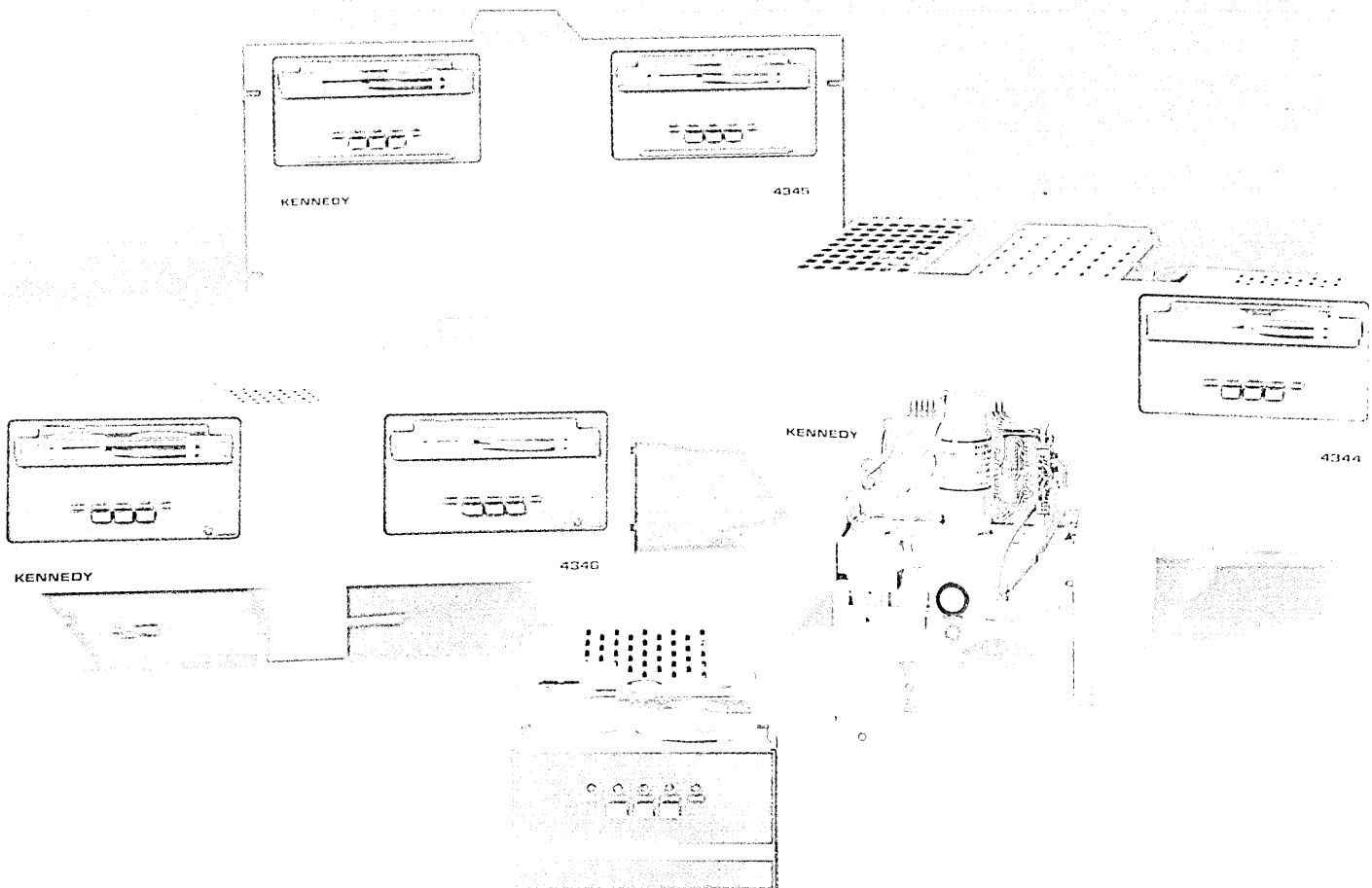
1600 bpi phase encoded data in the ANSI compatible format and utilizes simplified I/O commands such as "Write One Block," "Read One Block" etc. Model 4846, with two recorders, provides for system expansion.

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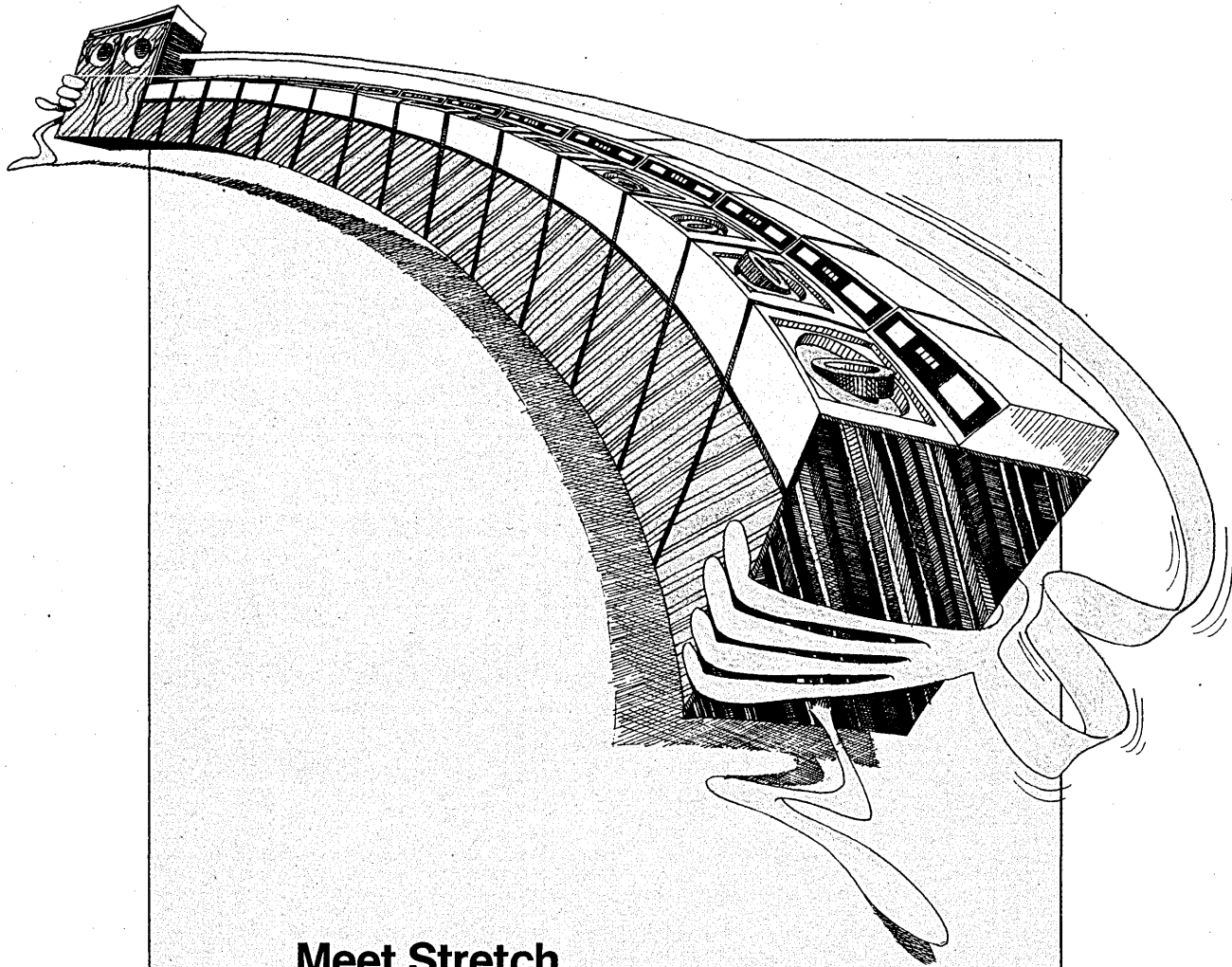
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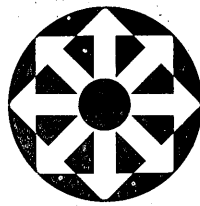
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VOLUME 21 NUMBER 4

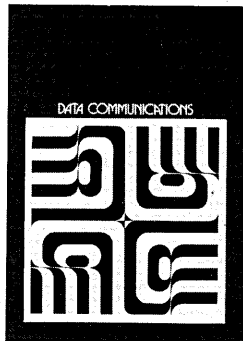
This issue 121,000 copies

APRIL 1975

FEATURES

Data Communications

The growth of data communications was at first stimulated by the ready availability of existing telephone lines, but eventually the analog nature of that medium became a disproportionately expensive impediment. Now new protocols, techniques, vendors, and services are broadening communication horizons. And first-time users of the services are guardedly optimistic.



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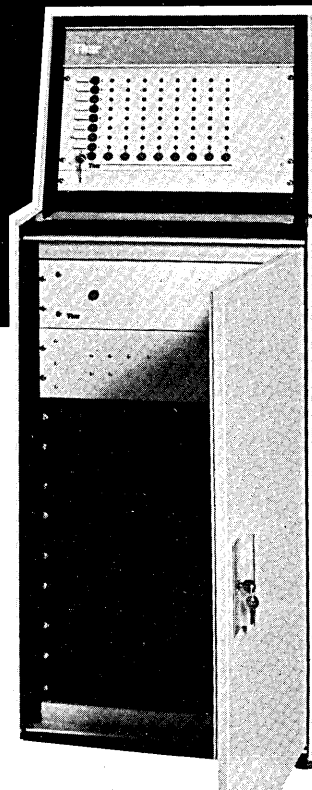
ABOUT THE COVER

Our data communications art is reproduced from "Aeleana", a serigraph by Manuel Barbadillo (Spain) from the "SDL Collection", a portfolio of nine original computer art prints. Commissioned by Systems Dimensions Limited, a leading Canadian-owned company in the information industry, the portfolio was coordinated and produced by Editions Gilles Gheerbrant, 2130 Crescent, Montreal H3G 2B8, Canada. More of Mr. Barbadillo's work appears elsewhere in this issue.

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EDITORIAL OFFICES

Headquarters: 1801 S. La Cienega Blvd., Los Angeles, CA 90035. Phone (213) 559-5111. **Eastern:** 35 Mason St., Greenwich, CT 06830, (203) 661-5400. Lakeside Office Park, 599 North Avenue, Wakefield, Mass. 01880, (617) 246-2121, 9805 Singleton Dr., Bethesda, MD 20034, (301) 530-7271. **Southwestern:** 2711 Cedar Springs, Dallas, TX 75201, (214) 744-0161. **Western:** 2680 Bayshore Frontage Rd., Suite 401, Mountain View, CA 94043, (415) 965-8222. **Foreign:** 14 Ashburn Place, London, S.W.7; 373-3745; 64/90 Blues Point Rd., McMahon's Point, NSW 2060, Australia.

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| Art & Production Director | Cleve Marie Boutell |
| Advertising Production Manager | Marilee Pitman |
| Production Assistant | Alberta R. Martin |

CIRCULATION

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Circulation Manager Suzanne A. Ryan
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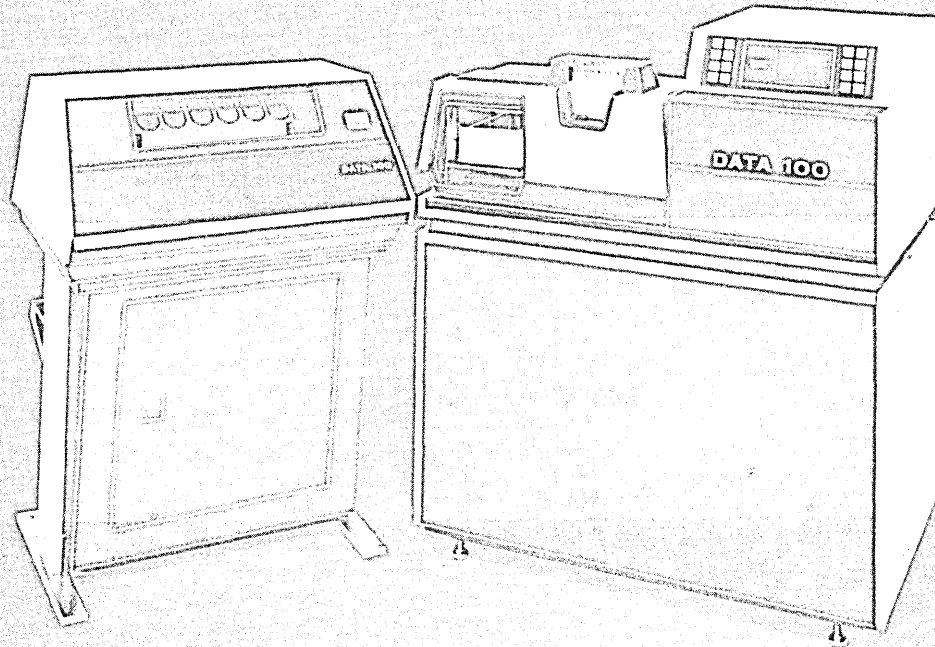
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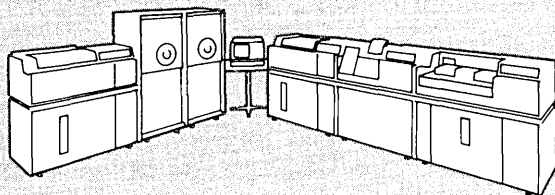
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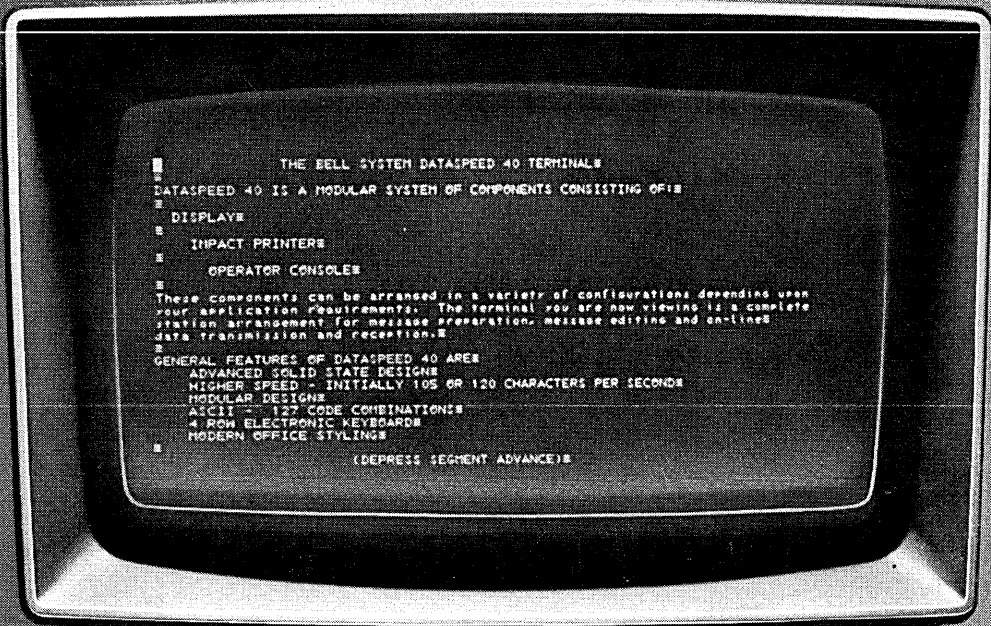


The new DATA 100 Model 76 is a low-cost, general purpose remote batch terminal with IBM 2780 and 3780 plug compatibility. Standard versions include 1150 to 1250 LPM printers, 1150 to 11000 CPM card readers and optional card punch. The above five year lease price includes a 1150 CPM card reader and a 210 LPM, 132 print position line printer. The Model 76 is the newest member of DATA 100's growing family of low-cost terminal products. These include, with a wide variety of optional choices, the programmed Model 78 and Model 74, and Keybatch with exclusive editing capabilities for remote batch and data entry. Each DATA 100 product is supported by a sales and service network operating from over 280 locations worldwide.



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A WORLD OF ECONOMY IN SERVICE The Singer-M&M service group provides national *and* international service coverage with 1700 representatives in the U.S. and more than 2000 in other key areas throughout Europe and the Far East. And, Singer-M&M people have the expertise coupled with more than 25 years of computer-related experience to assure service that's rapid, efficient — and economical.

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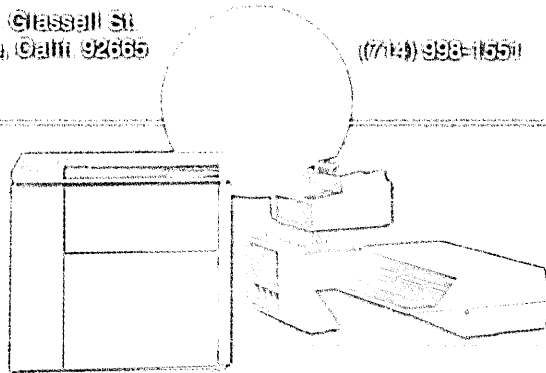
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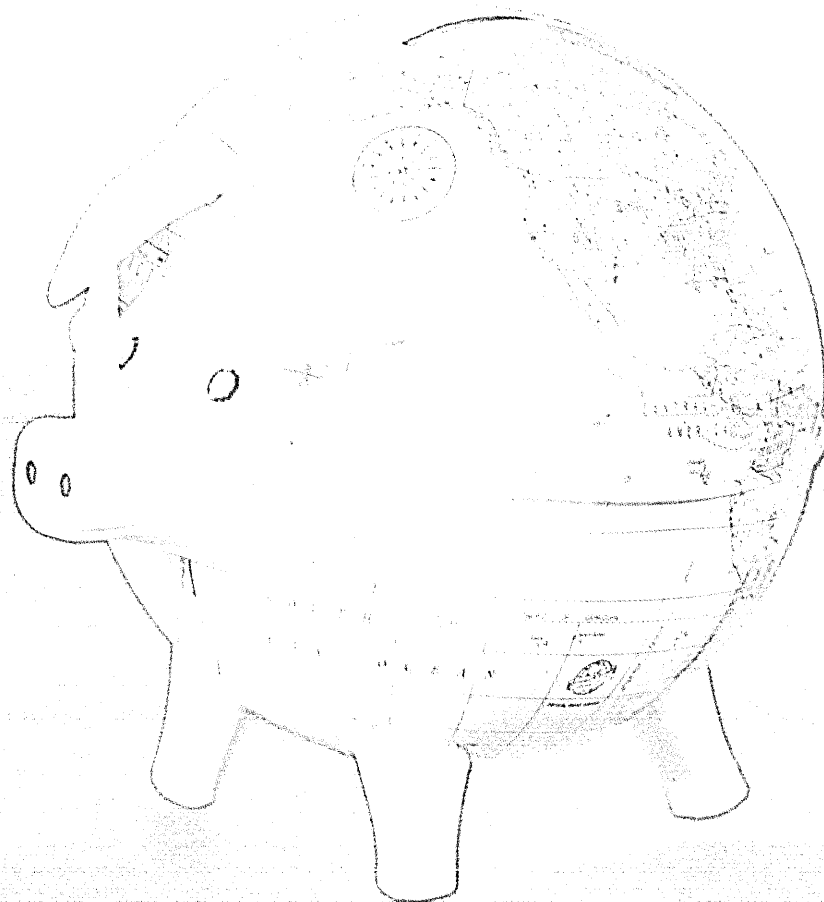
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A World of Economy



letters

Research on restructuring

February's "Look Ahead" column made apparent reference to a December research report which we had distributed to our institutional clients concerning a possible restructuring plan for IBM. . . .

Although we are flattered by your holding G. A. Saxton in such high standing in the analytical community, I must take issue with your implication that we have some special access to IBM management. This is both a disservice to IBM's management (which is operating under a court ordered prohibition against comment on the Government antitrust case) and a distortion of the purpose of our research paper. In addition, we have not discussed our restructuring proposal with IBM's management nor was it our intent to imply that IBM's management is discussing *per se* a restructuring plan.

DAVID R. HATHAWAY
Executive Vice President and
Director of Technology Research
G. A. Saxton & Co., Inc.
New York, N.Y.

No stripes in IBM suits

I understand that the contents of a monthly magazine cannot, always reflect the late breaking news event adequately.

But I must say that I find it disheartening to pick up the February issue of DATAMATION. It follows a month in which IBM filed its side of the story in the U.S. vs. IBM case in the form of a painstakingly detailed trial brief. It also follows in the wake of the U.S. Tenth Circuit Court of Appeals decision in the Telex case.

And what are your contents? You characterize the Tenth Circuit Court decision as permitting "IBM to systematically stake out and bear down on small competing companies." You feature a recipe for breaking up IBM, and based on a proposed government discovery subpoena, you spin a sinister tale headlined: "Computer Stocks: Did Financial Community Shun Everyone But IBM Out of Fear of IBM?"

Then we have a sour letter from William Rodgers illustrated by a cartoon showing IBM in shackles and prison garb.

True, you devote a half page to our 374-page trial brief. But, still, isn't it fair to say that the bulk of your issue is

a little heavy-handed when neither this company nor any member of its management has even been accused of a criminal offense, and when the company's practices have been upheld in the only court rulings that now stand?

FRANK T. CARY
Chairman
IBM Corporation
Armonk, New York

New scarce commodity: humor

I find it highly regrettable that a respectable technical magazine cannot resist the temptation to publish articles such as your "DP Industry Almanac," in the January issue. The tone of the article is typical of the current distasteful fad of poking fun at the Arabs, or of picturing them as planning to take over this U.S. industry or that.

Let me assure you and Mr. Gardner, the author, that if American experts are knowledgeable enough to comprehend that McDonald's automated checkout system does not really qualify as a computer system, so are Saudi Arabian businessmen!

The implications in the last para-



graph of Mr. Gardner's article—that the Arabs believe McDonald's is "a computer business"—in no way helps to enhance our country's chances of improving its economic relations with a fast developing area such as the Middle East, where the American data processing industry needs friends. Such a cynical attitude does not serve American interests nor the cause of mutual respect and understanding with the people who inhabit a vital area in the world.

KHALIL ZAHR
Vice President, New York Chapter
Association of Arab-American
University Graduates, Inc.
New York, N.Y.

A fertile Gardner

Mr. Gardner's "1975 DP Industry Almanac" is a classic. The only unfortunate part is that we have to wait until next year to get another peek at his

industry wit.

THEODORE J. SWIFT
North Wales, Pennsylvania

Actually, we'd like to run more Gardnerisms, but he's having difficulty getting gas to drive to work.

Beyond 1984

I find two disturbing omissions from F. G. Withington's excellent forecast of future developments "Beyond 1984" (Jan., p. 54).

Surely 1984 should see at least the beginning of the end of stored-program computers. The storage of programs and data in the same medium was a major advance of the early days. But it is now clear that programs require fast-read, slow-write, large-capacity storage. That is certainly practicable in the time-frame discussed. Self-modifying programs are known to be harmful; they are not needed at the higher language levels which will be the stored code of the new computers. Mixing of programs and data leads to abominations like *vs.*, with its false goal of program optimization for local referencing.

The second omission is the capability for efficiently and conveniently processing lexical data. Many installations spend large chunks of computer time massaging, not numbers, but streams of English or English-like words. To handle such lexical data with today's computers involves much forcing of round pegs into square holes. It is well within the capability of current technology to provide programmers with the tools for handling real words, not artificial "words." Flexibility can be designed into choice of delimiters, line breaks, symbol lookups, etc.

STEPHEN E. WRIGHT
Applied Data Research, Inc.
Princeton, New Jersey

Mr. Withington replies: On the first point, we agree that programs and data are tending to be separated in storage. My view is that stored logic "creeps up" from instruction sets into system program functions and to some degree into application program functions. However, full separation of programs and data seems unnecessary once the majority of instruction-related storage references are segregated. Also, backward compatibility to existing programs will always be wanted and will preclude the vendors introducing machines that cannot intermix programs and data (at least by 1985).

You are right about the computer time spent processing lexical data, but I'm cautious about agreeing with your statement that programmers can be provided with the tools to handle real words. Perhaps you don't mean in the sense of unconstrained semantics, but rather in a formal sense of representa-

letters

tion in storage. If the latter is true you are right, but from a pragmatic point of view it doesn't matter much. With logic and memory so cheap and so fast, it won't matter to the user whether internal handling of lexical data is efficient or not as long as the higher-level language manipulation tools he is given are as convenient as possible.

My CDP is better than . . .
The merits of the Certificate in Data Processing (CDP) program have been

discussed at length—in DATAMATION and elsewhere—to the benefit of the data processing community. One facet of this issue that has been overlooked, however, is the *legal status* of the term "CDP".

The data processing industry may be unique in that professionals (or would-be professionals) can obtain certificates in data processing from a variety of recognized sources. This situation has been understandably confusing to personnel, career guidance, and other interested persons in and out of the industry. In addition to the Institute

for Certification of Computer Professionals (ICCP), a number of universities offer graduate and undergraduate certificates in data processing following satisfactory completion of a prescribed course of study. American University in Washington, D.C., for example, offers an undergraduate certificate in data processing following successful completion of a selected sequence of ten courses of study (30 semester hours).

The data processing community can resolve this legal issue in the same way that other professions have in the past, and that is by getting behind a *single* strong association. That single association would coordinate with colleges and universities and proceed to copyright one term—possibly the term "CDP"—that best describes a professional. The real estate profession went through this process and the professional people in that field got behind the National Association of Realtors, which in turn copyrighted the term "Realtor."

The term "CDP" or any other term that follows a person's name must have a legal basis to prevent the situation from getting out of control. At present, anyone can use the term "CDP" and this is a situation that does not exist in other professions.

STANLEY R. BUTTERWORTH
Glendale, Arizona

The Forum in this issue also touches on this topic . . . ed.


Missing person

Some of the facts provided in your February People department item (p. 12) on the resignation of Henry Sherwood from the Diebold Group, Inc. came as a surprise to me too. While I have no wish to detract from the accomplishments of Henry in establishing and directing the European Research Program for so many years, it is not true that he was the only Director of that program prior to his resignation. I held the position of Director, Diebold Research Program, Europe from the beginning of September 1969 until the following August when I left to found Computer Systems Methodology GmbH.

JAMES H. SKIDMORE
Office of Management Technology
Dept. of Health, Education & Welfare
Washington, D.C.

Misplaced person

In the January News in Perspective (p. 99), my presentation of a paper entitled "What is a Computer Network?"
(Continued on page 164)



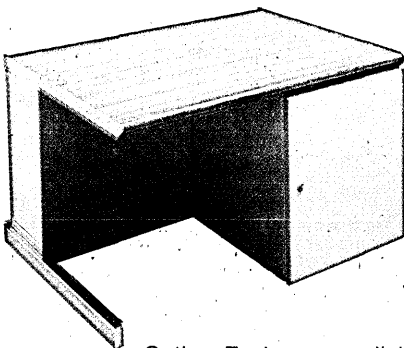
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It's from Telefile Computer Products. And we've taken this space for two reasons:

First, we're a Xerox computer user and like the others, we *believe* in the mainframe. Price/performance is second to none.

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If you don't have a Xerox computer now, look into one. System architecture is remarkably advanced and in such tune with the software that users claim the computers deliver up to 95 percent of capacity. Unheard-of efficiency.

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*Telefile's own Xerox Sigma 5.
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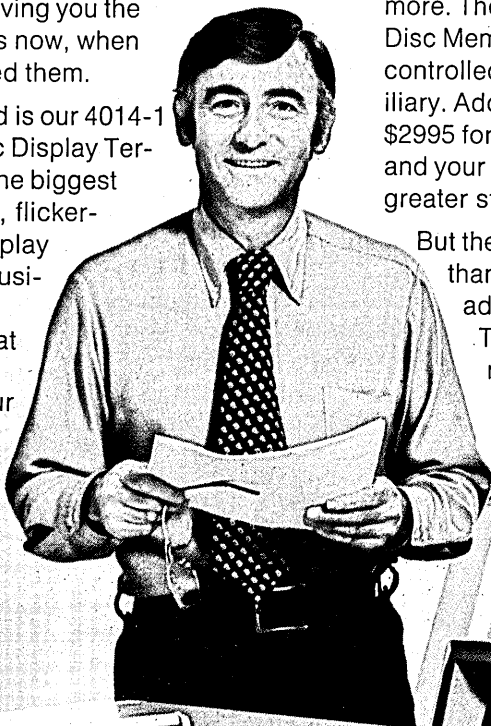
Today's Graphics.

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Pictured is our 4014-1 Graphic Display Terminal, the biggest 19-inch, flicker-free display in the business. Priced at \$9,995. Also, our



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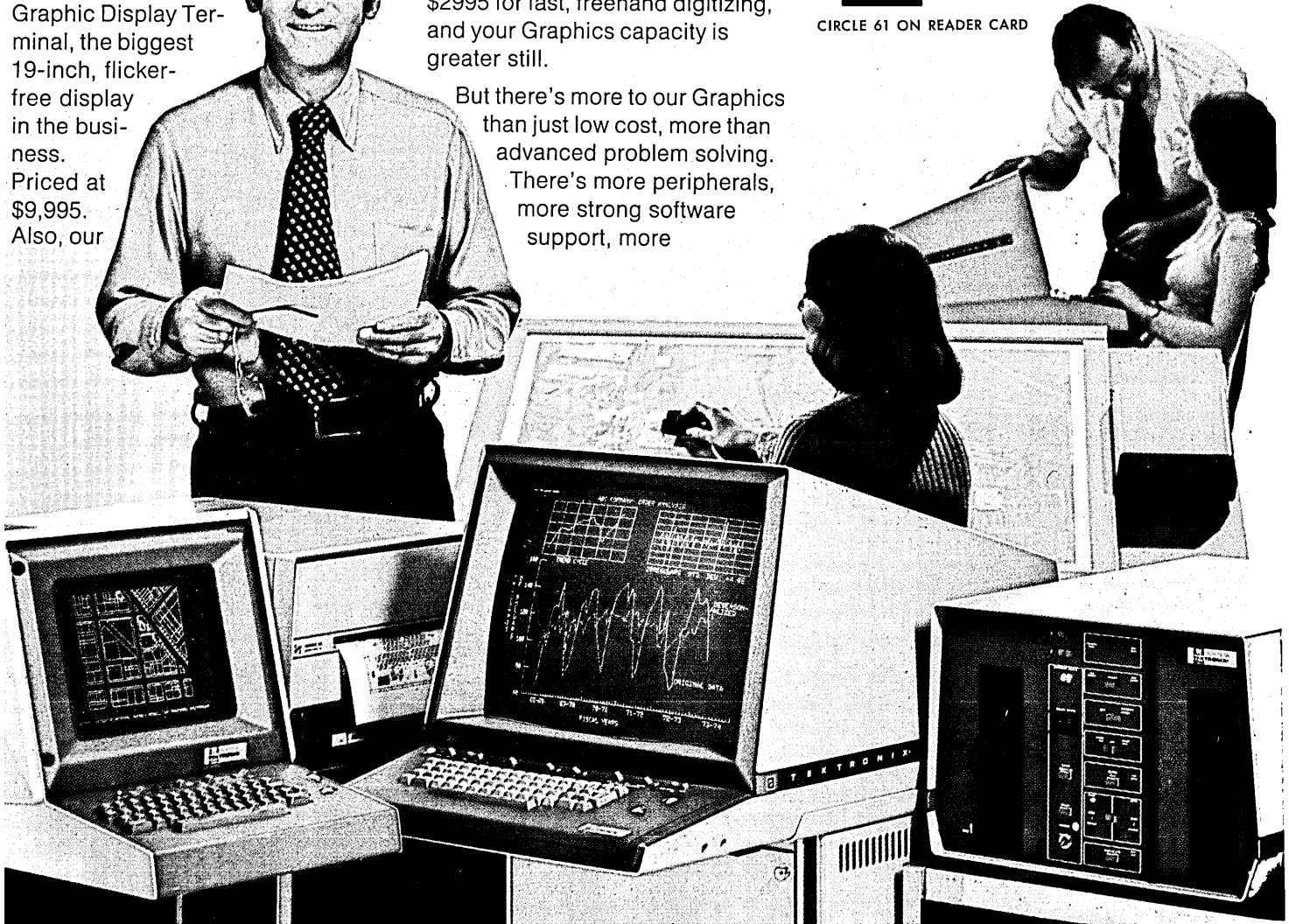
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people

ICL'S NEW EUROPEAN DIRECTOR

About 30 years ago, during the war, an IBM manager in France told a young messenger boy that the best he could aspire to would be an operator's job using IBM equipment. Not content with the verdict, young Roger Houbert crossed the English Channel and found a job with British Tabulating Machines as a trainee systems engineer. At the time he was the only Frenchman in BTM (which was then IBM's licensee in Britain).

Houbert worked his way up in the company as it changed its name and ownership, going through eight mergers to become ICL/IBM's biggest competitor in the U.K. today. Houbert went through almost as many metamorphoses. After seven years as an SE he ran the Midland region technical group, then became a salesman in Wolverhampton, and in the early fifties got very interested in the new HEC-2M computer—"a very, very slow drum machine, but revolutionary to us at the time."

In 1963 he spent three months in the U.S. when the company made its agreement with RCA to sell 301 and 1500 model computers. "That was another revolution," he says, "seeing the computer business in the U.S. It seemed very dynamic, with an entirely different approach from ours. The dynamic sales style and so on made a sharp contrast to our more gentlemanly approach." When he and several others came back from the U.S. they made a report pointing out the rapid advances in computers and the different sales style they'd seen. "We were still selling punched card equipment, but that era was going fast." To make the change the company ("ICL" by this time) appointed him and several others to be "computer executives," setting up technical sales and support groups.

Then in 1966, Houbert became an area manager in Manchester and in 1967 he was sent back to France to set up a marketing group in the French company. Two years later he became managing director there, a post he held until last August, when he took over ICL's Western European Division.

Five months later, after a weekend-long January meeting in Britain, the company's international activities were reorganized. The Western European Division and the Northern and Eastern European Division were combined under a single European Division—headed by ICL's first Frenchman, Roger Houbert.

For a Frenchman in an English company, Houbert still has an American approach. "I've had a lot of autonomy in the French company, and I see no reason why I shouldn't have a lot of autonomy in the European Division," he says, pointing out that the one sure



ROGER HOUBERT
"We can be smarter than IBM"

way to get and keep autonomy inside an organization is to be successful. "That's the right way—to do better than the objectives." The company has five year expectations, and he sets his own goals somewhat higher within that framework.

He succeeded visibly in ICL's French company, which became the largest foreign outpost, with 500 employees.

HE ENJOYS A TECHNICAL CHALLENGE

Donald Pritchard, president of Data Systems Engineering, Anaheim, Calif., is a man who likes a technical challenge.

He was one of the earliest respondents to the technical challenges presented by the use of minicomputers. He's been responding for the past 10 years and feels there always "will be problems (in the use of minis) where it will be necessary to sit down and do some special engineering." Toward this end, he has parlayed what started as a one man consulting firm into a 45-man company in eight years.

The French company now has about 300 installations ("on order or delivered") and Houbert points out that although there are still a few oldies around, about 270 of these are modern systems, and fully 120 are ICL's 2903 model. "We gained about 70% of those 2903 orders from the competition," he says proudly, noting that IBM's 1130 and System 3 as well as Honeywell Bull's 58 and Gamma-10 markets have been happy hunting grounds for ICL's French salesmen. The banking sector has also been fruitful, and ICL France has contributed to ICL's product development by developing a specification for a check-sorter that uses the CMC-7 reader prevalent in most French banks. Houbert feels his main contribution in France has been the creation of a flexible, open type organization, after years of a more autocratic and bureaucratic style. "Business has to change to fit people, what they aspire to, what motivates them," he says. "It can't be the other way around. In this sense I think we can be smarter than IBM. We don't have a big book with the answer to any problem on page 427. We allow people to use their initiative, and simply define the areas where they can exercise it. It's surprising how many good ideas we get. Competing against a more monolithic IBM, we can be flexible, fast, adaptable."

Looking from his 500-man organization in France to the 1,300-man organization in 17 European countries, he doesn't think there will be any problems of scaling this style up. The country managers' autonomy will be the key. "In the first year I will be successful primarily if we achieve the right kind of management at all levels," Houbert says. "That's crucial, because what happens this year will dictate the shape of future years."

Like many another entrepreneur in the minicomputer field in California's Orange county, Prichard is an alumnus of Decision Control Data Machines where he was employed from 1965 to 1967 and where, he says, "I learned more in two years than in any other period of my life."

As an undergraduate student at San Diego State College during the early '60s, he was seeking his technical challenges in the areas of solid state physics, semiconductor theory, and tunnel diode theory. But he was introduced to computers. While in school,

people

he held down a circuit design technician's job at Stromberg Carlson. He did work on a character tube which became part of a display system installed with an Air Force Univac 1103 which was, Pritchard said, the first computer intervention device.

Pritchard is quick to mention the people who influenced the course of his career. One was John Moser, "a young engineer," under whom he worked at Stromberg Carlson while he was a student. Moser later became a founder of and is now a vice president at Computer Machinery Corp., a data entry device manufacturer.

Another was Phil Davy, now vice president, technical operations, for Basic/Four Corp. Pritchard says Davy had more to do than anyone or anything else with his getting into the computer business. Pritchard's first job after getting his B.S. from San Diego State was with Strazza Industries, El Cajon, Calif. in the digital systems group. Strazza got a minicomputer from Clary Corp. for whom Davy was then working. When Strazza had programming problems, Clary sent out Davy. "I developed such a respect for Phil and such an interest in computers, I went to work for Clary."

He stayed at Clary for one year trying to help promote systems business. "It was too early. People weren't ready to accept minis. They weren't big enough."

Then came the two years at Decision Control Data Machines where he worked under Larry Goshorn, a third person he credits with influencing the course of his career. This relationship has now come full circle. Goshorn is now president of General Automation, Inc. A year ago this month, Data Systems Engineering became a wholly

owned subsidiary of General Automation.

Pritchard left Decision Control because "the technical challenge wasn't there." He saw a need for a "firm made up of highly qualified, above average computer engineers on both the hardware side and the software side." And that's the kind of firm he set out to organize in 1967, a firm that "would deal with individual problems, strictly involving minis, mini-interfaced, and mini systems."

It was a one-man company for the first year. "I was involved with many computer design projects, mostly with companies just getting started in the Orange county area."

Five years ago the company got its



DONALD PRITCHARD
Photographs the outdoors

first big contract, one of which Pritchard is quite proud and one which meant growth and a new facility and a number of new hobbies for Pritchard who says he'd spent most of his time before this immersed in technology and business.

The contract was for design of the Basic/Four small business computer

system. It included construction of a prototype and two pre-production systems and training of Basic/Four's initial employees (that company was just getting started). "Training is an important part of our company philosophy," says Pritchard.

The contract created a need for additional people and additional space. The company took over a facility which had been occupied by an out-of-business graphics company. With it they got a lot of camera equipment. Pritchard hired five of the people who had been with the graphics firm and set up a photographic division to do printed circuit board photography. He also became personally interested in photography. And, since he likes to photograph the outdoors, he became interested in back packing, motorcycling, and skiing. Most of his photography work is with stills but he has developed a movie camera which fits in a helmet for taking movies while on the slopes or on his motorcycle.

It was early in 1973 that Pritchard began to feel his company's growth had become limited. "We were spending more time on systems work and less with manufacturers. We felt we needed an affiliate."

"Other mini manufacturers had approached me but I went to see Larry Goshorn." Pritchard says the affiliation has worked well on both sides. "We sit down with General Automation customers with special engineering problems and they have opened up new markets for us and have given us a sales force."

The affiliation even has made it possible for Data Systems Engineering to come up with a product. It's a data collection terminal called the model 2801, primarily aimed at factory data collection applications. General Automation does the manufacturing and General Automation salesmen handle the sales. □

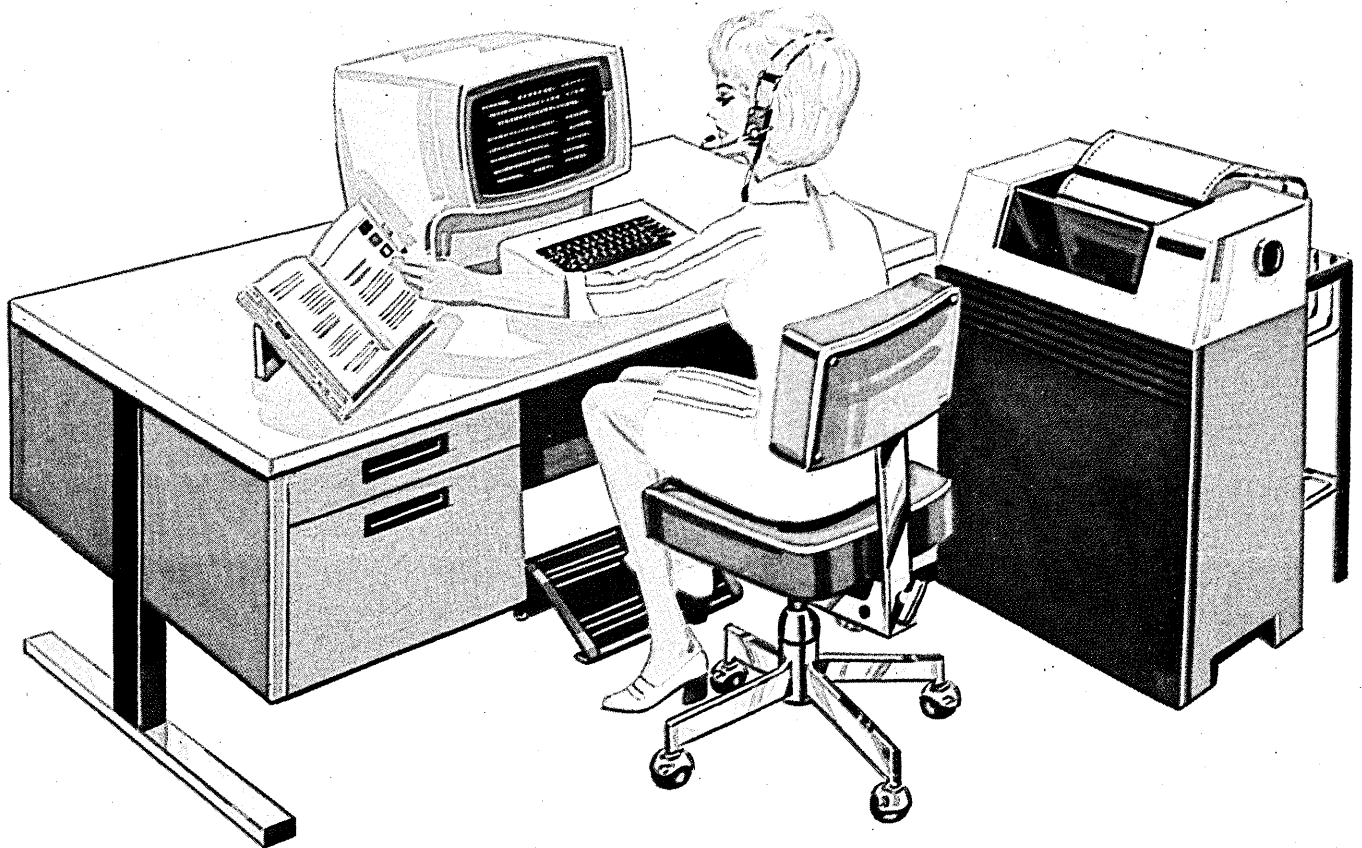
IN NEW POSTS . . .

DAVID R. DALZELL was appointed manager of Corporate Systems at Picker Corp., Cleveland, O. . . EDWARD L. GELBACH became senior vice president and general manager of new Intel Corp. Components Div. which includes its memory and peripheral components and microprocessor product lines . . . The American Society for Information Science elected JOHN SHERROD, an Informatics Inc. Information Systems Co. vice president, as chairman of its Special Interest Group on Public/Private Interface . . . SEYMOUR BLAU and MARSHALL CAMPBELL were elected vice chairman of the board and president, respectively, of Distronics Corp., the Western Union Teleprocessing division which provides computerized information services to wholesale distributors . . . Directors of Gould Inc., Chicago, elected DANIEL T. CARROLL as president . . . DENNIS DE CESARE was appointed data

processing manager for Davol Inc, Cranston and Providence, R. I. . . EVERETT T. BAHRE was named vice president and general manager of Sperry Univac's Information Storage Systems (ISS) operations in Cupertino, Calif. . . Directors of Computer Devices, Inc., Burlington, Mass., elected William E. Northfield, founder and president, to the office of chairman of the board . . . ALFRED CHRISTOFFERSON, JR., was named manager of engineering, Tucson, for TEC, Inc. . . JOHN P. DAVIS was elected group vice president, measurement systems group, Tesdata Systems Corp., McLean, Va. . . GARY LUTTJOHANN joined the staff of Fluor Pioneer Inc., Chicago, as manager, computer systems and programming . . . JOHN F. CROSSON was named director of membership services for the Assn. for Systems Management . . . NORMAN N. FELDMAN is new vice president of Honeywell's North American Systems Operation.

Important things to consider about terminal work stations...

1. Correct Keyboard Height
2. Convenient Viewing Height
3. Adequate Work Surface
4. Storage Space for Modems and Dataphones
5. Access to phones, files and reference material



...and how to be sure you get them

To get the best operator performance and productivity, proper work environments are essential for your CRT terminal operators. Wright Line Terminal Work Stations are recommended by leading terminal manufacturers. They are specially designed to provide proper viewing and keyboard heights, adequate work surface, storage space for modems, other electronic equipment and personal effects.

A wide variety of configurations is available, including swivel tops to allow access by more than one operator.

Circle readers' service number or write direct for illustrated brochure.



COMPUTER ACCESSORIES

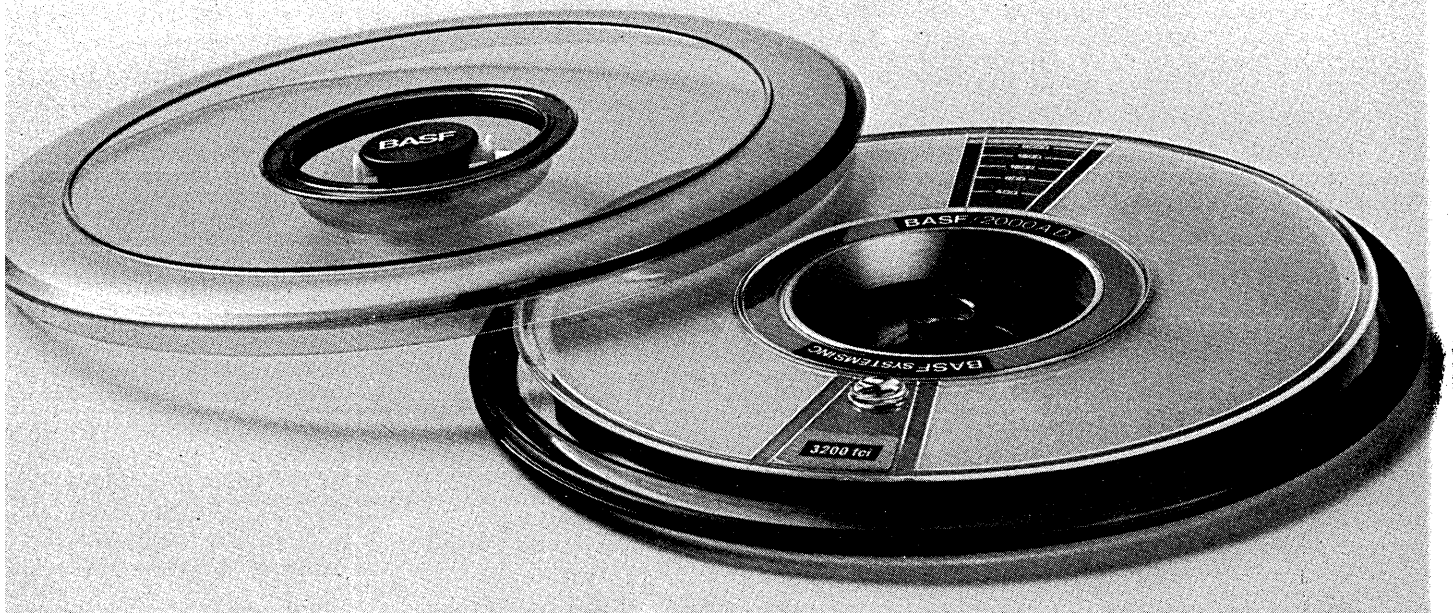
160 GOLD STAR BOULEVARD, WORCESTER, MASSACHUSETTS • A Division of BARRY WRIGHT CORPORATION

April, 1975

CIRCLE 69 ON READER CARD

15

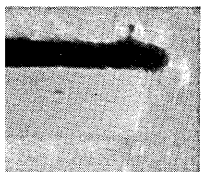
If you think all premium computer tapes are alike, take a closer look at BASF 2000/A.D.



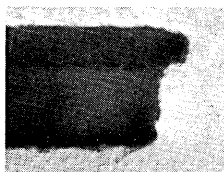
Because all premium computer tapes are 100% certified and meet industry standards, you might think they're all equal. They aren't. The important difference is the margin by which a manufacturer's standards exceed industry standards. It's this extra margin that allows you a margin for errors. Let's look at a few superior points of BASF 2000/A.D. computer tape:

Debris-free edges

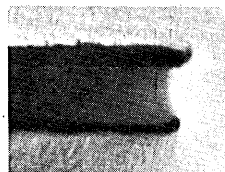
Rough edges and debris on tapes are the result of inferior slitting, which causes the coating to overhang the base. The projecting edges become detached from tape guides and drive rollers. The result: loss of head-to-tape contact... and errors. BASF has eliminated these problems with an exclusive double-cut slitting technique that keeps our tape edges perfectly debris-free.



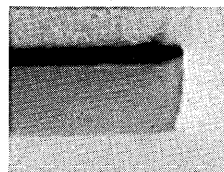
BRAND A



BRAND B



BRAND C



BASF

Straight edges

Another hassle, even with premium tapes, is edge waviness. This causes intermittent reading and writing errors. Dynamic conditions during tape transport can occasionally compensate for the waviness, so it's a tough job to track down. Again, our double-cut slitting technique keeps 2000/A.D. edges absolutely straight and symmetrical.

Uniform width

Uniform tape width is essential, in order to avoid dynamic skew errors. According to industry standards, a width tolerance of $\pm .002$ " is acceptable. We peg our 2000/A.D. standard at $\pm .001$ ". It's a small detail, but it could eliminate a few 3:00 a.m. debugging sessions.

Superior coating

We've developed a new "hotter oxide"

coating... a higher energy oxide that produces an output consistently higher than that of the National Bureau of Standards reference tape. Then we apply this oxide with a unique coating technique that provides a more even dispersion of oxide particles in the binder. For any bit density, including 6250 B.P.I., 2000/A.D. gives you more reliable writing and reading... better bit-to-bit uniformity... fewer drop-ins and drop-outs. And virtually no permanent errors.

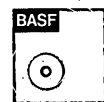
Hard surface

Head wear is inevitable, but it shouldn't be excessive. That's why we developed a finishing operation that gives 2000/A.D. a harder, smoother surface than anyone else's. It's a lot kinder to your tape head, and keeps your maintenance time to a minimum.

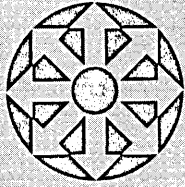
And in conclusion

2000/A.D. costs no more than other premium tapes. You're already paying for BASF quality... you might as well have it. For the whole story of how 2000/A.D. stacks up against the competition, write to BASF Systems, Crosby Drive, Bedford, Mass. 01730.

CIRCLE 12 ON READER CARD



You're already paying for BASF quality, you might as well have it.



LOOK AHEAD

ACTION IN NUMBERS RACKET

While IBM was busy disclaiming that it was writing off anything but the term "FS," rumors of more imminent systems popped up. One source says the next models will be the 151 and 161 -- upgrades for the 158 and 168. The 151 unveiling is due this month. Others doubt IBM would downgrade the number of an upgrade, but they claim IBM is planning dedicated machines. These could be thought of as upgrades for specific tasks like time-sharing, data base management, and scientific applications. The right floppy disc could scratch out instructions not necessary to these tasks, streamlining the 158 and 168 into a 151, 152, or 153. And then there's the System 2. An ex-IBMer now with a minicomputer company swears that the 2 is still in the plans as IBM's "real minicomputer." The System/32 could be the user's prelude to the 2.

THE FUTURE MAY HOLD AN OS SYSTEM

Computer market researchers at Quantum Science Corp. think IBM might be ready next year to ship a high performance OS machine--not VS--that would have three and a half times the performance of the 370/195 and nearly nine times that of the VS 370/168. It would have up to 16 megabytes of bipolar main memory and be priced one and a half times that of the \$195,000 a month 195. In the hierarchy of storage would be a billion byte disc drive, code-named the Apollo, and the console printer, replacing the 3210 and 3215 models, would be an ink jet device. The line printer, a non impact device using a laser, would run at up to 10,000 lpm. Quantum Science also expects that upgrades of the 145, 158 and 168, with four times their present performance, will be offered within the next five years.

(In its announcement in March that it was dropping the label Future Systems for its new machines, IBM said this "in no way implies that our development efforts on products for the future have stopped." In its pretrial brief in the Justice Dept. antitrust case, IBM said it was "betting the company" on a new computer generation, alluding to press reports in the mid-sixties that it bet the company in its development of the 360 line.)

MEMORY AT .04 CENTS A BIT

That MOS electron beam memory that has been humming away on CDC's Star computer in Minneapolis is just a hint of what a memory manufacturer hopes to offer IBM users before long. The memory, made by Micro-Bit Corp., Lexington, Mass., will eventually be aimed at the 370 main memory add-on and 2305 head-per-track disc replacement markets. The preproduction prototype at CDC has some 1.2 million bits of information, but Micro-Bit currently is working on a production prototype--called the 7000 system -- that would have 100 million bits, 75 million for data storage, 25 million for parallel error correction. But what is raising eyebrows more than anything else is the end user price that Micro-Bit is said to be shooting for -- .04 cents a bit. That is cheaper than anything currently on the market by a factor of 25. Micro-Bit is said to be planning to offer a "real product" by the end of the year. No one can say yet exactly when the firm will be ready to move in the IBM marketplace, but in-house engineering teams are working hard on interfaces for the 145 and 158.

Micro-Bit has some blue chip financial investors -- including CDC, Sprague Electric, and Exxon. Other mainframers besides CDC are said to have been talking with Micro-Bit about using the memories.

DATUM TO DEBUT ENHANCER

Datum, Inc., seven-year-old Anaheim, Calif. manufacturer of peripherals for minicomputers, will introduce its own mini at the NCC next month and, by the end of May will have produced the first 15 production units. Called Enhancer 1, it is a 16-bit, fully parallel, bus-organized, microprogrammable processor, designed to emulate most small to medium scale computers. "We didn't stop with just the capability to emulate a computer's instruction set," said Ron Murr, director-engineering of Datum's Computer Products Div. and the new mini's principal designer. "Enhancer 1 can be configured to emulate any I/O and memory

LOOK AHEAD

interface combination making possible use of an existing family of peripherals and memories without modification." Murr, who had previous experience with microprogrammable minis with both Microdata and California Data Processors, said the use of firmware lets a user custom-tailor emulation to meet unique requirements.

MINI SYSTEMS IN THE WINGS AT WANG

Although no announcement has been made yet, Wang Laboratories' salesmen are starting to tell some customers they can expect to see new mini-based systems from the Massachusetts firm. The systems, based on Wang's fast selling 2200, should accelerate the firm's thrust into the low end commercial market as well as maintain Wang's spot in the scientific market. The smallest system--a cassette based configuration--should sell in the \$5,000 to \$6,000 ballpark while a larger floppy disc based system should sell for just under \$10,000 in most configurations. The largest model, a full blown mini disc based system could cost as much as \$30,000 but that would include a crt, substantial memory, and a new dot matrix printer that Wang has designed. There is some speculation that the printer may eventually be broken out and sold directly to end users. There's additional speculation to the effect that the floppy disc based system could eventually be offered as an intelligent terminal.

THE NCC: AN UP SHOW IN A DOWN YEAR

If trade shows are indicators, the computer industry is recession resistant. The National Computer Conference May 19-22 will draw 270 exhibitors to the Anaheim, Calif., Convention Center. That's 20 more companies than the previous year's event in Chicago, although the 800 booths they'll occupy remains the same. The sponsoring American Federation of Information Processing Societies (AFIPS) says five exhibitors who cancelled in December and January because of the economy, have since renewed.

Harris Corp. has the largest investment in exhibit space with 3,000 sq. ft., followed by Xerox, General Automation, Control Data, IBM and Eastman Kodak (paper shortages have made this a big year for microfilm). AFIPS predicts a turnout of about 25,000 persons to the annual conference, no change from the Chicago turnout and about 7,000 fewer than the number attending the '73 NCC in New York. "Hard times bring out a more qualified audience," explains an optimistic AFIPS official.

MILLIONS FOR OFFENSE

In the Telex case, the Appeals Court felt the independent PCM manufacturers had a big, easy-to-get market among non-IBM mainframes. Floyd Walker, Telex attorney, said in appeal that the interfaces cost more than \$1 million to develop and used Formation Inc., a N.J. firm that has built RCA interfaces for Telex peripherals, as an example. Formation engineers were more specific. The engineering bill for each interface they have built for the IBM 3420 tape drives (to RCA Spectra and 3301, Honeywell 2000 series, and DEC cpu's) is \$200-300K. It jumps to \$300-400K for each 3330 disc drive interface. So figure several million dollars to attack that broad, relevant market that the appeals court discovered. That doesn't count the marketing costs expended in trying to prove to each of these smaller, non-IBM markets that a mixed shop is worth the savings. And, in each case, there is the stubborn resistance of the mainframer. Cambridge and Honeywell still have not reached court over the memory add-on for the H 2000 series (see July '74, p. 120).

THE PERFECT NEGOTIATOR?

The perfect man to negotiate a consent decree between the Justice Dept. and IBM may soon be on the scene. He is Harold B. Tyler, a federal district court judge in New York, who has been nominated for the Justice Dept.'s No. 2 post of Deputy Attorney General. Tyler is a former Exeter Academy prep school classmate of IBM general counsel, Nicholas Katzenbach (the two men later went on to Princeton). Once in the Justice Dept., Tyler would have free and easy

(Continued on page 134)

If you're a small user with a small data center, or a big user with a small satellite data center, look at our new 1/2 key station (System 1200).

It has the muscle of a small operations stand-by. Data purification and reformatting, plus complete range and error checking. And verification, accumulation and editing. All so you'll send clean and accurate data to your mainframe.

And you get your pick of up to 256 different formats. Even BJE communications, when you want to call home.

It's all wrapped up in a single, economical package. Disk, processor and tape drive are included in the compact console unit.

The key stations are the same ones proven for over two years now in our larger System 2400 key-to-disk.

The 1200 has all bits to offer your small data center. Available to your nearby MID/Softco, or to our head quarters at (616) 762-2262, will bring you to the factory.

Think about your self why data entry products like our Data Recorder, our powerful system 2400's and our new compact System 1200 have made our users the second largest in the industry. Mohawk Data Sciences Corp., Ulster, NY 12582.

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Circle 30 on Reader Card



**Now Mohawk has
a powerful key-to-disk
everybody can afford.**

Ford improves dealers' parts control "Silent 700" data terminals



Recently, Ford Motor Company decided to upgrade the communications network used to communicate parts inventory and management accounting data between its Dearborn, Michigan Computer Center and the nationwide network of Ford and Lincoln-Mercury dealerships.

This network is a crucial part of two services that Ford offers to its dealerships . . . Automated Inventory Management (AIM) and

Computerized Management Accounting (CMA). Dealers subscribing to these two services receive extensive parts inventory control reports and a wide spectrum of accounting and management information reports.

Striving to improve service to its dealers, Ford wanted more efficient data entry, simpler operating procedures, and greater accuracy than was offered by the existing mechanical teletypewriters. For this purpose, TI data terminals operating

with fast, accurate magnetic tape cassettes offered the best alternative.

"Silent 700" Automatic Send-Receive and Programmable Data Terminals from Texas Instruments provided the answers. According to a spokesman for Ford's Dealer Computer Services, "These terminals will provide major advancements through increased equipment reliability, data preparation efficiency, and improved data transmission integrity."

Improving man's effectiveness through electronics

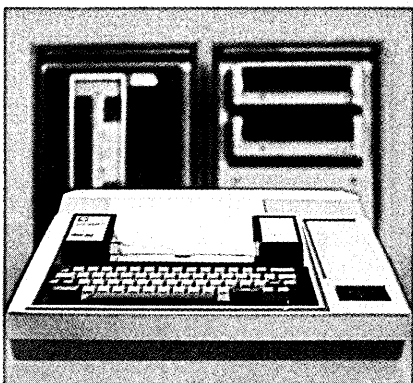
and management accounting with from Texas Instruments.

Operating Simplicity

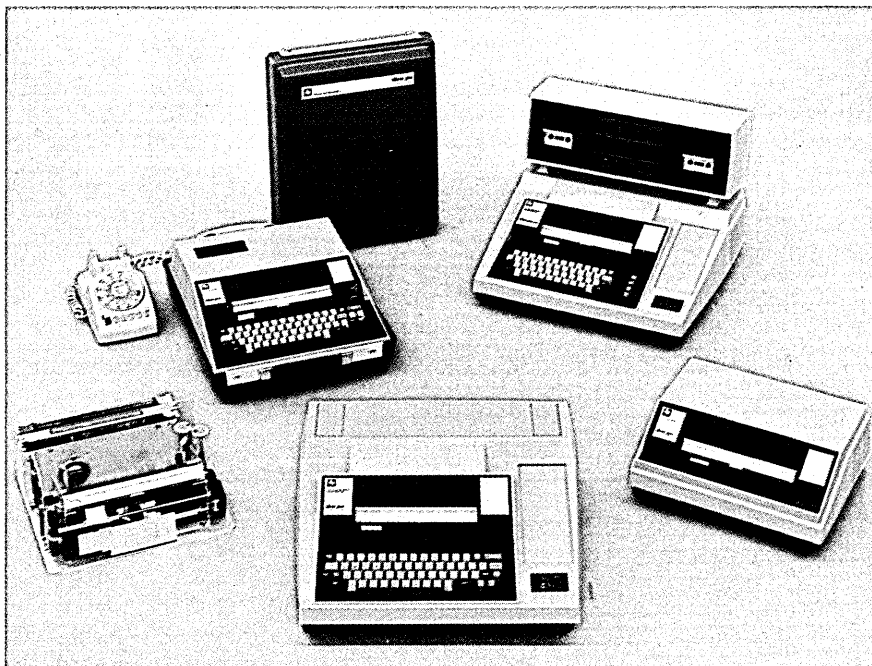
Reusable magnetic tape cassettes — easily edited, corrected and retransmitted — along with proven reliability, place the "Silent 700" ASR and Programmable Terminals far above those of conventional paper tape terminals in capturing inventory, management and accounting data. Built-in intelligence enables these "Silent 700" terminals to guide operators in their data entry procedures, check the data for correctness and format before recording it on tape . . . and later monitor data transmission to Ford's Dearborn computer facility.

And, all this is done with powerful performance features at a reasonable cost per unit . . . which means continued cost-effective communications for Ford and its dealers.

Data communications applications, like this challenging one at Ford, call for a wide range of capabilities in devising solutions. Texas Instruments has this capability . . . to serve you.



"Silent 700" data terminals combine with "EMS II" to form powerful data communication systems . . . for cost-effective applications



Other models from the Texas Instruments line of "Silent 700" data terminals

Is your problem different?

No matter whether your data communications requirements involve only a few pieces of equipment, several hundred units, or even a complete systems network . . . TI can provide the depth of application experience to obtain an effective solution.

A popular family of "Silent 700" Electronic Data Terminals backed by EMS* II Electronic Message Switching Systems, a host of peripherals and software . . . and a network of sales and service offices backed by TI-CARE† . . . enables us to give you complete service from design through support.

What's more, we can do it efficiently . . . just as we did it for Ford. And, we think you'll be completely satisfied with the results . . . just as satisfied as our current customers are.



Dispatcher at "TI CARE" center initiates service ticket via CRT to computer and transfers call to "TI CARE" technician

For more information, contact your nearest TI office listed below. Or, write Texas Instruments Incorporated, P. O. Box 1444, M/S 784, Houston, Texas 77001. Or, call (713) 494-5115, ext. 2126.



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TEXAS INSTRUMENTS
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calendar

MAY

National Seminar, Business Forms Management Assn., May 7-9, Chicago. Discussions on OCR forms and micrographics, as well as cost reduction sessions, are scheduled for the meeting sponsored by Business Forms Management Assn. aimed at managers, analysts, designers, and administrators. Fees: \$150, members; \$180, nonmembers. Contact: Joseph Miller, A. B. Dick Co., 5700 W. Touhy, Chicago, Ill. 60648, (312) 763-1900.

28th Annual ICA Conference and Telecommunications Exposition, May 11-16, San Francisco. Seminars, case studies, and special presentations will highlight this year's conference for representatives from industry, commerce, government, and education. There will be displays of products and services in the telecommunications field. Attendance is limited to ICA members and their invited guests.

National Computer Conference, May 19-22, Anaheim. The sponsor, American Federation of Information Processing Societies (AFIPS) is offering a \$15 discount to those registering before May 1. Preregistration of \$60 for the full conference (registration at the door is \$75) covers the NCC program, four days of exhibits, 20% discount on the conference luncheons and a copy of the 800-page NCC '75 proceedings. Other registration fees are: \$25, one-day, program and exhibits; \$25, four-day exhibits only; \$10, one-day exhibits only; \$10, students, four days. AFIPS also offers a discount travel plan. Contact: AFIPS, 210 Summit Ave., Montvale, N.J. 07645, toll-free number: (800) 631-7070; in New Jersey, (201) 391-9810.

23rd Annual Meeting, Digital Computer Assn., May 23, Los Angeles. The annual March meeting has been rescheduled to the Friday after the National Computer Conference in nearby Anaheim to allow Easterners attending the show to drop in on the oldest computer association in the West, forerunner of SHARE and ACM. Fee for the 6:30 p.m. meeting: \$10 (includes dinner). For additional information, contact Sandy Lanzarotta, Xerox Corp., 701 S. Aviation Blvd., El Segundo, Calif. 90245, (213) 679-4511 ext. 7181.

JUNE

International Word Processing Assn. Conference, June 4-6, Toronto. Syntopican III will cover "all phases in the development and performance of word processing methods, systems and applications." A full exhibit of equipment, machines and supplies will be offered, along with plenary sessions and general and specialized workshops. Fees: \$100, members, IWP, AMS, and OMMA; \$125, nonmembers. Contact: Linda Zangrilli, IWP, Maryland Rd., Willow Grove, Pa. 19090, (215) 657-3220.

14th Annual Technical Symposium, Association for Computing Machinery, (ACM), June 19, Gaithersburg, Maryland. "Computing in the Mid-'70s: An Assessment" is sponsored by the Washington, D.C. chapter, ACM, and the Institute of Computer Sciences and Technology, National Bureau of Standards (NBS). The symposium will feature reports on theoretical work, projects, and techniques in multiprocessors, structured programming, data security,

computer communications, and data management. Fees: \$20, members; \$25, nonmembers; \$10, students (all \$5 additional at the door). Contact: A. J. Neumann, NBS, Washington, D.C. 20234, (301) 921-3201.

2nd Annual Conference, Computer Graphics and Interactive Techniques, June 25-27, Bowling Green. Current developments and research in theory and techniques, hardware and software systems, and applications, as related to computer graphics, will highlight the meeting sponsored by ACM/SIGGRAPH. Those with a limited background may attend a workshop and tutorial on computer graphics, June 23-24. Fees: \$30 SIGGRAPH member; \$35, ACM member; \$40, nonmember; (all \$50 after May 31); \$5, students. Contact: David L. Fulton, Dept. of Computer Science, Bowling Green State Univ., Bowling Green, Ohio 43403, (419) 372-0340.

Federal Government Data Systems Conference, June 25-27, Washington, D.C. The American Institute of Industrial Engineers (AIIE) sponsors this government-industry conference on the federal government's use of automated data processing (ADP) over the next decade. Topics include predicted technology, evolving procurement regulations, and major agency system requirements. The conference is oriented to executives and professionals in government (ADP systems and procurement) and industry (systems, marketing, and contracts). Fees: \$195, government and educators; \$295, industry. Contact: AIIE Seminars, P.O. Box 25116, Los Angeles, Calif. 90025, (213) 826-7572.

3rd Annual Conference, EDP Auditors Assn., June 26-27, Philadelphia. Dp auditors, financial executives and dp specialists will attend this combination seminar and workshop entitled "Let's Be Specific." Exhibits of dp equipment will be on display. Fees: \$125, members; \$150, nonmembers (can be applied to membership). Contact: Boris Weisman, 1845 Walnut St., Philadelphia, Pa. 19103, (215) 491-1872.

Info/Expo '75, June 29-July 2, Atlanta. Data Processing Management Assn. (DPMA) explores the theme "Managing for Success" at its 24th annual international data processing conference and business exposition. Emphasis will be on professional management development, with other sessions devoted to technical subjects, personal growth topics, and product and service discussions. Fees: \$150, members; \$190, nonmembers and corporate teams; one-day registration, \$50, members; \$65, nonmembers and corporate teams. \$15, student members and \$25, other students. Contact: Martin H. Bowerman, DPMA, 505 Busse Hwy., Park Ridge, Ill., (312) 825-3124.

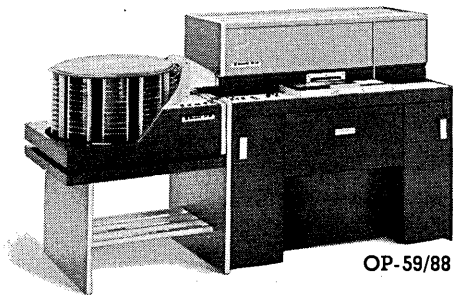
CALL FOR PAPERS

National Telecommunications Conference, Dec. 1-3, New Orleans. Original papers are invited on all aspects of telecommunications. Prospective authors should submit five copies of both the paper and a one-page summary *no later than May 1* to I. N. Howell, Jr., South Central Bell Telephone Co., P.O. Box 771, Birmingham, Ala. 35201. Completed manuscript must be submitted for publication by August 1 and authors of accepted papers will make a 20-minute formal presentation at the conference. The IEEE is sponsoring the meeting; conference theme is "Communications—Nucleus of a Nation."

Conferences are generally listed only once. Please check recent issues of DATAMATION for additional meetings scheduled during these months.

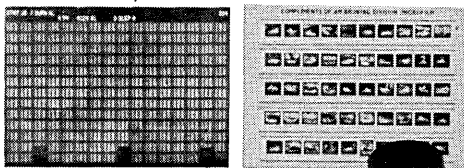
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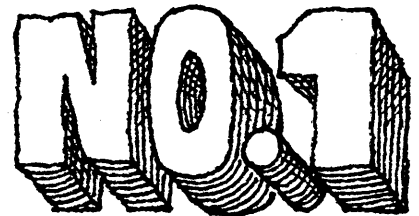
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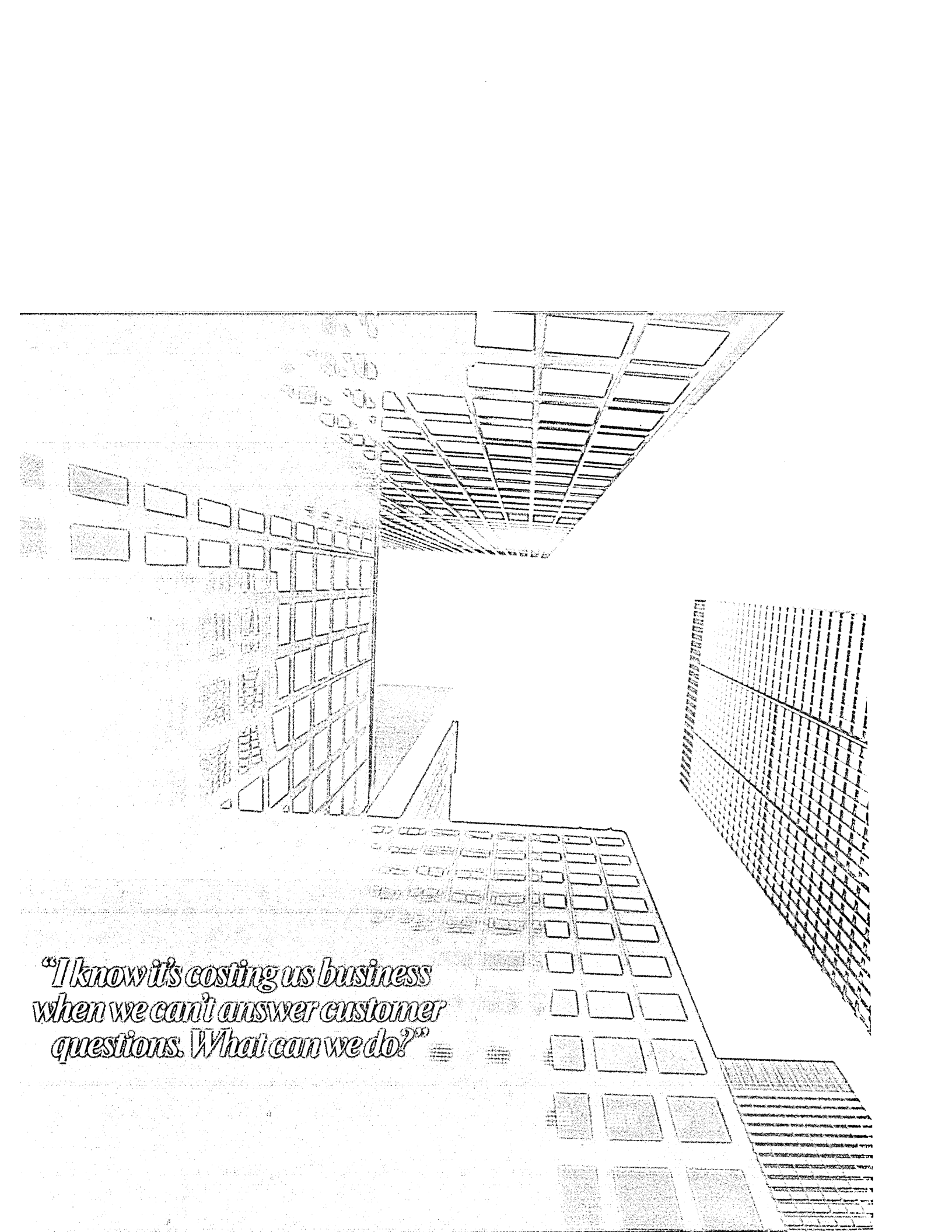
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Cleaning any keyboard dirty is easy. From dirt to oil, things become more difficult. Because the contacts on mechanical keyboards are very sensitive to contamination. And if the dirt hasn't already gotten to them, the cleaning process might.

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So things like dirt and coffee can't get in. And neither can a bath in hot, sudsy water.

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books

The Sun Never Sets on IBM: The Culture and Folklore of IBM World Trade

by Nancy Foy
William Morrow & Co., Inc.,
New York, 1975
218 pp. \$7.95
(Entitled *The IBM World in the UK*,
Eyre Methuen Publishers, London,
1974, 218 pp. £4.25)

In this book, Nancy Foy attempts to present the story of the two IBMs, Domestic and World Trade, as seen through the eyes of a European. With brevity and freshness, and combining precision with detail sufficient to give a clear picture, Miss Foy relates the rise, the glory, and the problems of the two halves of the company. She treats the story in much the way one might reflect upon a composer's or conductor's work, and its continuation by his descendants.

The tune was set by Thomas J. Watson the elder, and the original orchestra was closely led to his beat. His perception of ethics dominated like a major theme, and each player had little room for improvisation. Sales training has been likened to repetitive orchestra practice, yet was conducted with the awareness that, like musicians, a strong cooperative effort is required to "make beautiful music." Personnel policies made for "happy musicians," and as a result, the orchestra grew and grew.

While Thomas Watson Jr. became conductor of the orchestra at home, the second son, Dick, undertook supervision of the one abroad. The latter effort was secondary to the home company for a long time, since differences in the nature of national groups impeded early growth, at least in comparison to the gigantic proportions of the domestic arrangements. But finally a one-world theme was effectively played by all, as the unification of the product line became a reality. In consequence, combined royalties returned by the polycentric international orchestra of World Trade have now surpassed the revenues flowing to the original orchestra at home.

Nancy Foy points out the idiosyn-

crasies of the elder Watson, but she also states that while paternalistic rule persisted in many aspects, it is really the talented contributions of the people who make up IBM that explain the company's phenomenal growth. Miss Foy describes vividly the value placed on personnel and the willingness of management to listen to its people.

While the strict rules of the Old Man were the foundations on which Domestic grew, it was Dick Watson, and the foreign nationals developed under him, who helped the overseas operations evolve into an international brotherhood—a feat not achieved by competitors even where they had an original product advantage. The ability to accept differing viewpoints, regardless of origin, and integrate them into the mainstream, made IBM an effective multinational company early. Allowing for some moonlighting to go on abroad to parallel the massive centrally planned R&D efforts has permitted "wild duck" ideas to develop which have taken IBM into new fields, such as the Carnation project in Europe which produced the 3750 voice and data handling system.

Recognition of its dependence on its employees (and on large customers), and the possibilities and consequences of their being manipulated by outside forces, have created what Miss Foy describes as IBM's almost neurotic fear of unions, governments, and the press. She raises the question of whether or not IBM can master its future, and finds that its problems lie less in antitrust, unions, and economic nationalism. Rather they lie in IBM's ability to live in a no growth environment, in finding useful applications for all the money it has available, and last, but by no means least, in its ability to come up with the real reorganization that can fight off the bureaucratic effects of its enormous size.

In all, this book provides a refreshing departure from the tone that has become so common lately in publications dealing with IBM. Nancy Foy did her homework well, and presents her findings "without anger and after careful study." She wrote with a sharp pen, not with a bludgeon.

—O. H. Rothenbuecher

Mr. Rothenbuecher, a senior staff member of Arthur D. Little, Inc., is an expert in multinational and conglomerate organizations. He has been fa-

miliar with the dp industry since working with some of the first Univac installations in Germany in the 1950s.

BOOK BRIEFS . . .

Directory of Data Bases in the Social and Behavioral Sciences

Vivian S. Sessions, ed.
Science Associates/International, Inc.,
New York, 1974
312 pp. \$35

As pointed out in the preface by Dr. Mina Rees, past president of the AAAS, this volume has been assembled by a librarian. In fact, Ms. Sessions is the Director, Center for the Advancement of Library-Information Science, City University of New York. This alone would make the volume a rarity—the librarians and the information scientists are not famed for their past cooperative efforts. More important however, this is a useful and detailed listing of data bases, here and abroad, that pertain to the social and behavioral sciences.

The information is presented in a clear, concise format and includes such mundane but hard to obtain details as the name, address, and telephone number of the person to contact. Just this feature alone separates this volume from one of those maddening listings that tantalize a reader with an installation name and provide no additional clues. Where applicable the access conditions are stated and, of course, the form of storage media.

Handbook of APL Programming

by Clark Wiedmann
Petrocelli Books, 1974
213 pp. \$12.95

Intended for both "the novice and the sophisticate," the book contains numerous examples of basic and advanced APL functions used in both business and scientific programming environments.

Science & Technology in the Arts

by Stewart Kranz
Van Nostrand Reinhold Co., 1974
335 pp. \$40.00

This richly illustrated, handsome, over-size book explores the collaboration of scientists and engineers with artists of the '60s and '70s through the use of cinematography, computer-generated graphics, and other technical tools. Interviews with these personalities offer insight into the new wave of creativity.

Automated Design of Control Systems

by C. W. Merriam III
Gordon & Breach, 1974
339 pp. \$32.50

Designed for advanced students and professional engineers, this volume ex-

source data

plores the use of linearization and optimization techniques as a means of achieving automated design. The book contains a large quantity of problems covering deterministic, stochastic, and finite-time design.

The Anatomy of a Compiler

by John A. N. Lee
Van Nostrand Reinhold Co., 1974
470 pp. \$17.95

This second edition has been expanded to include recent developments in compiler design and implementation, and extensions in language usage resulting from those advances. The first edition focused on FORTRAN; this one is multilingual.

Annual Review of Information Science and Technology

Carlos A. Cuadra, ed.
American Society for Information Science, Washington, D.C., 1974
457 pp. \$22.00

The latest volume in a series of "state of the profession" reports describes and appraises significant developments during the past year, as reported in the literature. This report notes the movements toward networking and the growth in use of on-line information retrieval services.

The Auerbach Annual: 1974 Best Computer Papers

Isaac L. Auerbach, ed.
Petrocelli Books, 1975
346 pp. \$17.50

Culled from the yearly deluge of computer papers, this volume offers a "collection of significant papers . . . which will provide the reader with an overview of advanced thinking in the information processing sciences."



Languages and Systems Reliability

Infotech continues its State of the Art series with reports number 19, *Commercial Language Systems*, and number 20, *Computer Systems Reliability*. These hefty volumes follow a standard format of extensive analysis (150 to 200+ pages), followed by numerous presentations and invited papers by experts in the field. There are always very useful annotated bibliographies and thorough indexes.

The 555-page volume on languages discusses a variety of languages available and the essential needs of the commercial user. Every aspect of choosing a language, from its ideal properties to its practical use in commercial programming, is detailed.

The 829-page report on systems reliability exhaustively examines unreliability in hardware, systems, and software; how to reduce it in the design and production process; and how to detect it as well as recover from it. Experts such as Ramamoorthy of Berkeley and Mathur of the Univ. of Missouri are heard from on software and hardware respectively. Three essential approaches to improving reliability are discussed in detail: simplification, testing, and redundancy.

Prices for the volumes are \$125 each, or \$700 for eight reports on a subscription basis. INFOTECH INFORMATION LTD., Berkshire, England.

FOR DATA CIRCLE 200 ON READER CARD

"Specificationless" IBM System/32

In addition to IBM's description of its System/32 as "programmerless," it is also described in Datapro's February newsletter, NEWSCOM, as "peripheralless," "maintenanceless," "memoryless," and "specificationless." These features "will probably result in more System/32 sales than have ever been achieved with any other computer system," according to the report. Winners and losers are mentioned. Among the former are IBM of course, first-time computer users, competitive small computer vendors, independent software companies, and diskette suppliers. The losers include suppliers of small accounting machines, vendors of large programmable calculators, time-sharing services, service bureaus, and plug compatible peripheral manufacturers. DATAPRO RESEARCH CORP., Delran, N.J.

FOR COPY CIRCLE 201 ON READER CARD

COBOL Handbook

To solve the problem of the ANS COBOL language being, according to this vendor "just too large for the average programmer to commit entirely to memory," the 166-page *ANS COBOL Syntactical Handbook* was created. This reference contains the unique feature of having Procedure Division verbs, e.g., RELEASE, in alphabetic order. Each verb in addition has a page to itself containing explanations, illustrative examples, options, and comments. The usefulness of this reference manual is enhanced by its pocket size, its looseleaf binder which allows pages to

lie flat, and its thin plastic pages to avoid smudging and ripping. Price: \$18.50; reduced rates for orders of more than 25. ADVANCED SYSTEMS INC., 1601 Tonne Rd., Elk Grove Village, Ill. 60007.

Intelligent Terminals

With large price drops in memory and microprocessor circuitry over the last few years, intelligent terminals are much lower in cost than older hardwired terminals. The revised and expanded *AUERBACH Guide to Intelligent Terminals* contains an evaluation report with charts of over 75 terminal models. Specifications on processors, auxiliary storage, software support, keyboards, display units, etc., are given to help in selecting the right system. Price: \$24.95. AUERBACH PUBLISHERS INC., 121 N. Broad St., Philadelphia, Pa. 19107.

Bibliography of Computer Books

The eighth annual *Bibliography of Computer-Oriented Books* contains 1,200 books published since 1970. Added this year are 236 new books, and two new subject areas: computers and law, and a history/future section. This bibliography is compiled by J. Daniel Couger, Professor of Computer and Management Science at the Univ. of Colorado. Price: \$4 (\$5 if invoice is necessary). COMPUTING NEWSLETTER, Univ. of Colorado, Colorado Springs, Co. 80907.

San Francisco Dp Market Analysis

There is a definite rapid growth in on-line and remote computer usage in dp firms in the San Francisco Bay area, an area having a large number of service organizations; and overall, there is a growing separation between customizing firms and those offering only package applications. Such are the findings of a comprehensive study, *EDP Market Analysis: A Management-Oriented Review of the San Francisco Bay Region*, which details the major dp firms in the area, their portions of the market, their clients, the general services offered, and an analysis of their computer usage.

Like Gaul, this area is subdivided into three parts: San Francisco/So. San Francisco, Oakland/East Bay, and San Jose/Peninsula. Names, addresses, and phone contacts for each dp company in these areas are supplied, including government dp centers. In providing both historical and current trends and a statistical overview of the

(Continued on page 33)

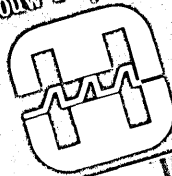
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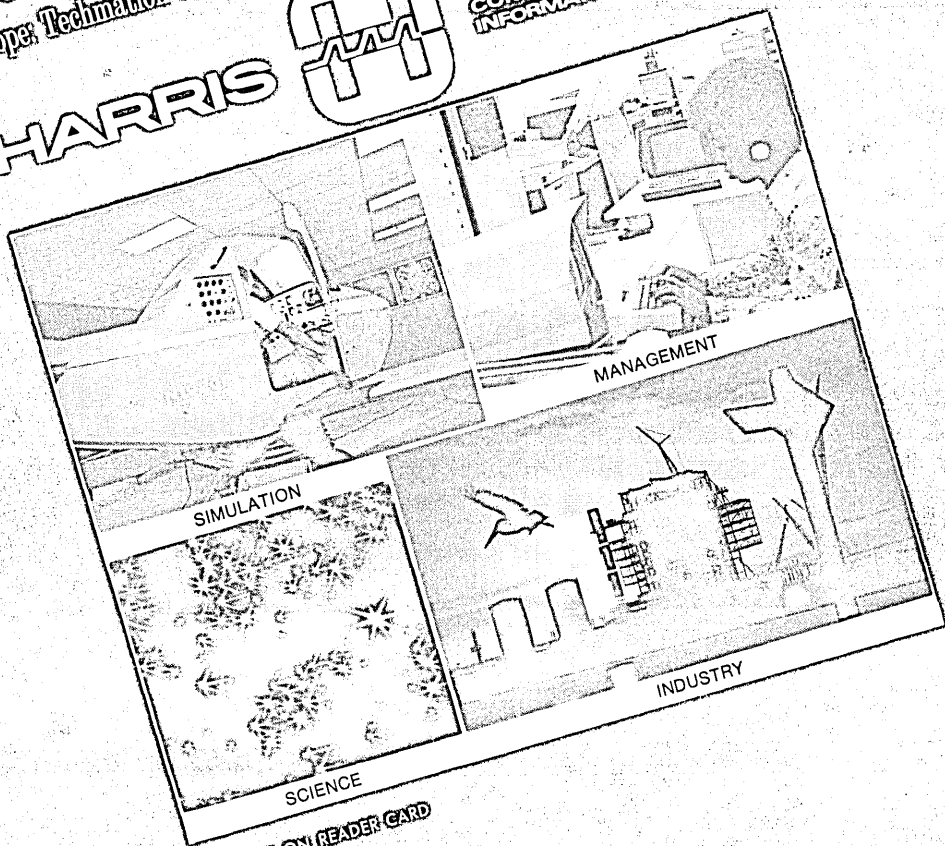
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1200 Gateway Drive, Ft. Lauderdale, Fl. 33309.

Europe: Technation N.V., Gebouw 105/106, Schiphol-Oost, Netherlands.

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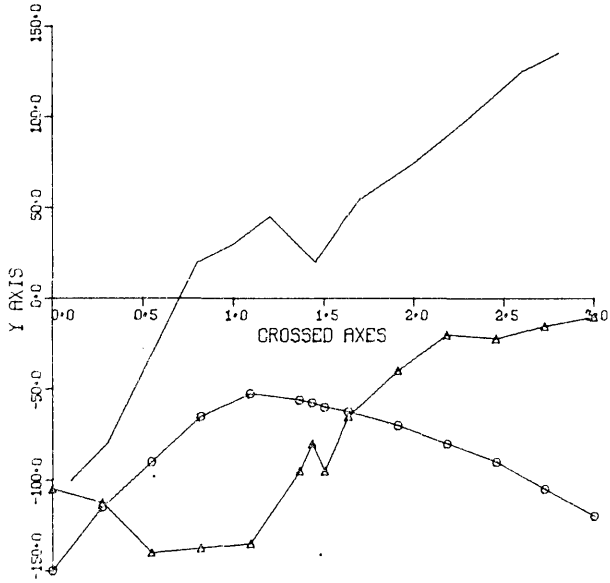


COMMUNICATIONS AND
INFORMATION HANDLING

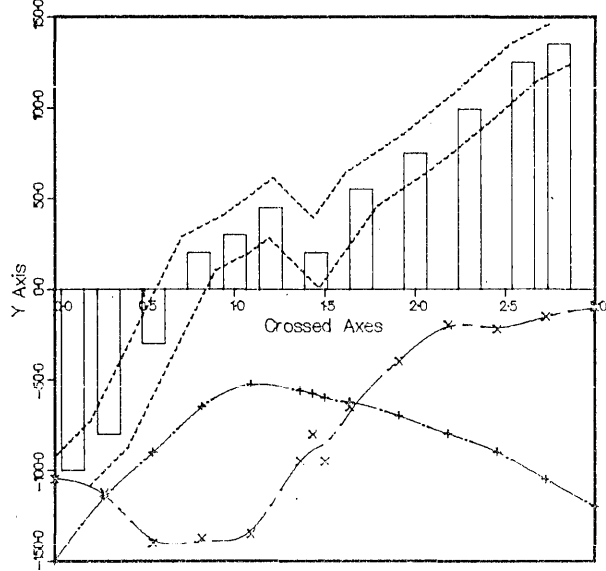


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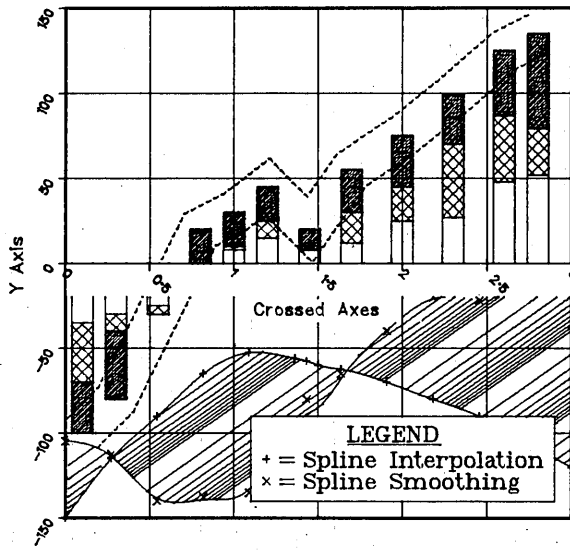
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Now we'll add more features to the calls of plot "2". You will get underlines, centering, a grid, or even crosshatched and shaded areas. Add legends for the

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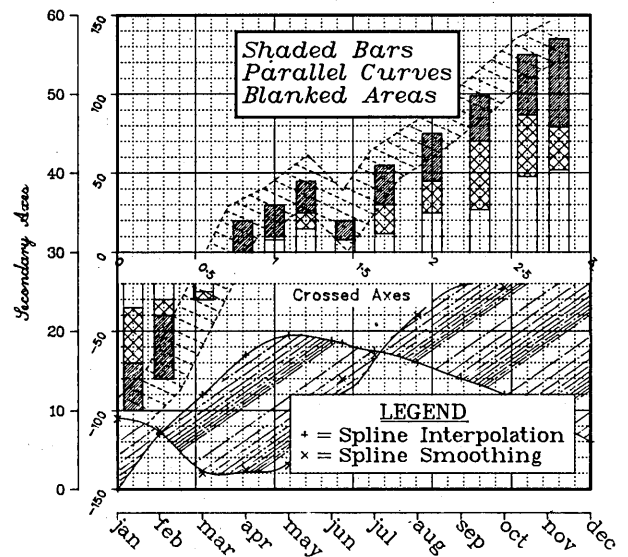
51 Character Sets



3

Progressive Sophistication

51 Character Sets



4

It Makes Complex Plotting Simple.

curves, then blank out any area for clarity. Still need more? Go to plot "4"

The plot is becoming complex—simply. The calls from plot "3" remain. Call a dotted grid or dashed shading, change lettering style to Old Gothic, Roman becomes Old English, italics becomes Gothic Italian. Why not superimpose a secondary y axis, a month labeled x axis? And in one or two hours the plot is done. Now draw it in color with a pen plotter, all it takes is one more call.

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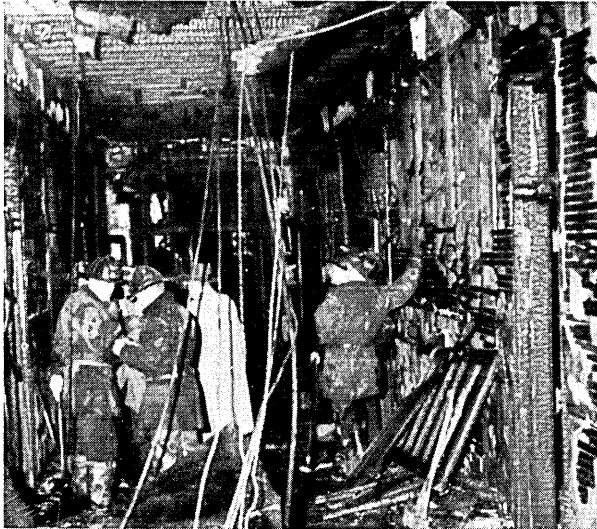
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P.O. Box 9906, San Diego, California 92109

In Europe contact: Repko bv. van Blankenburgstraat 58
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Even if your building survives, your business may die.



The gloomy fact is, even a minor blaze can cause enough damage and business interruption to close you down for good.

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For this very reason, you need a fire *protection* system that quenches the flames faster. Before they can do extensive damage. And allows you to get right back to work. With no clean-up. And a minimum of downtime.

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The Fenwal Fire Suppression System does both. Because it uses Halon 1301. A chemical you may have seen demonstrated on TV. When released as



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Faster than anything yet developed. And dry — no wet mess to clean up.

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What's just as important, Halon 1301, unlike water and CO₂, won't damage whatever it is you're trying to protect.

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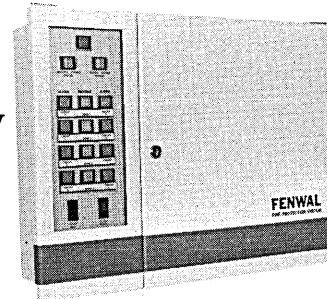
This all adds up to two very important advantages you don't get with other fire protection methods: 1. A Fenwal system gives you the fastest jump on the flames because you don't have to evacuate the area before it's released.

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area, this report furnishes the bases for business forecasts and market strategies, and provides aids in selecting a firm. Price: \$50. JEFFERSON ASSOCIATES, INC., San Francisco, Calif. FOR DATA CIRCLE 202 ON READER CARD

Internal Auditing

Described as how-to-do-it guides geared for the practicing internal auditor rather than the dp expert, three papers in a continuing series, "Modern Concepts of Internal Auditing," aim at involving the staff auditor in data processing. *Establishing the Internal Audit Function in EDP* suggests possible ways to organize and provides job descriptions for nine levels of computer auditors. *Auditing Fast Response Systems* describes the history, hardware, and systems design requirements of a fast response system, plus techniques and areas of consideration for auditing these systems. *Auditing Computer Centers* is an auditing-aids and training package for approaching the computer complex. Price: \$3 each. INSTITUTE OF INTERNAL AUDITORS, INC., 5500 Diplomat Circle, Orlando, Fla. 32810.

Microcomputer Design

How to design a microcomputer is the subject of *Microcomputer Design*, a 300+ page loose-leaf book intended to fill a gap in the literature by concentrating on the hardware necessary to make the microprocessor part of an electronic system. Assuming familiarity with digital electronic circuit design, and transistor-transistor logic (TTL) in particular, the book contains a brief introduction to microcomputers, numerous schematics, and detailed chapters on such topics as bus structures, I/O instructions, output techniques, interrupts, etc. In short, one should be able to design with microprocessors on a more cost-effective basis with the use of this book, the vendor claims. Price: \$75; the vendor offers the book along with an 8008 microprocessor for \$100, and with an 8008-1, for \$110. (The 8008 alone sells for about \$100.) MARTIN RESEARCH LTD., Chicago, Ill. 60608.

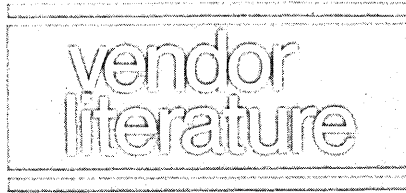
FOR DATA CIRCLE 203 ON READER CARD

Financial Terminals

Three categories of financial terminals are covered in *A Guide to Financial Terminal Systems*: teller terminals, cash dispenser/automated terminals, and brokerage terminals. The strengths and weaknesses of this equipment are detailed in analyses based on user in-

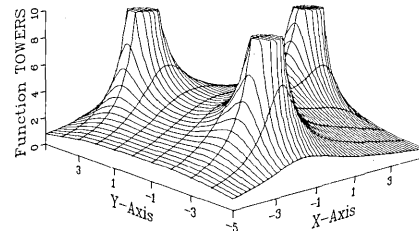
April, 1975

terviews. Price: \$19.95. AUERBACH PUBLISHERS INC., 121 N. Broad St., Philadelphia, Pa. 19107.



Graphics Software

DISSPLA, a machine and device independent graphics software system is described in a 12-page brochure which tells how a user can utilize the full computational power of FORTRAN, with the system of FORTRAN subroutines that make up the package. The brochure also describes how a user can



construct a sophisticated plot on a crt terminal in about one hour, then switch to any other available device such as a drum plotter, flatbed plotter, or microfilm. Layout, typesetting, and the allocation of illustration space for the brochure, were done by DISSPLA. INTEGRATED SOFTWARE SYSTEMS, San Diego, Calif.

FOR COPY CIRCLE 206 ON READER CARD

Printer/Plotters

High speed electrostatic printer/plotters are described in a brochure along with specifications and information on specialized software packages. One system, the 4800, is claimed to be able to produce graphs, charts, diagrams, and alphanumeric approximately 800 times faster than by drum or pen plotter. Another, the 5000 system, designed for minicomputers, will plot up to 400 times faster than pen plotters and will print almost twice as fast as line printers for large computers. The brochure describes a system designated 5100 as having the widest plotting capability of any electrostatic unit on the market. GOULD INC., Cleveland, Ohio.

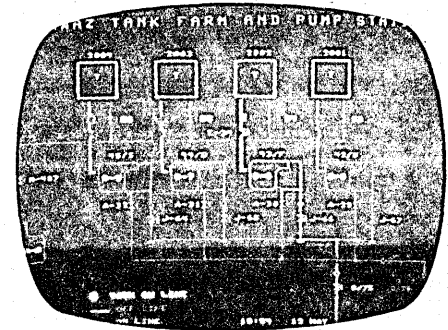
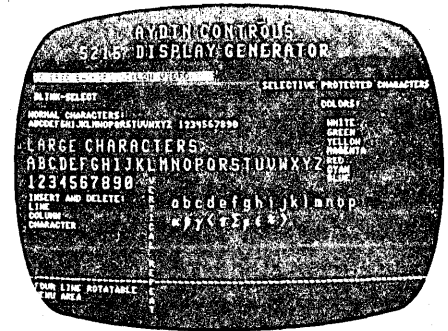
FOR COPY CIRCLE 207 ON READER CARD

Minicomputer Systems

Four interactive minicomputer systems designed for business, scientific/engineering, time-sharing, and real-time applications are described in a 92-page

(Continued on page 158)

CIRCLE 97 ON READER CARD →



Seeing is believing . . . so take a good look at what Aydin Controls new raster scan, multi-channel, RGB display generator can give you at a reasonable cost:

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Digital introduces PDP-11/70. The system all other 11's have been leading up to.

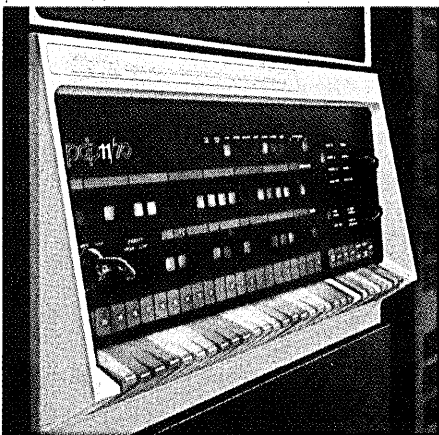


Not just fast, completely fast.

The System is here from Digital. It's PDP-11/70 — and it's fast beyond anything of its size or price ever built.

This complete system is designed for speed inside and out. Not just the CPU, but the software, the cache memory, the I/O channels, the disks, the peripherals — the entire package.

The 11/70, with its 32-bit



architecture, is a real-time system, a batch system, and a timesharing system simultaneously. And the incredible low price — from under \$100K — means that enormous computer power is about to appear in places it's never been before.

System processor speed. The heart of the PDP-11/70 is a 300 nanosecond central processor connected to system components by high-speed 32-bit data paths (that perform automatic parity checking on both data and address transfers). And by adding a double-precision floating point processor, you can divide two 64-bit numbers in just 9 microseconds.

System memory speed. The integral memory management unit provides memory relocation, protection, and expansion to 2 million bytes of extremely reli-

able core memory. A standard 2K-byte, 240-nanosecond bipolar cache memory acts like a high-speed buffer between main memory and the processor. The result: an effective memory cycle time under 400 nanoseconds, but at core memory prices.

System peripheral speed. High-speed peripheral controllers plug directly into the central processor using high-speed 32-bit data paths for fast data transfer. Disk transfer time, for example, can be as fast as 4 microseconds for 32 bits. Disk capacity, using the high-speed interface, can be expanded to 700 million bytes of on-line storage.



Complete system software. The PDP-11/70's new multi-function operating system, IAS (Interactive Application System), allows concurrent timesharing, real-time and batch. IAS supports a mix of languages including ANSI-74 COBOL, extended

BASIC, Macro assembler, and a powerful ANSI standard FORTRAN IV-PLUS that's



designed for the fastest execution time possible.

And for dedicated time-sharing applications the popular RSTS/E system has been enhanced to accommodate 63 simultaneous BASIC-PLUS users with concurrent batch COBOL operation. For real-time applications, field-proven RSX-11D provides multiprogrammed real-time operation with concurrent batch in the background.

The System is here from Digital. PDP-11/70. Completely fast. For full details contact your local Digital sales office or send the coupon below to Digital Equipment Corporation, Maynard, Mass. 01754. (617) 897-5111, Ext. 2540. European headquarters: 81 route de l'Aire, 1211 Geneva 26. Tel: 42 79 50. Digital Equipment of Canada Ltd., Ontario.

digital

- Please have a Digital sales engineer call on me.
 Please send me literature on the PDP-11/70.

Potential application _____

I am considering a new or replacement system.

Other system(s) now performing on this application _____

Other system(s) in my company or organization _____

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Department _____ Organization _____

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The OMRON 8025 system.

It speaks for
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I AM THE OMRON 8025.

I'm microprocessor controlled. User programmable. Field expandable. For the money, probably the most flexible, intelligent, capable CRT terminal system there is. And very modest.

I may look like other CRTs, but I'm actually quite unique. First, I'm easy to get along with. Editing with me, for example, is a snap. You can enter, delete, store, change, or transmit individual characters, lines, columns, forms, half-pages or whole pages. Correcting errors is a piece of cake. And so is preparing forms. Which is why host computers like to have me around. I save them a ton of work.

Secondly, I can do whatever you want me to do. Data entry, inquiry, retrieval, and communications. Credit checking. Instrumentation, manufacturing or process control.

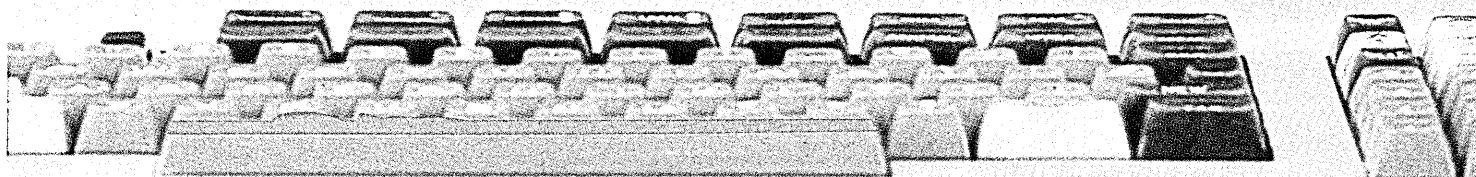
When you want me to do more, all you have to do is add: Cassette storage. Printers. Then I become a remote batch terminal, if you wish. Memory -- up to 16K bytes in combination of ROM, RAM, PROM. Anytime, right in the field. Point is, I abhor obsolescence.

In fact, you can even change my software. Using a high-level programming language that makes it easy, efficient, and direct. I'll BLINK, DIM, ~~REVERSE~~ UNDERSCORE, VIDEO BLANK, ~~REVERSE~~ BLINK REVERSE -- you name it, I'll do it. Synchronous or asynchronous.

It may sound like a lot. But then, I'm just doing my job.

OMRON. J 1 -

OMRON



OUR SHORT DROPS COULD BE A WHOLE LOT CHEAPER THAN YOUR LONG HAULS.

If you're thinking of expanding your communications network, then a Cable & Wireless leased circuit system is what you need. If you're already running a leased circuit there's more than a chance that if you let us look it over, we could make it a lot more cost-effective.

And, if you're a company whose major interests are in the Far East or the Middle East we could

certainly save you money.

Cable & Wireless have the computer-switching centres which can pick up your messages and transmit them more cheaply.

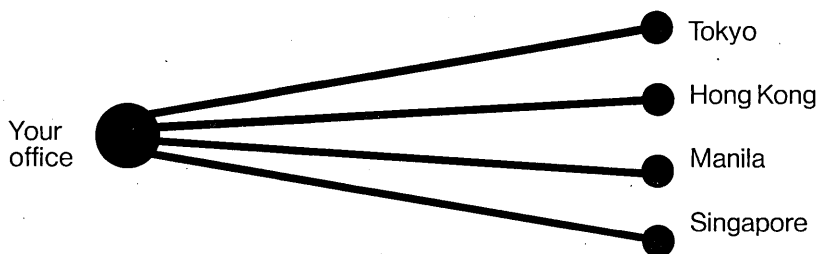
Our switching centre in Hong Kong, for instance, means that your traffic can be passed through there and routed on by a 'short drop' to, say, Tokyo and Manila at a tremendous saving in cost against a 'long-

haul' system direct from your head office.

Similarly, our switching centre in Bahrain can cut your costs in the Middle East.

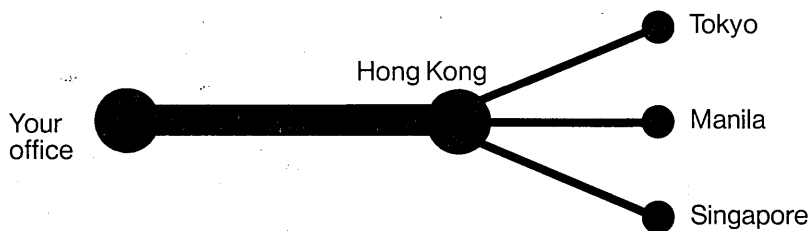
But there's a lot more to it than that, and we'd like to explain it to you.

If you think you'd like to listen, contact us at the address below. We'll send you literature, or have someone call.



THE LONG HAUL.

This system could be costing you much more than it need!



THE SHORT DROP.

A Cable & Wireless leased circuit using short drops like this could cost you much less than you think!



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Just say, "First Freight."

When that shipment has to be there, call United or your freight forwarder. Yours can be the "First Freight" there—to any of our 113 cities.

First Freight service effective April 1, 1975, subject to C.A.B. approval.

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 **UNITED AIRLINES CARGO**

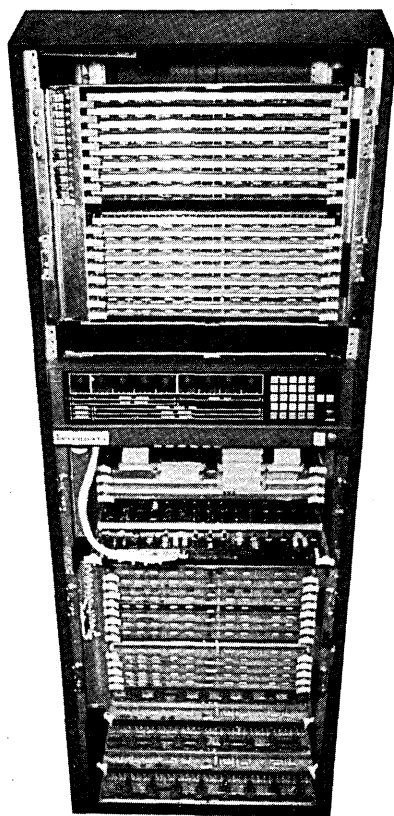
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THE INTERDATA 8/32—UNMATCHED LEVELS OF PERFORMANCE IN A MINICOMPUTER SYSTEM.

MEGAMINI ARCHITECTURE: AN ABUNDANCE OF SHEER POWER.

Interdata's new 8/32 Megamini has performance characteristics found only on large scale computers. Like direct addressing to one million bytes. Full 32-bit hardware with performance enhancers such as dual instruction



The 8/32 MEGAMINI — with a full Megabyte.

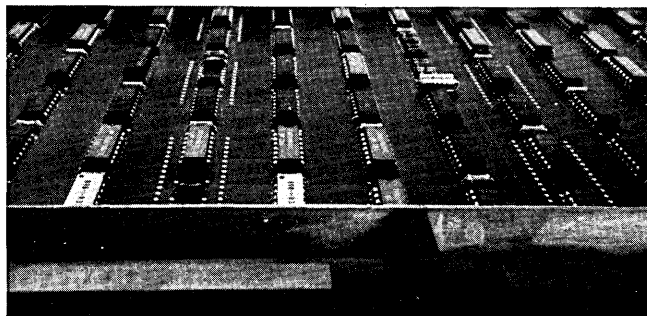
look-ahead stacks, multiple register sets, interleaved 32-bit memory, and fast floating-point hardware. What our 8/32 Megamini means to you is an unequalled combination of power, flexibility, and reliability in a compact package. All at a price that's fully competitive.

MEGAMINI SOFTWARE: POWERFUL, FLEXIBLE, EASY-TO-USE.

Today's hardware must be designed to ease your software effort. You shouldn't have to spend a lot of expensive programming time trying to figure out how to get around minicomputer hardware limitations. With the 8/32 Megamini you don't — because there are none.

For example. The direct addressing capability of the 8/32 Megamini allows you to build programs and data arrays in any size up to the amount of memory you have — no more 64K limits.

It also means we can give you versatile and powerful software to help lower the cost of building your system. Software with a multi-tasking operating system, OS/32MT, with unique multi-user



Multi-Wire Technology — a key to MEGAMINI performance.

M I N I TM

COMPARE: THE INTERDATA 8/32 MEGAMINI VS. THE-LESS-THAN-MEGAMINI COMPETITION.

| | INTERDATA 8/32 | XEROX 550 | IBM 370/158 | DEC 11/70 | DG Eclipse |
|--|---------------------|---------------------|--------------------|--------------------|-------------------|
| WORD LENGTH | 32 bits | 32 bits | 32 bits | 16 bits | 16 bits |
| INSTRUCTION TIMES (Register to Memory) | | | | | |
| Integer Add | 1.25 | 1.8 | .9 | 1.8 | 2.5 |
| Multiply | 3.54 | 6.2 | 2.0 | 3.9 | 8.8 |
| Divide | 5.8 | 14.4 | 9.9 | 8.3 | 11.2 |
| Floating Point Add | 2.3 | 6.1 | 2.4 | 8.25 | 5.5 |
| Multiply | 3.0 | 9.1 | 2.3 | 11.25 | 7.2 |
| Divide | 5.35 | 23.3 | 8.9 | 12.25 | 7.9 |
| HARDWARE I/O | Yes | Yes | Yes | No | No |
| MAX. DMA RATE/SECOND | 6MB | 4MB | 6.7MB | 4MB | 2MB |
| MAX. ADDRESS CAPABILITY | 1MB | 1MB | 16MB | 64KB | 64KB |
| GENERAL PURPOSE REGISTERS | 8 stacks 16 each | 4 stacks 16 each | 1 stack 16 each | 2 stacks 8 each | 1 stack 4 each |
| PRICING | | | | | |
| CPU + 128KB Memory | \$51,900 | \$128,700 | N/A | \$54,600 | \$44,500 |
| CPU + 1048KB Memory | \$179,400 | \$478,700 | \$1,905,700 | \$163,800 | N/A |

program development capabilities. Software that has an optimizing macro assembler, MACRO CAL. And software with a sophisticated telecommunications access package, ITAM, that allows you to treat remote communications terminals and computers as if they were simply local devices.

Now, with all of this available, you can concentrate your efforts on the real problem at hand — your application.

THE MEGAMINI: NOT JUST A COMPUTER — BUT A SYSTEM.

The Interdata 8/32 Megamini gives you a full range of peripherals, software and advanced features to choose from in tailoring your system: 166MB disc systems, fast line printers, 1600 BPI tapes and graphic CRT's. Plus software modules like FORTRAN, BASIC, EDIT, AIDS and many more.

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- All that power sounds marvelous. Send me more information on the Interdata 8/32 Megamini.
- You may have hit on the solution to my megaproblem. Have a representative call me.

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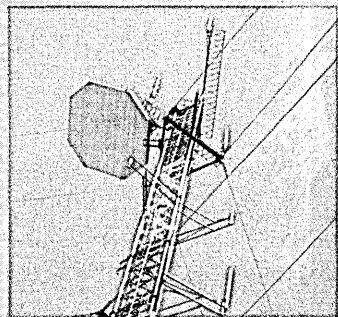
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DATA-75

Why Crime Pays Less Than Ever In Lake County, Illinois:

INCOTERM.[®]



In an inflationary economy, it's nice to see someone holding the line on the wages of sin.

That's what they're doing at the Lake County Sheriff's Office. With a little help from INCOTERM.

A powerful INCOTERM SPD[®] 10/20 Intelligent Display terminal serves as controller for 50-odd mobile teleprinters in local and county police cars covering nearly 500 square miles of northern Illinois.

The officers on the road call in verbal reports and queries; they get hard-copy responses right in the cruisers. For the first time, police can receive such transmissions with no risk of unauthorized interception.

At the other end, INCOTERM ties into the Illinois LEADS system in Springfield, to access the state's fast-growing criminal data bank... about crimes, about vehicles, about stolen property, about guns.

Through INCOTERM, the officer on the street can also communicate with law enforcement agencies in surrounding states—Wisconsin, Ohio, Indiana, Kentucky—over the high-speed lines of the new ALECS system. And INCOTERM also ties him into the NCIC system of the FBI.

Even if a suspect is seated in the cruiser beside the officer when the return message comes in, INCOTERM screens the information in the station house first to permit the encoding of data critical to the officer's safety.

And it does all this while cutting typical transmission times in half. Plus... the built-in INCOTERM memory lets the officer in the car interrupt incoming messages for emergency voice transmission—without missing a word.

INCOTERM: More Power To Your Terminal.

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Editor's Readout

John L. Kirkley, Editor

The Uncommon Carriers

As three of the four theme articles in this issue indicate, users are happy with the specialized communications carriers. Whether it's cost savings from Datran, "zero bureaucracy" from MCI, or Westar from Western Union, the uncommon carriers are coming into their own.

To survive and flourish they will have to be innovative, imaginative, at the leading edge of technology. Particularly now that Ma Bell—prodded by their success, an aggressive FCC, and IBM's encroachments on her home turf—seems to be shaking off a century old lethargy.

IBM's proprietary protocol, SDLC/SNA, is discussed in the fourth article—an excellent tutorial. But a cloud hangs over SDLC: the Canadians are pushing SNAP, the Datapac network protocol. If the Canadians are successful in convincing CCITT (the international standards making group for the world's communications carriers) to adopt SNAP as a standard communications format, IBM may have to modify SDLC and support a non-IBM communications protocol—a boon to the user and new hope for IBM's beleaguered competitors.

Balancing the Privacy Board

Imagine for a moment that you wanted to make a national investigation of leaky faucets. In best bureaucratic fashion you would assemble a panel of experts to conduct a study and make recommendations. Logic would dictate that at least one of your panelists would have a rudimentary knowledge of plumbing.

But this rather simple-minded approach to commission-creation seems to have eluded our representatives in Washington. At least when it comes to the bill creating the Privacy Protection Study Commission.

This important commission is chartered to "make a study of data banks, automated data processing programs, and information systems of governmental, regional, and private organizations . . ." to find out how to best go about protecting our privacy. They will have to delve into the mysteries of large data bases, telecommunications, and other subtleties of computer technology. As a result of their studies, the commission will make recommendations to the President and Congress regarding legislation which walks the delicate line between the needs of society and the rights of the individual.

Four of the seven members have already been named. One is the managing editor of a Philadelphia newspaper, another a state senator from Minnesota, the remaining two that familiar congressional team of Goldwater and Koch.

President Ford will select three more. That process—including the careful screening that presidential appointees can expect these days—is now underway. Just whose names are in the hopper isn't common knowledge.

Nothing in the bill establishing the commission demands that these commissioners know the slightest thing about computer technology. The law states that the members shall be chosen from *any* of the following areas—civil rights, law, social sciences, computer technology, business, records management and state and local government.

So far we have a journalist, two congressmen and a state senator. No matter how impeccable their credentials, it is not likely that these men are familiar with the ins and outs of telecommunications and the perplexities of large data bases. And no matter how expert a staff these individuals can muster, a computer technologist at the policy-making level is absolutely essential.

We urge that at least one of the staff members be selected from among that cadre of computer professionals who have made it their business to straddle two worlds—that of computer technology and social implications. Their names are well known. Even the most cursory glance at computer conference panels on the subject, congressional hearings, major studies funded by federal agencies and professional societies, will garner the same names: men and women who are that rare combination of computer technologist, social scientist, and concerned citizen.

IBM and the Industry

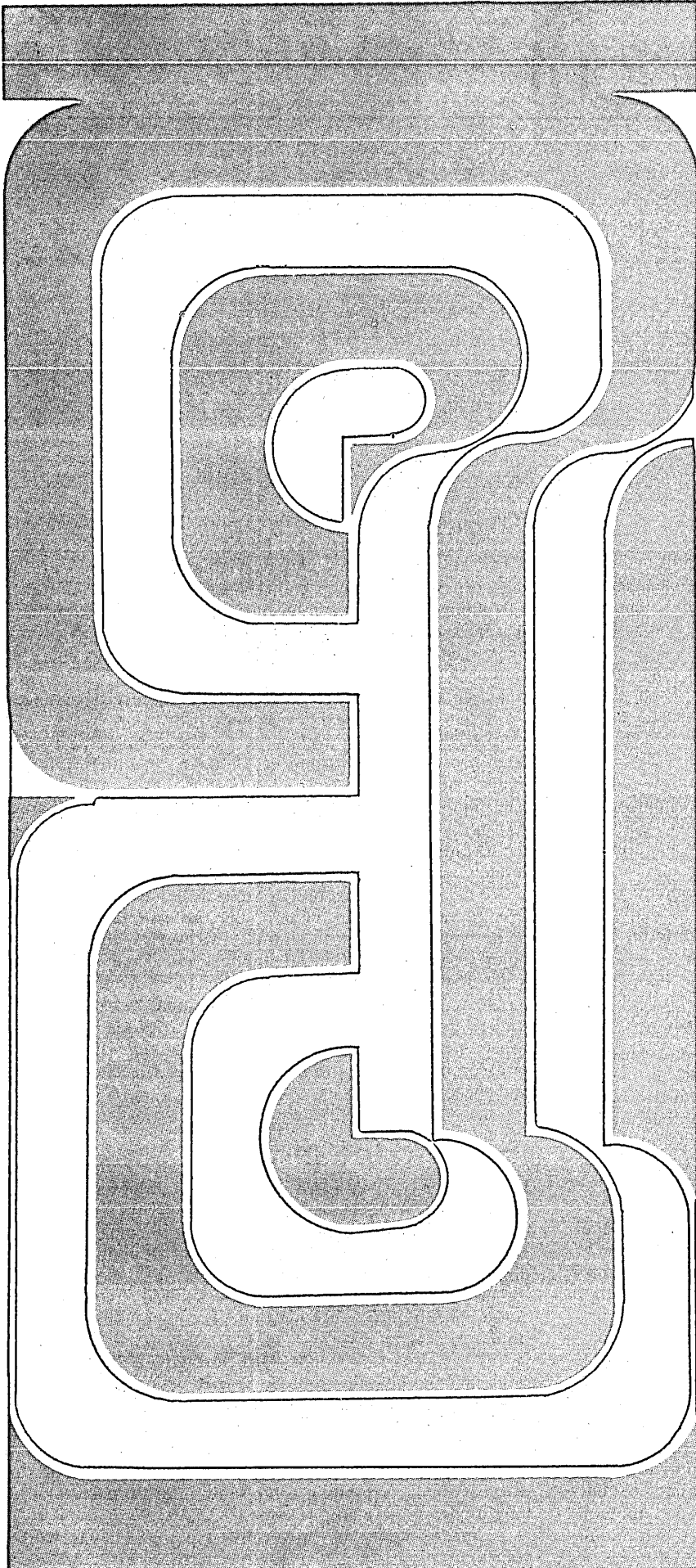
In the March issue we asked for comments about restructuring the computer industry and offered DATAMATION's pages as a sounding board. Responses are beginning to come in and on page 103 you will find four viewpoints, all thoughtful, all different.

One reader advocates an IBM restructured much like the automobile industry: a collection of autonomous branches similar to dealerships.

Another also recommends restructuring with the key provisions that the new divisions be restricted to outright sale of hardware and software—no leasing, no renting.

But fragmenting IBM is not the view of the two other contributors. Instead one writer looks to the user for fundamental change; the other, with wry optimism, declares that the dp world is finally exhibiting some sanity and proposes guidelines to prevent a relapse.

All make interesting, provocative reading. They're worth your time.



RECENTLY announced communication services have provided the network designer with an ever increasing range of alternatives. Two of these have been integrated into Infonet, Computer Sciences' nationwide remote computing network. The services are Western Union's Westar Satellite and AT&T's Dataphone Digital Service (DDS). The evaluation criteria in the decision to integrate these services into Infonet are undoubtedly identical to those faced by network designers of a wide variety of communication networks servicing a multitude of general and special applications. Principal among these are cost, performance, reliability, and operation.

Infonet Communication Network

The communication network which connects the Infonet computing centers in El Segundo, California and Oak Brook, Illinois, with subscribers located throughout the United States and Canada is shown in Fig. 1. This network provides local access in over 125 U.S. cities and incorporates more than 100,000 channel miles of dedicated circuits.

The principal component of the communication network is the Remote

So far so good.
Western Union's satellite
and Bell's Dataphone Digital Service
are proving their value for this nationwide
teleprocessing service vendor.

THE COMMON CARRIERS' UNCOMMON OFFERINGS

by P. A. Tenkhoff and J. C. Collard

Communications Concentrator (RCC). The RCC is the interface for user terminals, and performs the statistical multiplexing between user terminals and host computers. (Host computers used in Infonet are Univac 1108s operating under CSTS, Computer Sciences Teleprocessing System.) A simplified functional diagram of the network is shown in Fig. 2.

The RCC is a Comten-20 with software designed and implemented by CSC as an integrated part of CSTS. Functions performed by the RCC include terminal speed detection, terminal code detection, code conversion, error detection and retransmission, host computer routing, and performance diagnostics. The RCC supports: (1) low speed access from 50 to 1200baud (tty model 32 terminals through 120cps terminals), (2) high speed bulk terminal dial access at 2000 and 4800bps, (3) high speed dedicated bulk terminals at speeds of 2400, 3600, 4800, 7200, and 9600bps, and (4) multiplexors carrying traffic from lower density cities.

The dedicated circuits functionally depicted in Fig. 2 are Bell System C2 or D1 conditioned point-to-point voice grade lines. Modems operate at 9600bps for RCC-to-1108 links and at

4800bps for multiplexor-to-RCC links. Since the performance of these links is of paramount importance to the operation of Infonet, and since the total cost of these circuits is substantial, CSC investigated alternatives to Bell System leased voice grade circuits.

Because of their much lower cost, coupled with potentially better performance, satellite circuits were an attractive alternative for RCC-to-1108 links. Also, the expectation of lower digital error rates made DDS a prime candidate for multiplexor-to-1108 circuits.

Western Union Satellite Service

In August, 1974, Infonet obtained one satellite private line circuit connecting computer centers in El Segundo, California, and Oak Brook, Illinois, for engineering tests and evaluation. The objectives of the engineering test were to provide assurance that satellite circuits could be introduced into the network while still maintaining a high degree of reliability and network availability. In addition to the engineering tests, this phase of the evaluation program included the definition of an operational support plan which specified Western Union's ap-

proach to the continued maintenance of circuit availability and performance.

Engineering tests were conducted over a period of seven weeks beginning in August, 1974. These tests included the measurement of analog transmission parameters, circuit delays, and probability of error. The results of the transmission parameter tests showed that the satellite circuit met all Bell Telephone Co. parameter objectives for a point-to-point, C2 conditioned 3002 terrestrial private line circuit. (Those technical parameters where the satellite circuit significantly exceeded terrestrial circuits were: (1) Separation between the fundamental and harmonic frequencies was 10db greater; (2) above one degree phase jitter there were no phase hits whereas the Bell practice has an objective of no phase hits above twenty degrees; and (3) impulse noise was considerably lower than that experienced on terrestrial private lines.)

End to end round trip propagation delay through the Western circuit was measured at 525msec. The delay arises principally from the transmission delay to the Westar communication satellite which is located at an altitude of 22,300 miles above the earth. Exten-

THE COMMON CARRIERS' UNCOMMON OFFERINGS

sive tests were conducted to observe the effect of this propagation delay on RCC performance. These tests verified that the RCC communication software appropriately handled the propagation delay. RCC performance exhibited no degradation when operating on a satellite channel over that observed on a terrestrial circuit with normal error rates.

The Westar circuit tests were conducted at 9600 bps. It was observed that the overall error rate performance of the satellite circuit during the seven week test period proved to be ten times better than Infonet's experience on terrestrial private line circuits.

During the pilot operation, the weakest link of the satellite circuit has been the local loops. In the seven week test period, two outages were recorded and both problems were isolated to local loop failures.

Satellite link-up

Based upon the success of the engineering tests, the initial satellite link was incorporated into the network, connecting one of the RCCs in Oak Brook to the El Segundo computer

center. Backup terrestrial circuits are provided in the event of circuit failure. Performance of the satellite circuit has continued to be good; however, continuity of service has not met expectations. Restoration of service, during the two failures which occurred in the initial three months, required excessive time. As mentioned, in both cases the failure was isolated to the local loops in lieu of the satellite path. Also, in both cases the redundancies included as part of the network insured that a continuity of service for customers was maintained.

In January, 1975, the second domestic satellite link was incorporated. This circuit connects the RCC in Dallas to the El Segundo computer center. Engineering tests were conducted prior to integration of this circuit into the network, and test results were similar to those for the Oak Brook/El Segundo link.

Because of the uncertainties in the overall availability of links, Infonet has taken some additional measures for satellite links to insure the overall integrity and continued high degree of reliability and performance of the net-

work. These measures include the provision of fully redundant local loops, utilization on paths which also have multiple terrestrial circuits, and provision of 9600bps dial-up backup.

Infonet will incorporate additional satellite circuits in a manner consistent with the fundamental requirement of maintaining network reliability. For the immediate future, this will entail a relatively slow evolution coupled with the provision of additional backup alternatives.

Dataphone Digital Service

Existing analog data facilities require that binary signals be modulated or superimposed on analog waveforms for transmission. As this waveform progresses over the transmission path, its original shape becomes distorted from the combined effects of noise and the electrical characteristics of the transmission facility. In the DDS system the binary signals received from the customer's business machine are time-slotted into the network for transmission to the distant end. At each regeneration point, this binary sequence is reshaped into a "nearly per-

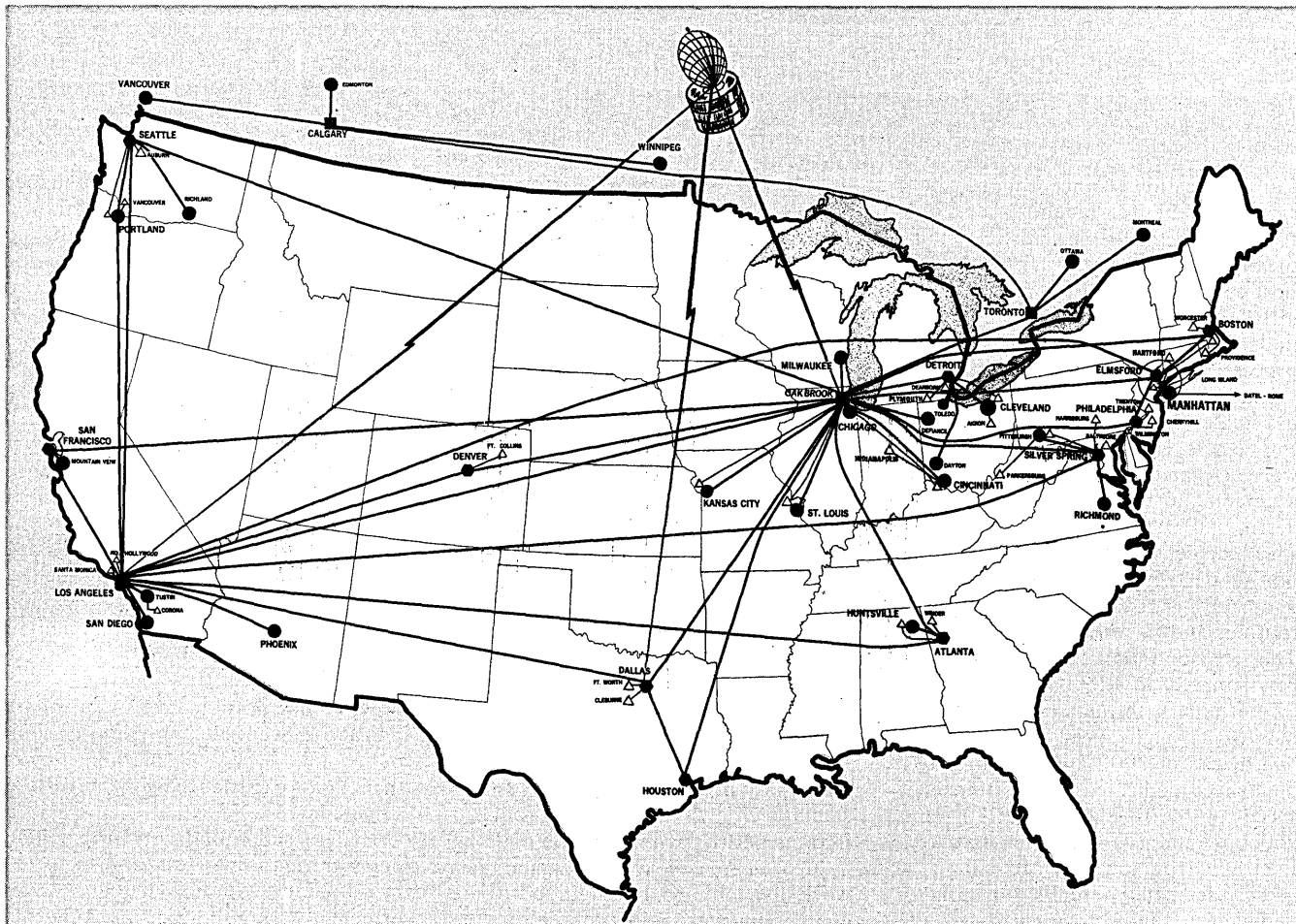


Fig. 1. Computer Sciences Corp.'s Infonet encompasses 125 U.S. cities, plus some in Canada, and incorporates more than 100,000 channel miles of dedicated circuits. One satellite

private line circuit currently links Illinois and California; another links Texas and California. So far, the weakest links have been the local loops.

fect" signal regardless of distortion. The result is that the binary signal received from the customer can be passed through the network to the distant terminal with very low probabilities of bit error.

AT&T's Dataphone Digital Service provides full duplex digital data circuits at four synchronous speeds of 2.4, 4.8, 9.6, and 56 kilobits/sec. A 4.8 kilobit/sec. link between Manhattan and Philadelphia is now being evaluated. The evaluation began January 2, 1975. The error rate test results were extremely favorable. For several test periods the circuit would run with zero errors over a three day period. Over the total period, the error rate was less than 1×10^{-7} .

No outages have been recorded on the pilot circuit since it became operational. The loss of synchronization and the large burst errors that are often experienced on analog circuits have not been observed on the pilot DDS circuit over the first two months of operation.

This new service will be used for Infonet on an increased basis as it becomes available. Principal among the reasons for the extended incorporation

of DDS are the following Bell System claims:

- 99.5% of 1 second interval error free performance
- low cost 56kbps service
- circuit availability of 99.96%
- improved restoration of services
- availability of additional fault isolation tools

This initial DDS circuit has now been incorporated into the network and is handling asynchronous time-division multiplexor traffic from Manhattan to Philadelphia.

Summary

Infonet's initial experience with diversification of communication services to include satellites and DDS in its network has been favorable. The performance of both services has exceeded that obtained over conventional voice grade circuits. However, our experience has been over a limited period and a longer time span of proven operation is required before Infonet will commit these services on a significantly wider basis.

The carriers furnishing these services must demonstrate through opera-

tion that they are capable of providing 24 hour per day, 7 day per week operation at reliability levels consistent with the requirements of remote teleprocessing service. (The overall communication reliability of the Infonet network is 99.6%; dedicated circuit performance represent only one element of this overall outage.) While there is little doubt regarding the technology associated with these services, successful operation must be proven by the carriers. Assuming that reliability of service is established in a rigorous manner, it would be expected that networks such as Infonet will incorporate these new services on a broader scale. □

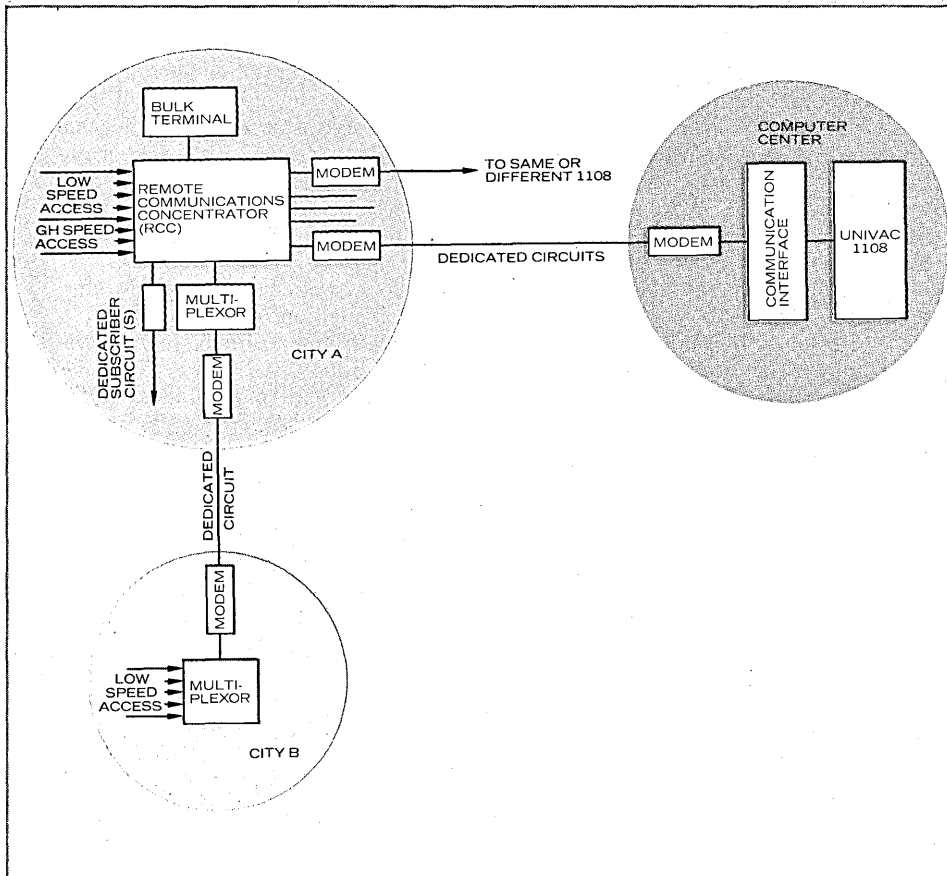
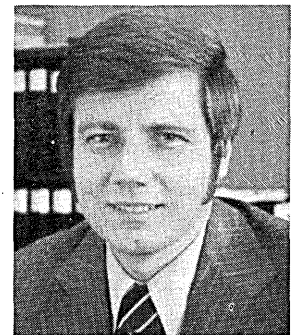


Fig. 2. Univac 1108s in Oak Brook, Illinois, and El Segundo, California, are fed through regional Communications Concentrators in major cities, which in turn are fed through multiplexors in cities with lighter data traffic. One of the multiplexor-to-RCC loops, between Manhattan and Philadelphia, is currently operating over a 4.8Kbps DDS circuit.



As director of systems development for the Information Network Div. of Computer Sciences Corp., Dr. Tenkhoff is responsible for the planning, specification, and installation of hardware and communications for the Infonet remote computing network. He is also responsible for its evolution and security. His previous experience was with CSC's Advanced Systems Group, where he was responsible for studies in satellite communications, error correction, and modulation, among others.



Mr. Collard has had over 12 years experience in project management, hardware requirement analysis, and communications system design and evaluation for nationwide time-sharing networks. Currently he is Infonet's manager of network engineering. As such he is responsible for evaluating, designing, implementing, and maintaining new communications services.

MCI'S MICROWAVE SERVICE

by William Hohri

The cost savings
are not as important as other
benefits of the service.

OUR COMPANY, Administration/Systems/Communications, Inc., got involved in teleprocessing by happenstance. We provide on-line computing support for benefit administration ("fringe" benefits such as health, welfare, and pension funds, both union and corporate), and primarily compete with IBM System/3s and other small batch machines, either customer-owned or in service bureaus.

In 1971 we inherited a GE Datanet-30 on-line system which had been installed by an outside firm. Even to our untutored eyes it was obvious our legacy was an economic albatross. The Datanet-30 was a very effective front-end communications device, but it could not carry the load operating as a standalone. Therefore we shopped for a current technology, cost effective replacement, and settled on a Varian 620F.

Varian was willing to interface a 2314-type disc to a 750nsec memory. The firm offered a 32-line data communications controller, and the 620's instruction set was acceptable. We made the switch solely for survival, but discovered we had taken a giant step in minicomputing. The end result is a 32K word system which supports 32 partitions (time-sliced), each with its own remote line and terminal and with a very respectable 1-second response time. (We currently have three Varian V73 systems, two live and one for backup and new applications development.)

The knowledge gap

ASC is probably typical of much of the data processing community. We know a lot about computers, especially software. But we are not so smart about teleprocessing. We have also learned that people in telecommunica-

tions are often not so smart about computing.

For example, I vividly remember the attempt to enlighten our Bell representative of the fact that Bell, and everyone else, does indeed run data lines at full-duplex on two-wire lines. The ability to run full-duplex on two-wire lines, I explained, is a function of the baud rate and the modem. You can do it at up to 300 baud with standard modems.

The problem we were having at the time, in 1971, was being forced to operate 600baud terminals at half-duplex. Running in half-duplex mode required that some hardware-software discipline be implemented to turn the line around. The only "discipline" in use, believe it or not, was having the terminal operator manually rock a switch from "remote" to "local" to "remote."

It wasn't only Bell that failed to understand. We arranged a long distance conference call between Texas (the terminal design engineer), California (the computer interface engineer), and Illinois (us). We were informed by Texas that line turnaround could be done by using reverse channel. We were informed by California that the interface did not support reverse channel. So it looked like a stand-off.

That was in 1971. Our client had been rocking the rocker switch for about a year. It seemed to us that the state of the art ought to be ready to move forward. We consulted a General Electric reference manual on GE modems and learned that at over 300 baud one could go full duplex on four-wire lines. We assumed that four-wire would cost twice as much as two-wire. Makes sense, doesn't it? Wrong. In *in*-trastate use, four-wire costs no more than two-wire! The state of the art had been around for a long time. Only no

one knew about it. (In *inter*state use, four-wire adds 10% to line costs.) So much for the early part of our learning curve.

Getting involved with MCI

Stage two in our learning began in 1974, when ASC decided to install a long distance telecomputing system. The system installed in 1971 ran only from Lake Bluff, Illinois, to Chicago, a distance of 35 miles. What we proposed was a system running from Lake Bluff to Philadelphia. We were attempting to displace an on-site IBM System/3, thus line costs were an important consideration. But after three years of experience, we considered service and maintenance to be of equal importance.

We looked at communications offerings from Bell and MCI and settled on MCI Telecommunications for the following reasons:

- they were less expensive
- they were the "right" size (we could talk to them and get to know them)
- They were aggressively competitive
- "microwave" is a good buzz word
- they promised prompt, direct service

MCI contracted to provide modem to modem service, including: two high quality voice-grade microwave circuits, Bell local loops (between their Chicago offices and ours, and at the client's end in Philadelphia), and 7200baud Codex modems.

We supplied the other hardware, including two time-division multiplexors in Philadelphia, two more in our

offices, and 20 terminals (300 and 1200baud) at the user site, making the entire system duplex to provide fail-softness.

The installation has not been an unalloyed success. We had to switch to Computer Transmission Corp. (Tran) as our multiplexor vendor in mid-stream because of problems with our initial supplier. We found a couple of bugs in the microprogram of the multiplexors. We found problems in our database software. We've had to hassle maintenance people in Philadelphia. But perhaps the most interesting problems and results have to do with MCI. The following points are of interest:

- We save about \$366/month in line costs. Bell would have charged us \$1,636; MCI charges \$1,270.
- MCI's being the "right" size was important.
- MCI's competitive stance overcame hassles with Pennsylvania Bell.
- The microwave circuits are a buzz word come true.

MCI's service

MCI does provide very close to zero-bureaucracy service. We call directly into their control center on the 93rd story of the John Hancock building in Chicago. Their microwave antennae are at the top of "Big John." We talk directly to the people performing tests and diagnostics. They, in turn, talk directly to their counterparts in Philadelphia. They have hustle. They usually reply to a call in 15 minutes. They are very cooperative. But not all their people are familiar with the extended complexities of data circuits.

The two main sources of problems have been the high speed modems and the local loops. The modems are sub-

ject not only to hardware failure but also to human error. We have had two notable instances of human error:

1.) A modem in Philadelphia was left in DC bus-back (loop-back) mode, with no communication (message or note) to anyone; and

2.) A couple of circuit boards were inadvertently swapped between two modems in Lake Bluff, causing one of two fail-hard conditions. (The other was caused by an errant automobile wiping out a power line.)

In both cases everything looked fine from the Hancock control center. "But," we insisted, "all associated terminals are down." This is a frustrating human communication problem. This is when the size of the organization is very helpful. One can then appeal to marketing or to management. And from MCI the response is excellent.

These were unusual failures. A more common problem is the intermittent error, say 100 errors per hour. This is the flea-bite syndrome, not bad enough for major surgery but very annoying and frustrating to the user. They are often far more difficult to isolate. The intermittents have been traced to local loops, to modems, to static electricity, to multiplexors, to the computer interface, and to software.

Still more learning

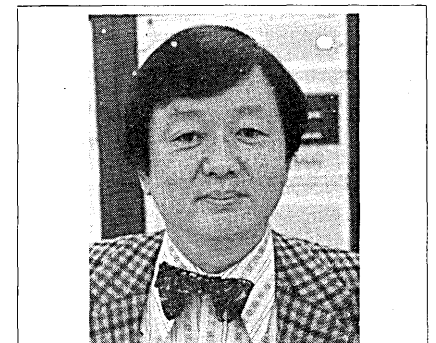
It became rapidly apparent to us that we needed to improve our level of technical understanding. Not all vendors understand this. We needed to know how things worked so we could tell what went wrong. We also needed instrumentation. We needed to be able to monitor performance and to quantify problems. We read the literature, conducted classes, and purchased a Checktran instrument (made and used by Tran and also used by MCI). The Checktran allows us to monitor line performance continuously, including the modems and multiplexors. We do

it simply by looping back one of our low speed channels on the multiplexors and using the Checktran's signal generator and error count capability to log errors. We can also use the Checktran to test terminals and provide terminal maintenance people a more precise problem definition.

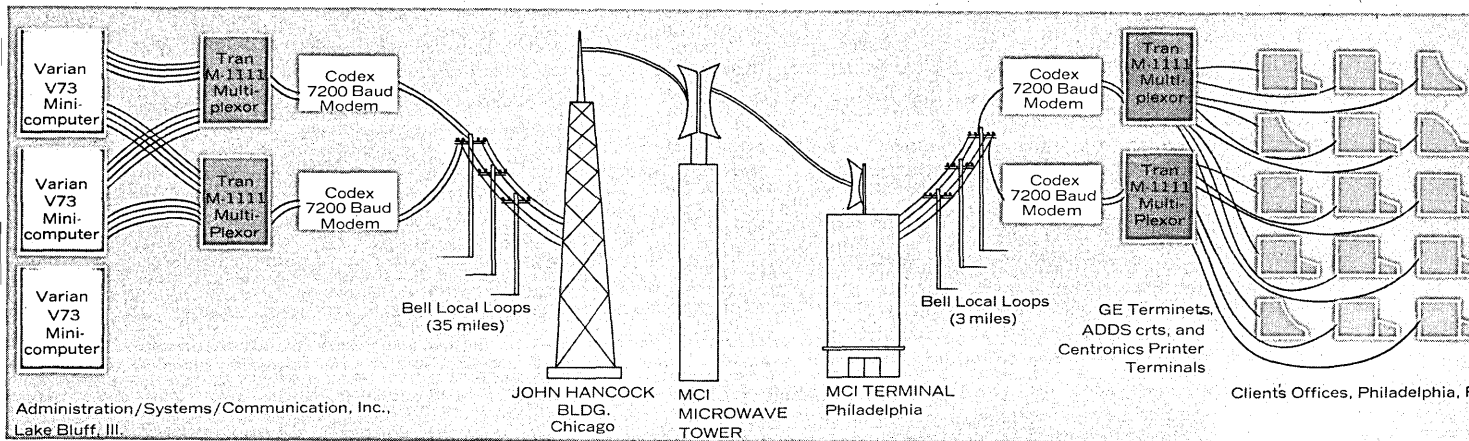
We have also developed our own internal operations staff to monitor the hardware monitors, to call MCI when necessary, and to respond to trouble calls from our clients.

Perhaps the most significant step we took was at the management level. The president of ASC met with the regional vice president of MCI. We had to impress upon MCI our need to perform smartly for the client in Philadelphia. We had to provide viable alternatives when failures occurred. We had to provide assurances of top priority response. These requirements were accepted and have been implemented by MCI.

We are now pretty well along our learning curve, far enough to know how to make teleprocessing pay off for us, and far enough to know MCI was a good choice for our application. □



Presently the manager of technical development at ASC, Mr. Hohri has also installed computer systems at HMH Publishing and for the American Hospital Assn.



A savings in line costs helped this service vendor displace an IBM System/3 700 miles away.

A 24-day test of the service leads to a cautious, tentative okay.

STARTING UP WITH DATRAN

by Robert E. Bump

THE Standard Oil Company (Indiana) has a Bell System, private line switched wideband network service providing 50Kbps data communications. The facilities are used to permit major data processing locations of Standard's subsidiary companies to communicate with Standard's computer centers in Chicago and Tulsa. The network includes 10 locations, 15 intercity communication links, and 22 local links. Approximately 10,000 circuit miles of wideband channels are involved.

The costs

Early in 1974, the Data Transmission Company (DATRAN) contacted Standard to discuss providing high-speed data communications services to supplement or possibly replace present wideband services. The cost of the DATRAN service is such that a significant reduction of Standard's wideband data communications costs could be attained. The high quality of service provided by Bell was such that a possible improvement of the service in terms of improved error rate, reliability and overall performance was not a factor.

Recognizing the potential for significant savings, Standard entered into a contract with DATRAN to provide 50 Kbps service between Kansas City and the Chicago computer center. The DATRAN facility was placed in service February 1975. Standard's plan is to use the facility for normal day-to-day operations maintaining the Bell switched wideband service for use in the event of a failure. At such time as satisfactory performance of the DATRAN service has been established, the Bell service will be discontinued.

The cost of DATRAN 50 kilo baud service and the Bell services currently in use were compared for two specific links—Chicago to Kansas City and Tulsa to Houston. DATRAN charges were estimated to be 20-25% less than the Bell services.

The dollar savings anticipated in the first year of the DATRAN Chicago/Kansas City link are about \$10,000. A preliminary estimate of annual savings if DATRAN services were to be leased at all points served by DATRAN may be in the range of \$50-100,000.

Testing the service

The DATRAN service for Standard's Chicago to Kansas City system is an all microwave facility including the communications link to Standard's premises at both Chicago and Kansas City. The local communications link connecting Standard's building to the backbone network is provided by a 0.9 mile, 39GHz system at Chicago and a 2.3 mile, 39GHz system at Kansas City. The interface in this case is identical to, and the electronic equivalent of, the Bell 303 type synchronous modem.

User diagnostics

The diagnostics provided by DATRAN for Standard's use are basically the same as Bell's. Standard's personnel may conduct digital loop back tests at the Chicago interface using a Standard Company-owned data transmission test set. The Kansas City Standard personnel must install a DATRAN-provided digital loop-back plug at that interface in order to permit the test. The installation consists of disconnecting and connecting interface plugs.

The DATRAN service was available to Standard January 17, 1975. A digital loop back test was conducted for the

following 24 days. During that period, there were no significant outages. The error rate is less than one error in 10^7 . The number of failures of sufficient magnitude to have caused operational problems was nine, i.e. not significant. The facility has since been placed into operation. One major failure has occurred on the backbone since it was placed in operation causing a loss of service for a seven hour period.

It is obviously much too soon to draw any final conclusions about the service provided to Standard. However, based on the service's performance in the next few months, we expect to expand our use of the service, at least to selected locations. □

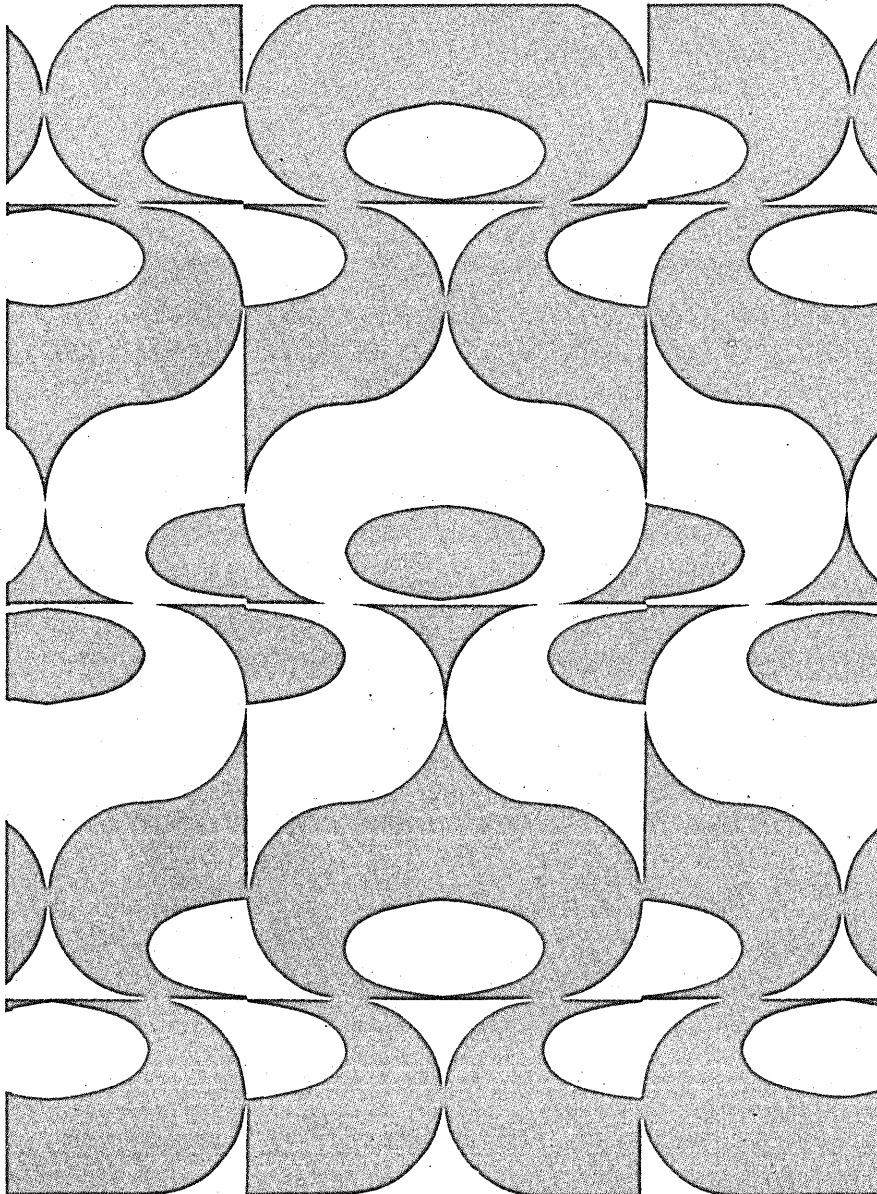


Mr. Bump is responsible for the design, implementation, and maintenance of the Standard Oil Company (Indiana) corporate data communications networks serving the company locations throughout the continental U.S. and Canada. He has worked extensively in the design and implementation of major private line networks, and spent 23 years with Bell in equipment and plant engineering and marketing.

Just as the System/360
was intended
to merge divergent
computer series,
SNA's purpose is to
consolidate divergent
communications protocols,
philosophies,
and access methods.

IBM'S SYSTEMS NETWORK ARCHITECTURE

by James P. Gray and Charles R. Blair



DURING the 60s, large, complex on-line systems were usually created only for high return applications, such as airline seat reservations. The systems often were constructed of customized hardware, software, and communications links. As technical knowledge and experience grew, it became apparent that most teleprocessing systems could be assembled from standard products that were part of a unified communications system design. Systems Network Architecture (SNA) provides that unified design; it defines both the functions and the structure for IBM's communications products.

Today's teleprocessing networks are beset by many problems:

- Network components, including terminals and communications links are often dedicated to particular applications (see Fig. 1).
- A diverse set of line controls and terminal types insinuate themselves into the support programs, the application programs, and the planning of network configurations. (About a half-dozen communications protocols have been regularly used, including variations of bi-sync and start/stop.)
- Different access methods (including BTAM, QTAM, TCAM, etc.) may be used by different applications, thwarting resource sharing.

Each of these problems makes it difficult to expand existing applications or to add new ones.

Teleprocessing systems are complex and are growing even more complex. They compete for scarce resources so that applications development is delayed with resulting high opportunity costs to the organization trying to reap the benefits of data communications.

IBM'S SYSTEMS NETWORK ARCHITECTURE

TERMINAL

REMOTE 3704

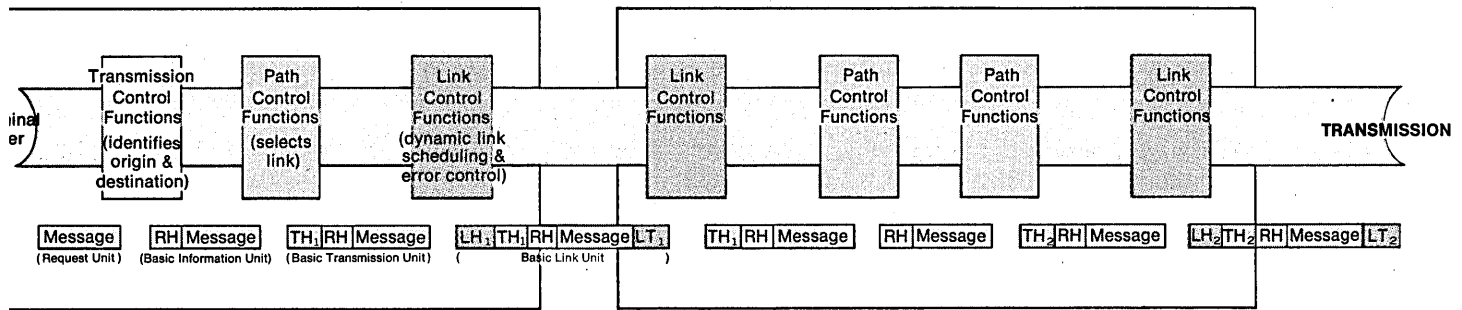


Fig. 3.

Also, as applications that are critical to the company's operation are considered for development, high system availability becomes an important consideration.

The potential for solving these problems is inherent in the lower costs of electronic circuits and memory. Since large scale integrated circuits can be best utilized by designing a limited set of microcoded chips, it becomes clear that future communication products will be designed around microcoded controllers. To provide products tailored to the many diverse application requirements presented by the broad spectrum of teleprocessing users, a large number of devices have been developed which are designed to be controlled by these microcoded controllers.

The availability of microprocessors did more than reduce costs, make application tailored terminals possible, and increase product performance; it ensured the existence of distributed processing power. This was fortunate, because the solution to the system problems described above requires a distributed processing architecture.

By structuring the use of this distributed capability (to implement network functions like routing, scheduling, and error control), and by providing a shared access method and transmission protocol, SNA can improve response time, decrease communications line costs, decrease main processor load, and improve system availability. These improvements, especially improved systems availability, make possible many industry applications that were previously not possible.

Fig. 2 illustrates one way the network shown in Fig. 1 might be upgraded to an SNA network. A single network access method, VTAM, provides access to the rest of the SNA net for program products, system control program components, and user written applications programs. In the network, terminals and terminal cluster controllers are attached to communi-

cations controllers through Synchronous Data Link Control (SDLC) switched or non-switched, point-to-point or multidrop, full or half duplex

communications facilities. The SNA cluster controllers like the 3791 illustrated provide the distributed processing capability.

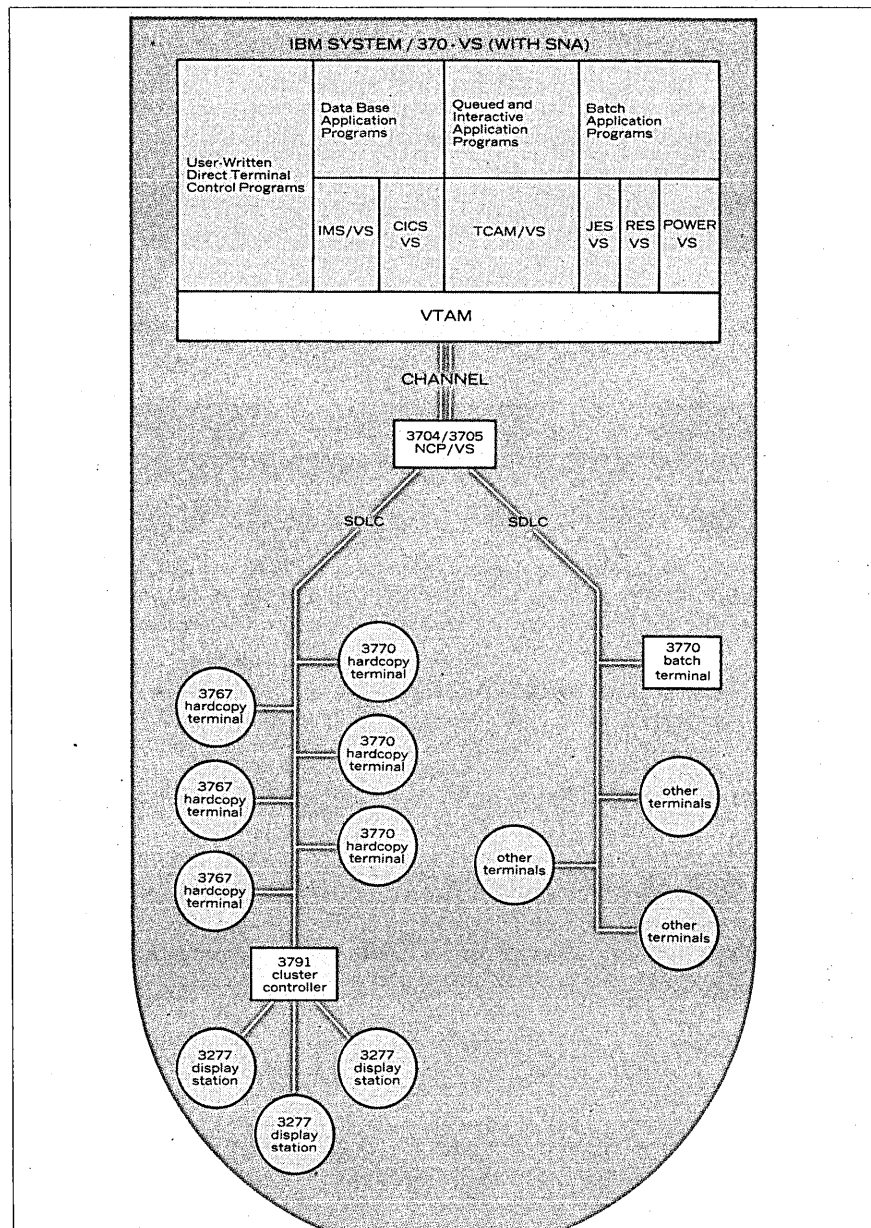
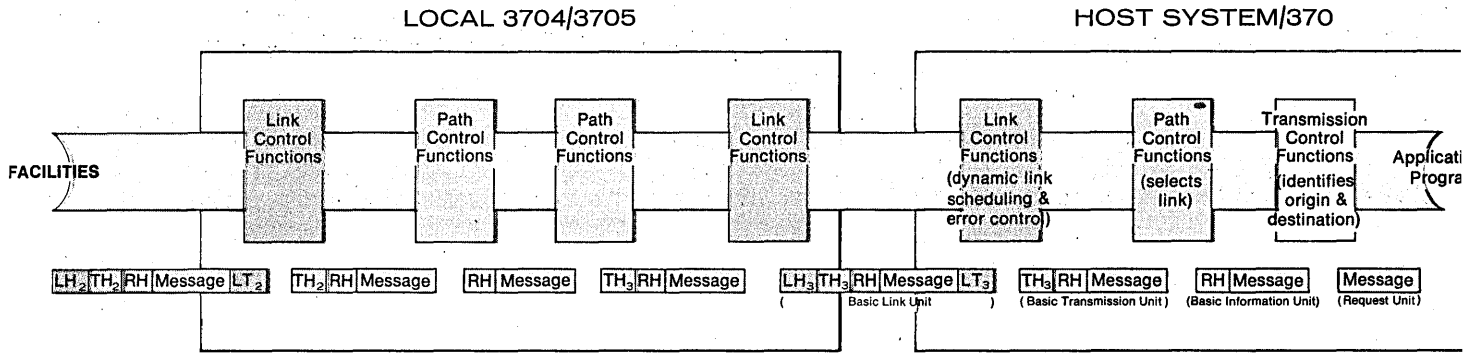


Fig. 2. Converting to SNA requires replacing IMS, CICS, etc. with new versions, but does not require touching the interface between these programs and the applications. The goal is to have one access method interface, one communications protocol, and one communications controller program (NCP).



The basic functions

SNA provides these immediate benefits and provides a foundation for long term growth and development of tele-processing networks by structuring the functional relationships of the hardware and software and communications components of the net. These functions, including node identification and addressing, communications link scheduling and management, and error correction, in the past were often dispersed in applications programs or other customized software. SNA attempts to correct this past fault by partitioning the functions into three types: Link Control Functions (dynamic link scheduling and error control); Path Control Functions (selecting the communications link); and Transmission Control Functions (identifying the origin of a message and its intended destination).

Link Control and Path Control functions are performed by *each* hardware component of a network: terminals, communications controllers, cluster controllers, and computers. Transmission Control, the origin and destination identification, need only be performed at the "ends" of a network—at the terminals or in the cpus. Careful separation and structuring of function, of course, are widely understood to be keys to successful designing of large, complex systems of any sort.

Fig. 3 shows the functional layers in a sample SNA network consisting of a terminal, a remote 3704 communications controller, a transmission facility (which may be telephone lines, a satellite channel, or whatever), a local 370X communications controller, and a host cpu. Other transmissions would be handled in a similar manner; the point is that the same functions are performed at each step along the way.

An overview of the operation

Under SNA, messages (or, in the case of hardware-directed messages, commands) are called Request Units. As these Request Units are shuttled from station to station along their path, vari-

ous headers and trailers are added or stripped off of them each time they pass through another piece of hardware.



The first function performed on a Request Unit occurs at its origin, where the hardware or program there appends a request-response header (RH) to it. The result is called a Basic Information Unit.



The Path Control component then adds a transmission header (TH) to identify the communications link to be used to get to the next station in the path. The result is called a Path Information Unit. Several of these may be concatenated in a single Basic Transmission Unit.



Next the Data Link Control component adds a header (LH) and trailer (LT) and the result is a Basic Link Unit.

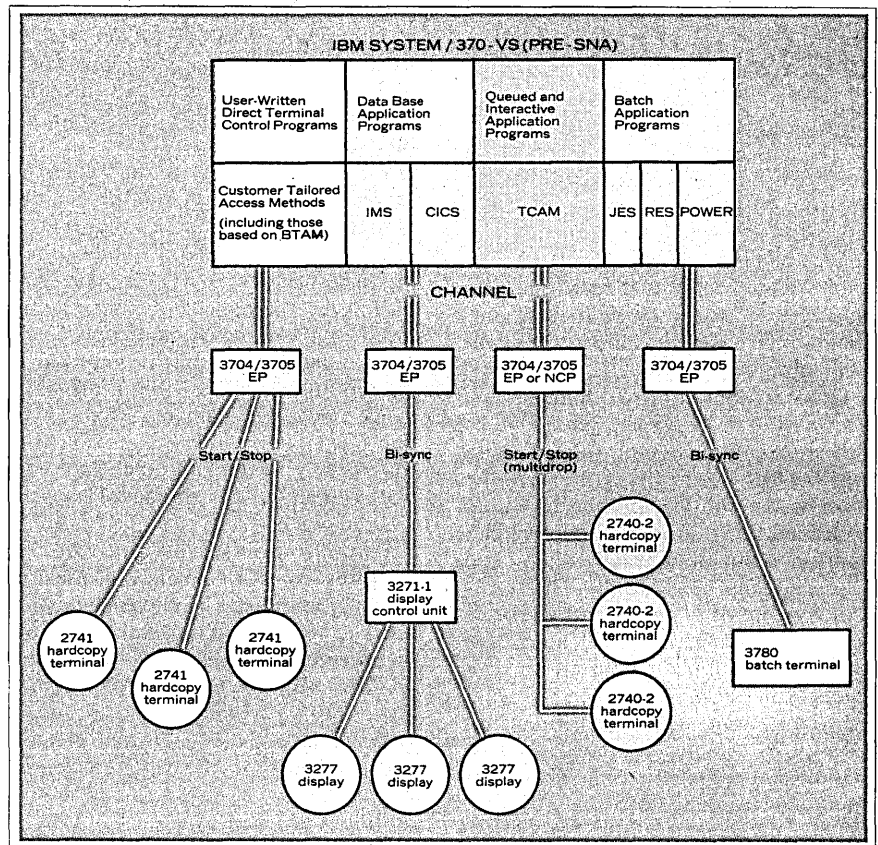


Fig. 1. A pre-SNA network might involve several different access methods, as many as six communications protocols, plus terminals and lines which are dedicated to specific application programs.

IBM'S SYSTEMS NETWORK ARCHITECTURE

The Basic Link Unit travels to the next hardware component where the stripping of old headers and trailers and the adding of new takes place. The request-response header remains untouched until the very last station in the progression, the destination, where it is no longer needed.

Any "reply" message goes through exactly the same steps (even in the same sequence) in its travels.

Data base applications

Fig. 5 provides an example of the use of SNA to support a distributed data base system. In this example, the application has been designed so that certain data is held in the data base of the local cluster controller. Additional data is stored at the central site.

At the cluster, each user is served by an application program that drives one (or more) devices. The device operators (who might be tellers in a bank, sales clerks in a retail store, or branch office personnel in any company) enter inquiries and updates that are first processed by an application program in the cluster controller. If the inquiry can be satisfied by accessing the local

data base, no traffic passes to IMS, in the System/370. (Of course, operator entries are checked for syntactic correctness by the local application program so that when inquiries or updates do go to IMS, they are correct.) This reduces line loading and decreases response time.

If the transmission facility or central processor should fail, the cluster controller can still answer inquiries by accessing its local data base. Its application program can also save updates that are temporarily unable to reach IMS. When the connection with IMS is established again, IMS can reestablish synchronism without losing or duplicating any of the saved updates.

Migration aids

Many current network users will be concerned about migration of their existing applications to an SNA network. A number of migration aids are built into the various cluster and terminal products, program products and system control programs to help make this possible, including the following:

The IBM 3767 hardcopy terminal has a start-stop compatibility feature.

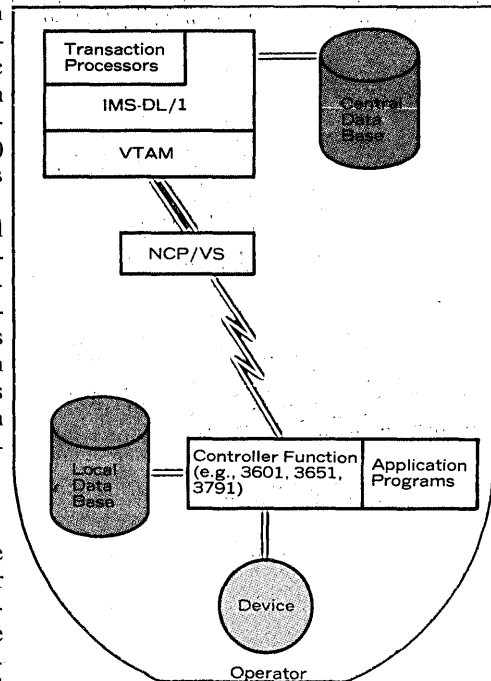


Fig. 5. IBM expects, and has built SNA facilities for, the maintenance of distributed data bases. Local programs determine if an inquiry of the central files is necessary.

TECHNICAL DESCRIPTION

Transmission Control

Transmission control elements are the origin and destination of all Basic Information Units passing through the network. Transmission control elements are used in pairs, and the origin-destination address pair uniquely identify each "session" or logical connection between transmission control elements.

Transmission control elements act as ports to the network, and together with the inner path control and data link control elements, comprise the transmission subsystem. The BIUs that are traded by transmission control elements contain Request Headers and Request Units (e.g., text). The RH is built by transmission control elements as a service for the Logical Units (LUS). A sequence number field in the TH header is also incremented and checked by transmission control. Until a session is established between transmission control elements, logical units are unable to send into the network.

Data Link Control and Path Control

Data link control must be established between any two contiguous elements

in a network. The elements may be either a primary/secondary pair, like a communications controller talking to a terminal on an SDLC link, or a channel and its associated program talking to a communication controller on a 370.

In SNA, data link control elements serve only to move Path Information Unit messages from one node to the next. At the receiving node, these PIUs are passed to Path Control. Any specialized management (scheduling, traffic, responding to interrupts, etc.) for the data link is performed by data link control elements; the information needed by these elements is carried in link headers and link trailers added to the PIUs by the sending data link control element and stripped off by the receiving one.

Path Control accepts PIUs from a data link control element and uses the destination address in the transmission header, together with Path Control's own routing tables, to determine where to send the PIU next.

Addresses, which are 16 bits long, are divided into subarea and element address fields. If the subarea doesn't match the subarea of the node it is in, the PIU is queued by Path Control for the data link control element which drives the communications link leading to the next node. If the subarea does match, the element address is

used to deliver the PIU to its local transmission control element.

The transmission headers are appended by the originating path control element and stripped off by the destination path control element before the Basic Information Unit is delivered to the destination transmission control element. The TH fields, such as the sequence number, are supplied to the path control elements (by transmission control elements) as parameters, and returned to the transmission control elements (by path control elements) as parameters.

Boundary function

Our brief exploration of SNA has covered the functional elements and message structures in Fig. 3. Not suggested by Fig. 3 is the fact that there are several different formats for THs. The more general format 1 headers, with 16 bit addresses, are translated into format 2 or format 3 headers as part of the boundary function of a communication controller to which a cluster controller or terminal is attached (see Fig. 4). The boundary function provides a decoupling between the addresses of the format 1 network and the shorter addresses used by the hardware products. This allows the network to grow and evolve without impacting installed cluster controllers and terminals, and also

The various models of the IBM 3770 terminal family can have a bi-sync compatibility switch. NCP, the Network Control Program, can be generated to drive start-stop, bi-sync, and SDLC lines, and it can coexist with the 270X emulator within an IBM 3704/05. VTAM supports both SNA and many pre-SNA devices. While TCAM, IMS, CICS, RES, JES 2 and POWER/VS all use VTAM, they retain the ability to directly drive the 3704/05 in its emulator mode.

Most pre-SNA IMS and CICS transaction processors can be used with SNA products, although changes to the mapping services might be required. A modification of the TCAM message handler will allow many TCAM application programs to use SNA products. RES, JES 2 and POWER/VS provide their full complement of remote job entry services with SNA.

Upgrading the old

The easiest migration is from systems which have evolved with each new product announcement. Their migration might look something like the change represented in Figs. 1 and 2.

helps hold down the cost of the terminal by shifting more of the processing to the controller.

Pacing

When large volumes of data are being directed to a printer, or other "data sink," steps must be taken to avoid either underrunning or overrunning it. In local control of devices, this is easily done because the System/370 channel is fully interlocked and transfers data at the device rate (thus preventing overrun) while the device can signal device end to the channel (and access method) when more data can be accepted.

In earlier teleprocessing systems, this device control function was mixed into the line control; e.g., in bi-sync the ACK response both positively acknowledges the transmission and asks for more, while WACK acknowledges the transmission but asks that any additional transmissions be delayed until after a subsequent ENQ is given an ACK response.

Since intermixing of functional levels is not allowed in SNA (it is the arch-enemy of sharing and orderly growth), an alternative, called pacing, is used. When more data can be accepted by the receiver, its transmission control element sends a pacing message to its boundary function. This causes the boundary function to send a fixed

number of additional RUS and then wait for another pacing message. The effect is to regulate the flow of data from the boundary function to the logical unit.

However, even very old configurations can be upgraded to SNA in relatively simple steps. No one need cut over to a totally new environment all at once. A System/360 user, for example, will find it easier to follow the sequence in which products were announced. The first step, of course, is to stop basing application development on BTAM. While BTAM-based applications can coexist with SNA, they cannot enjoy all the benefits it provides. This will be an excellent time to consider the higher level functions offered by CICS, IMS, JES, POWER, RES, and TCAM. These look even more attractive from the new perspective provided by SNA.

The second step is to upgrade to a System/370-vs and the 3704/3705. With BTAM and the 270X emulation program (EP) for the 3704/3705, old applications can continue to run, either with old terminals or with new ones having compatibility switches. With new terminals, new applications requiring direct control of terminals can be based on VTAM, rather than BTAM.

Thus an older system has a clear

number of additional RUS and then wait for another pacing message. The effect is to regulate the flow of data from the boundary function to the logical unit.

In addition to regulating the flow of RUS from the boundary function to the receiving LU, pacing regulates the flow between the boundary function and the transmitting transmission control element. This prevents the network from being flooded with requests created by a unit that is capable of generating requests at a rapid rate. The overall function of pacing, then, is to regulate the rate at which requests or responses are sent while still buffering enough of them close to the destination (i.e., in the boundary function) to maintain good performance at the receiver.

The SSCP and physical units

While Logical Units (LU) are the most numerous users of the transmission subsystem, there are two other users: the System Services Control Point (SSCP) and a set of functions called Physical Units.

The SSCP contains the centralized data about the current state of the network. The Physical Units (one in each node) work with the SSCP as local extensions of it for activating and controlling data links and detecting and reporting failure conditions.

migration path to the latest. The steps can be paced to minimize disruption. Old applications can continue to run on the new system, even alongside new applications. New applications can gain the advantages of distributed processing, and a firm base can be constructed for future growth.

Summary

SNA affects every aspect of a telecommunications system. Operators work with fewer devices since a single terminal can serve multiple applications. Users enjoy a more available resource because the cluster controllers can continue local processing without host support. New applications can be more easily justified since they can share the existing network and existing terminals. Programmers can devote time formerly spent on system development and maintenance to the creation of new applications. Application programs can be maintained more easily since network and device control functions are no longer intermingled with application code. Dp managers will find their work simplified, too, since training people becomes easier and

LU-to-SSCP sessions

Each LU has a logical connection (or session) with the SSCP that is used to create and destroy sessions between LUS. A trace of the system activity that results when an operator at a

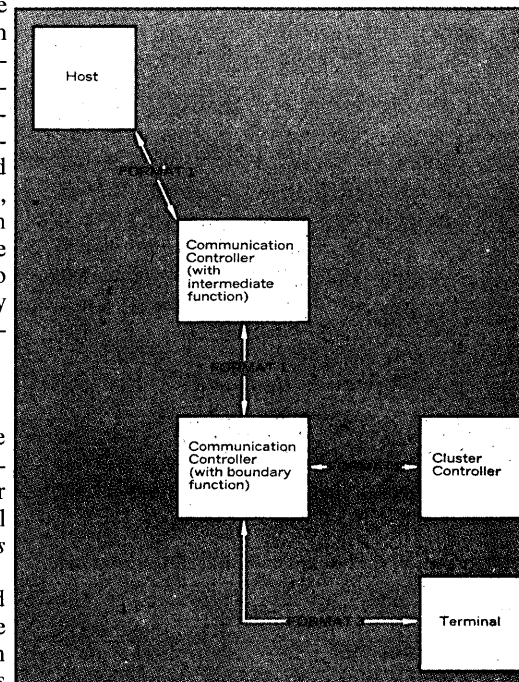


Fig. 4. Under SNA, there are three different formats for transmission headers, but this fact is transparent to the user.

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less time consuming. Once trained in SNA, VTAM and the basic hardware of the terminal family, they need only be trained on new functions and features as these are developed. □

References

1. *Advanced Function for Communications: System Summary*, GA 27-3099, IBM Corp.
2. *Systems Network Architecture: General Information*, GA 27-3102, IBM Corp.
3. *IBM Synchronous Data Link Control: General Information*, GA 27-3093, IBM Corp.

TECHNICAL DESCRIPTION . . .

terminal wants to call an application program (LOGON) will illustrate this. The LOGON RU is sent on the LU-SSCP session. At the SSCP, a syntax scan converts the LOGON character string into a formatted INITIATE request. (It is also possible to perform the syntax scan in a cluster controller and send the formatted INITIATE directly to the SSCP.)

The INITIATE contains the name of the LU with which a session is desired, the operational mode desired for this session (e.g., batch or interactive) and user data. The SSCP transforms the LU name into a network address, uses this address and the mode to create a CONTROL INITIATE (CINIT) command, and sends the CINIT, including the user data, to the primary LU. (The primary LU is in control of the session.) At the primary LU, the session can be accepted or rejected; if accepted, the primary LU transforms CINIT into a BIND and sends it to the secondary LU in the terminal. The primary LU can also send an INITIATE to the SSCP, the CINIT comes back and BIND is sent. The BIND establishes the session between the two LUS.

When the session is completed, the primary LU sends CLEAR (to clear out the network) followed by UNBIND. Alternatively, the secondary LU can send TERMINATE to the SSCP which will send CONTROL TERMINATE to the primary LU which will send CLEAR, UNBIND to the secondary LU.

Implementations of SNA usually provide logical unit services for the LU-to-SSCP session in order to simplify use of the network. In VTAM, for instance, the CLOSE DESTINATION macro will send the SNA command sequence CLEAR, UNBIND.

More about LUs

In addition to being users of the transmission subsystem, LUS serve their own end users (terminal operators, remote unattended I/O devices, and application programs). There are two functional elements involved: data flow control elements and pres-

entation class elements.

The RUS in a session experience, in general, a variable message delay that depends on the physical configuration of the network, the location of the LUS and the network load. The data flow control elements utilize protocols that provide good performance over a wide range of session delays. This is achieved by discarding the polling mode of operation (commonly used when data link and application functions are mixed), and substituting an asynchronous sending mode of operation. That is, the session is full duplex within the transmission subsystem. The primary LU does not, then, send out a request for data (a poll); the secondary LU sends the data when it is ready. In addition, long messages are sent as chains of smaller RUS so that processing or printing can overlap transmission.

Data flow control elements manage the sending and receiving of chains and when synchronization of the LUS is required, data flow control protocols are used to establish the synchronization point. Synchronization between LUS is necessary under several circumstances, but the most basic occurs when related RUS are grouped together, i.e., to form a transaction. The transaction is a unit of work for the primary LU.

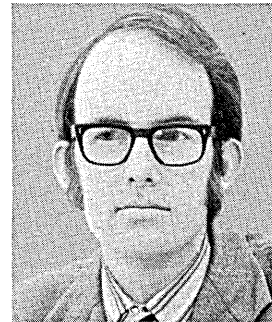
Since either LU can initiate a transaction, race conditions can occur. These are resolved by a brackets protocol within data flow control, wherein an attempt to start a transaction initiates a bracket, and the completion of a transaction terminates a bracket. Under SNA one of the LUS is designated the first speaker, the other the bidder. When a session is between brackets, both can attempt to start a bracket at the same time, but the first speaker wins any race that results.

A similar bracket concept existed in pre-SNA systems, but was implemented entirely within the host software. This was possible since IBM's host programming support maintained strict half-duplex control over the state of terminals. In SNA, a significant portion of the brackets protocol has been distributed into the data flow control element at the remote (secondary) LU.

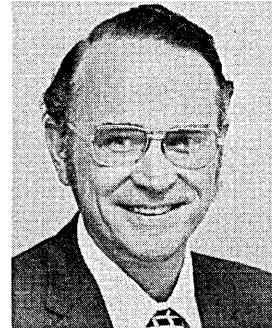
When one LU views another LU through a session path, it sees one type of LU, composed of data flow control and presentation class elements. When both the data flow control and presentation class are architecturally defined, an LUTYPE is visible. When other than an architected LU has been implemented, there must be a prior agreement on the presenta-

tion class before the LUS can work together. Data flow control can also be set by prior agreement or it can be established via BIND. Each LU at the cluster controller is assigned to a cluster application program.

A primary end user may use a presentation class in the primary LU to further transform the view of the secondary end user that the secondary LU provides. Thus, IMS or CICS transaction processors can have syntax scans performed on incoming chains of RUS, and can have message formatting added to outgoing chains of RUS. □



Dr. Gray is with IBM's Communication Systems Architecture group in Raleigh, N.C. He has worked in both the computer and communications fields, in areas such as network architecture, data link controls, microprocessor architecture, logical design, detection theory, modem technology, and systems programming.



The first job Mr. Blair had in the dp field was as a maintenance technician on the first ERA 1101 computer. That was at the National Security Agency in 1950. He became the NSA's chief of information processing research.

He joined IBM's Research Div. in 1969, after serving as assoc. director of an information systems in education study at Assoc. Universities, Inc. In IBM's System Development Div., he later worked to set long-range goals in computer communications and the means of achieving them, including SNA. Since Sept. 1973, Mr. Blair has acted as a technical advisor to IBM's legal counsel.

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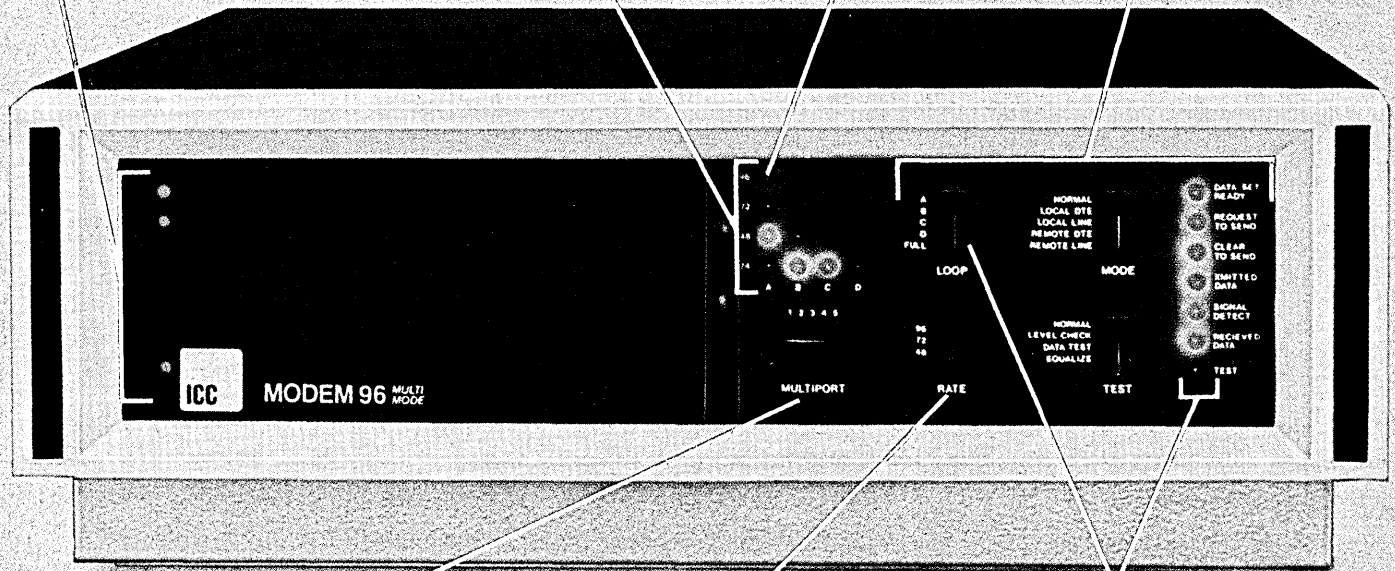
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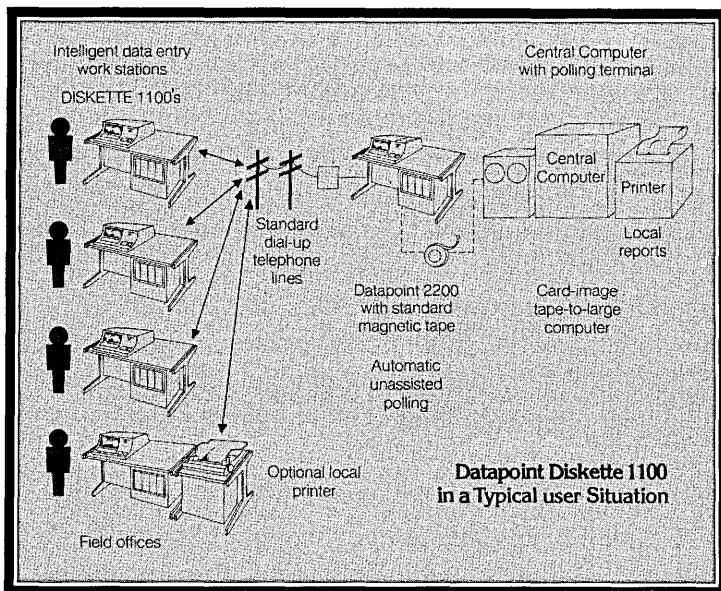
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| e^x | yes | yes |
| 10^x | yes | yes |
| x^2 | yes | yes |
| \sqrt{x} | yes | yes |
| $\sqrt[y]{x}$ | yes | no |
| $1/x$ | yes | yes |
| $x!$ | yes | yes |
| Exchange x with y | yes | yes |
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| % and $\Delta\%$ | yes | yes |
| Mean and standard deviation | yes | yes |
| Linear regression | yes | no |
| Trend line analysis | yes | no |
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| Product to memory | yes | yes |
| Random number generator | yes | no |
| Automatic permutation | yes | no |
| Preprogrammed conversions | 20 | 7 |
| Digits accuracy | 13 | 10 |
| Algebraic notation (sum of products) | yes | no |
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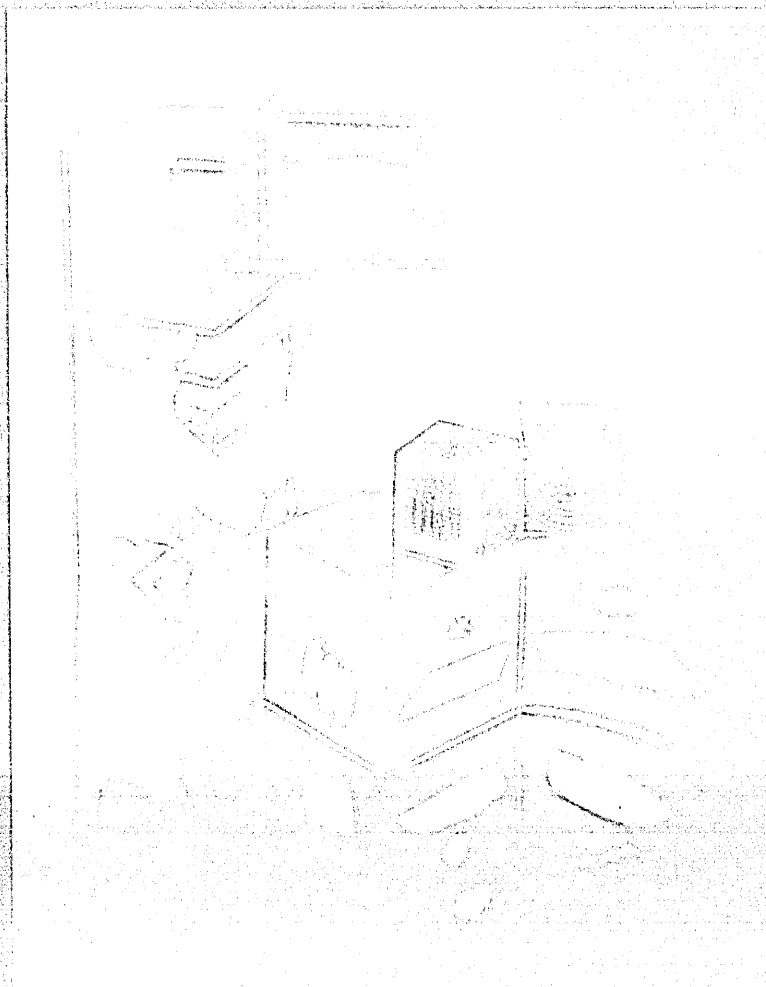
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CIRCLE 57 ON READER CARD

The goal is to separate completely the data base definition from the applications program; existing systems are part way there.

DATA INDEPENDENCE IN DATA BASE SYSTEMS

by Robert M. Curtice

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The concept of data independence is central to the data base approach and is a fundamental capability of all data base management systems. The basic notion is straightforward—to separate the description or definition of the data base from the application programs, thereby permitting certain changes to be made to the data base without affecting the existing programs. The benefits of this flexibility to program maintenance costs and system expandability are evident.

The data independence facilities of the major data base management systems do provide for the storage and use of a definition of the data base externally to applications programs. The data base manager in each case makes reference to this definition to interpret and execute the required I/O commands as called for by an application program. One key to the flexibility provided by independence is this: each application program references only that portion of the data base with which it must operate. Therefore, if changes occur to portions of the data base which are not referenced, then the program need not be changed. A secondary degree of flexibility results from the mere fact that the data manager itself has control of the physical access mechanisms, which can be quite flexible. This permits changes to device type and access methods again without effect on the individual programs.

(The degree of flexibility provided by the major systems for changing devices, space allocation, and access methods—where alternative methods are in fact offered—do differ to some degree, but will not be reviewed here.)

There are surprisingly significant differences in the way these systems handle data independence when changes are made to the data itself or to its structure. Here are the ways data independence is handled by IMS, TOTAL, ADABAS, SYSTEM 2000, and the CODASYL systems (IDMS, DBMS-10, DMS-1100, and others in this class).

Two methods

As described above, data independence is based on providing the applications program with only the data it requires. There are two fundamental methods to achieve this capability. In the *field request method*, the applications program specifies the fields which are subject to the I/O operation as part of each call to the data base management system. For example, suppose a payroll record contained the following fields:

| | | | |
|-----------|-----------|----------------------|-----|
| Emp. Name | Emp. No. | Address | ... |
| ... | Gross Pay | Number of Deductions | |

A program using a data base management system supporting the field request method might make a call such as

and would receive only those fields. Again, if a change is made to the employee name field such as increasing its size from 20 to 25 bytes, or a new field for "Exempt Status" is added to the record, it would have no effect on this program. Typically such changes involve the running of utility programs to unload the data base and reload it using a new data base definition.

The second method is called the *sub-schema method*, from CODASYL terminology. Here a subdefinition of the data base is generated using the same language as the definition for the entire data base (the schema). However in the subdefinition, only those records, fields, and relationships of interest to the program are defined. The program (or group of programs if more than one needs to look at the same or a very similar subset of data) merely references the subdefinition of the data base. In our example a subdefinition of the payroll record might be

| | |
|--------------|-----------|
| Employee No. | Gross Pay |
|--------------|-----------|

The data base management call need not reference these fields because the program had specified it was using a subdefinition of the data base which contained a payroll record description as above. The call

DATA INDEPENDENCE

GET PAYROLL RECORD

would retrieve only the two fields contained in the subdefinition of the record. Again, the same changes are possible without affecting this program.

In either method the data base manager must actually read the entire record (and probably several more contained in a physical block of data as well) into its own buffers. Control of subsequent transfer of particular fields depends on the method of data independence used.

The major data base management systems all use one of these two methods to achieve a degree of data independence. However, each one does it somewhat differently, and a description of each is needed to sort out the differences.

CODASYL systems

The CODASYL systems of course use the subschema method of data independence. Each subschema is named and cataloged by the system along with the schema itself. Note that one subschema could in fact be totally equivalent to the schema or entire data base if required. Usually, however, a subschema will reference some of the record types, some of the fields in each record, and some of the sets (relationships among records) contained in the schema. Changes to records, fields, and sets not referenced in a subschema will require no change to programs referencing that subschema.

SYSTEM 2000

Like the CODASYL systems, SYSTEM 2000 uses the subschema method, but in a different manner. In SYSTEM 2000 the subdescription of the record is constructed and placed directly into each program. This subdescription is somewhat confusingly called a schema, there being one schema for each record or repeating group in a hierarchy. This is not to be confused with the use of the word "schema" in CODASYL, where it refers to the description of the entire data base.

IMS

In IMS there is a separately maintained subdescription of the data base, referred to as a logical view. In this system the description of the data base is called a Data Base Definition, or DBD. There is one DBD for each physical data base, which must be a hierarchy. Relationships among physical data bases may be used in a logical view, thus giving IMS the ability to support network systems, although a logical view must itself be a hierarchy.

A logical view in IMS may thus contain records in a number of physical data bases, but again it contains only those that the application program using this logical view actually needs.

Even in a physical hierarchy, intermediate level records can be transparent to a program using a facility called segment sensitivity. However, data independence in IMS is at the record and not the field level, in that the entire record must be used in a logical view. Of course, extra space could be provided for in application program buffers to accommodate future expansion of a record.

Other systems which have field level data independence, however, are able to accommodate new fields in the middle of existing records without affecting programs. This facility would permit expansion of a fixed array in a record, for instance, which would cause difficulty in IMS. Note that the other systems also have the ability to reorder the sequence of fields as they appear in the application program's

buffers whereas IMS does not. However, this is not a real functional difference but rather an aesthetic one.

Whereas the lack of field level data independence in IMS may limit flexibility, it does have an effect on performance since a contiguous move of data from system to applications program buffers is possible rather than a field by field move.

TOTAL

The TOTAL system uses the field request method of data independence. Prior to each call made to the data base system, the program must place the names of the fields to be operated on (retrieved, stored, etc.) into a list in working storage. The name of the list is then passed to the TOTAL system as an argument in the data base call. Alternatively, the list could be initialized using the "value is" clause and could

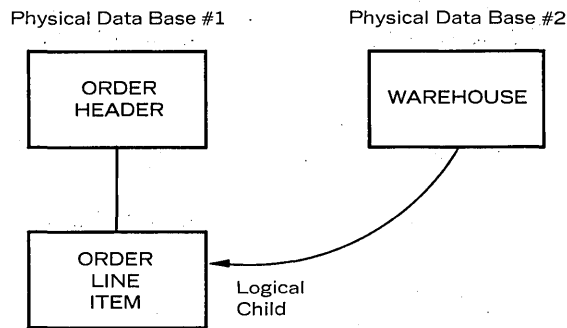


Fig. 1. IMS rules make it difficult to relate a single data segment to more than one outside data base; Order Line Item

can be the "logical child" of only one external data base like Warehouse.

| | CODASYL | SYSTEM 2000 | IMS | TOTAL | ADABAS |
|--------------------------------|---------|-------------|-----|-------|--------|
| External Data Base Description | Yes | Yes | Yes | Yes | Yes |
| Subschema Method | Yes | Yes | Yes | No | No |
| Field Request Method | No | No | No | Yes | Yes |
| External Subdescription | Yes | No | Yes | N/A | N/A |
| Field Level Independence | Yes | Yes | No | Yes | Yes |

Table 1. Comparison of data independence features of several data base systems.

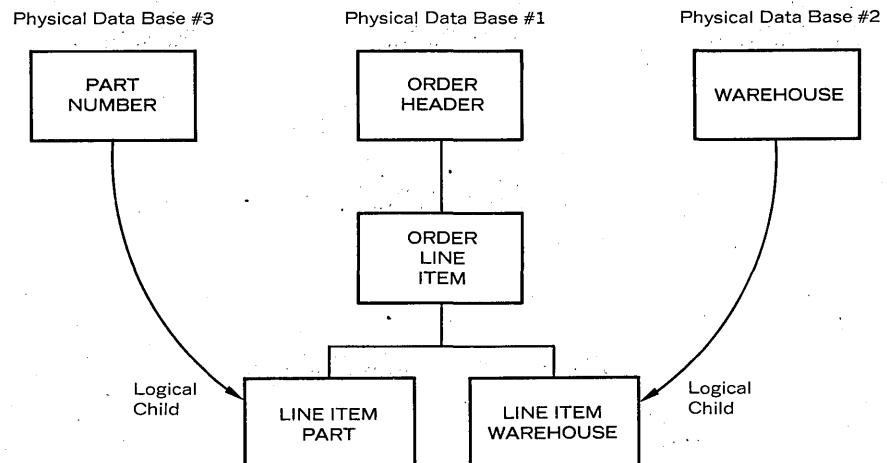
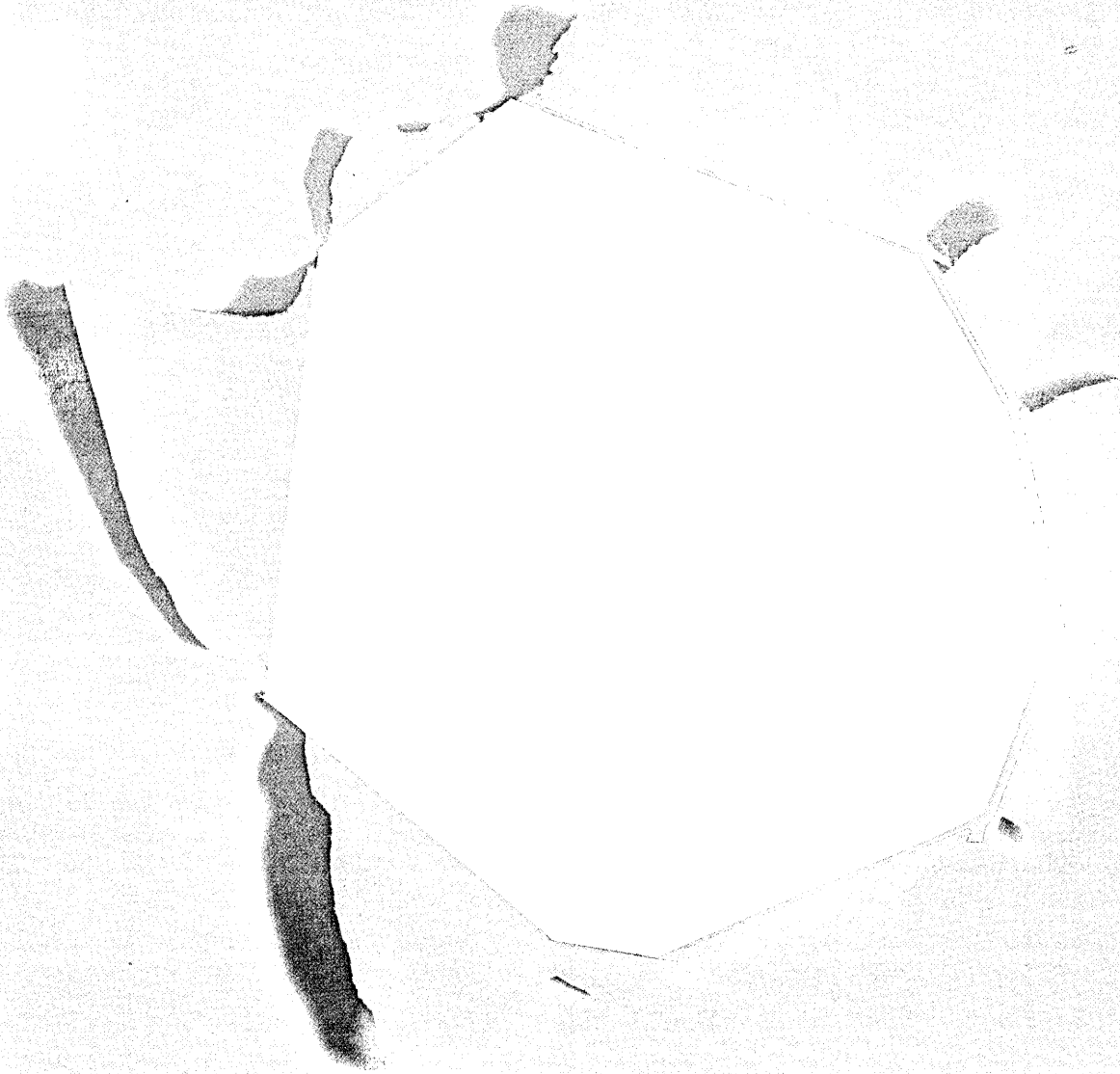
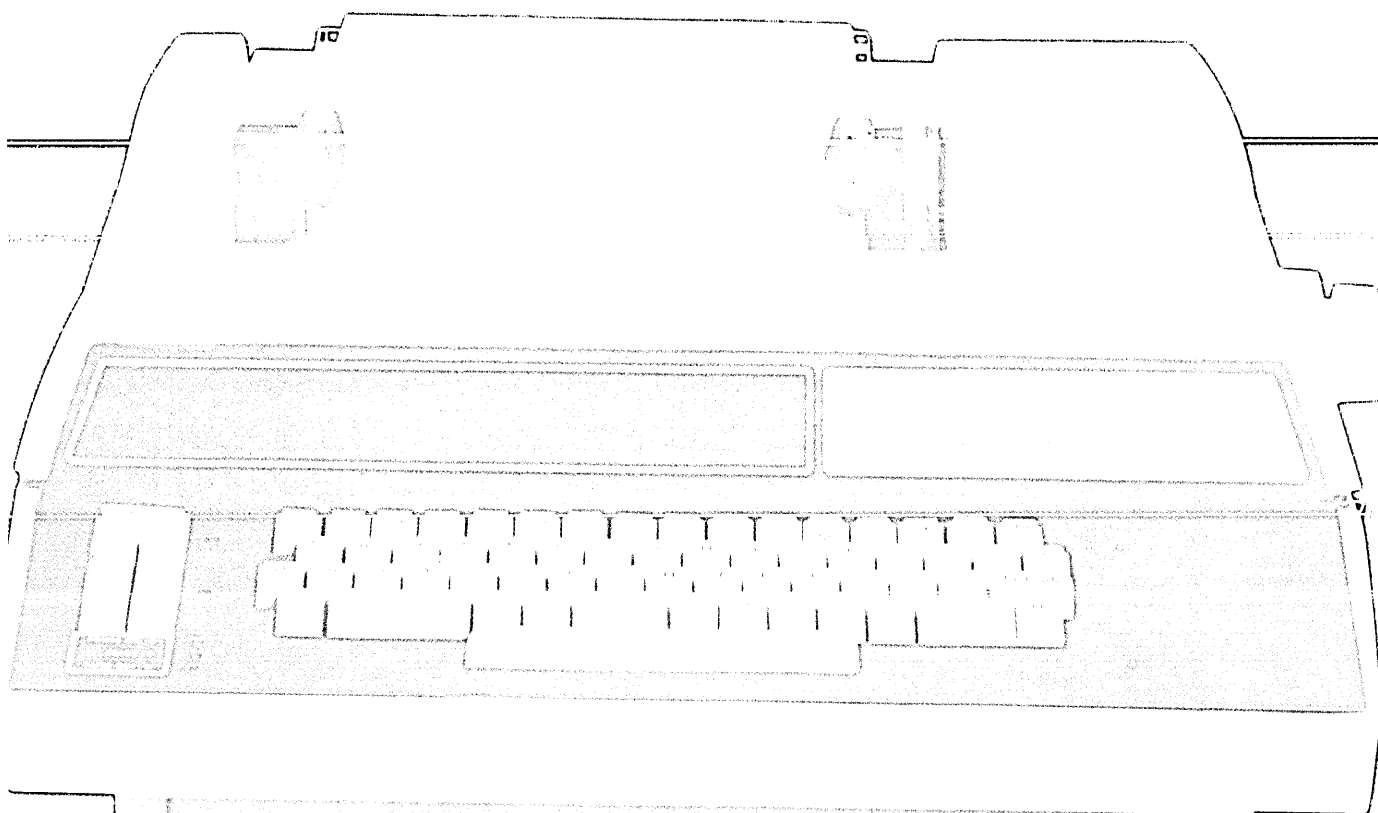


Fig. 2. Either future relationships must be anticipated, as here where Order Line Item has been related to two outside data bases, or program changes must be made when IMS relationships are restructured.

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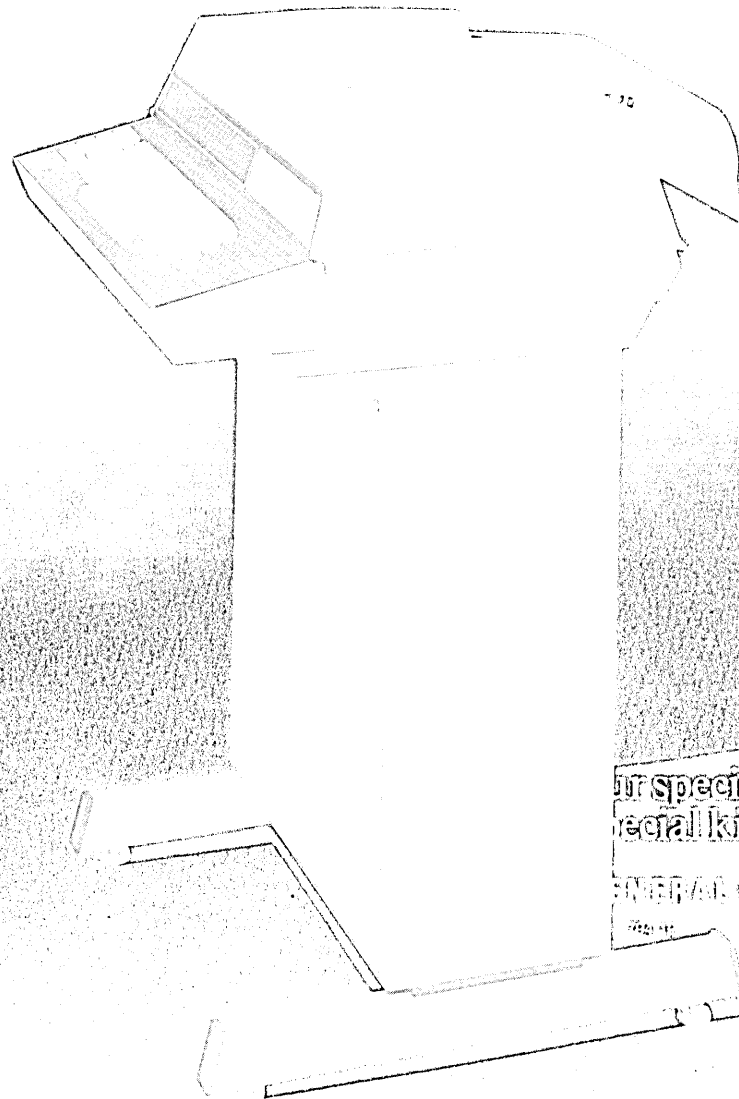
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DATA INDEPENDENCE

be used for all operations on a record type. One or more such lists are used for each record type with which the program deals. The order in which the fields are placed into working storage corresponds to the order in which the field names occur in the referenced list.

ADABAS

Like TOTAL, the ADABAS system uses the field method of data independence, and each call must reference a list of field names. ADABAS, however, offers some additional data independence features not found in other systems. In ADABAS an identification of each field and its length precedes the occurrence of each field as it appears in the data base, giving ADABAS variable length record and data compression features. But it also permits newly defined fields to be added to records without unloading and reloading the data base, since there is no distinction between adding a newly defined field and having one which was defined but never actually occurred.

Moreover, ADABAS permits certain editing or conversion to occur during the transfer of fields from system to program buffers. In the list of fields to be transferred, the applications program can optionally specify a given format for the field; if none is specified, the data base format is used. Thus if the format of a field changes on the data base, this program could continue to use the specified format.

Some comparisons

Table 1 summarizes the data independence features of the major data base management systems.

In addition to providing these data independence facilities, the subschema method can also be used to control access to the data base. Where an external subdefinition is used, the data base administrator can control the generation of these subdefinitions, and only include in them the fields which are required by each application program. Systems which do not provide external subdefinitions permit programmers to control which fields they wish to see. The external subdefinition systems can record which programs reference which subschemas, and access can be controlled in this way. Note that SYSTEM 2000 uses the subschema method, but it is not generated externally to each program.

The subschema method also makes it possible to present to the programmer a restricted view of the data base so he need not even consider data which is not relevant. In IMS, this facility is used to provide unique logical

data structures which are tailored for use by particular applications programs. In CODASYL, the facility merely restricts the subschema to a subset of records, fields, and sets of interest. Neither SYSTEM 2000 nor CODASYL permit a level of a hierarchy to become transparent to a program, as in IMS.

The format conversion and field addition without reloading features are unique to ADABAS.

Record relationships

As mentioned, data independence provides flexibility when the relationships among records change, as well as when the content of the records must be altered. The addition of entirely new records, and the establishment of relationships with existing ones, is a change which permits expansion and evolution of the data base itself. Again, each of the systems provides this capability in a different way.

Fundamentally however, the ability to accomplish these particular changes depends on the data structuring capabilities and limitations of the systems. CODASYL systems, IMS, and TOTAL provide a high degree of system managed data structuring through the use of pointers. Since there exist various rules in each of these systems for forming record relationships within the structuring capabilities provided, the ability to change or add new relationships must also be limited by these rules. For example, in IMS there are rules which state that a segment cannot be a logical child twice, nor can a logical child segment have a subordinate segment which is also a logical child. Suppose that currently a data base exists which looks like Figure 1.

We now wish to expand the scope of this data base by adding a Part Number segment, and connect it to all Order Line Items for each appropriate part. Normally, this would be achieved by establishing a logical child relationship from the Part segment to the Line Item Segment. But this would violate the rules, since the Line Item segment is already a logical child of the Warehouse Segment (linking together all line items for a given warehouse). If we had anticipated this change, it could have been accomplished as in Figure 2.

In other words, a separate segment, "Line Item Warehouse," had to be used as the logical child in order to allow future relationship additions within the rules. If we hadn't anticipated this change, forming the new "Line Item Warehouse" segment would cause changes to existing programs.

Again, each system imposes various rules on data structuring, and these

tend to restrict future options for change. Generally, IMS contains quite a few such rules, TOTAL fewer, and CODASYL Systems fewer still. SYSTEM 2000 and ADABAS, on the other hand, provide less system managed data structuring capability. Record relationships are achieved by placing the same data in two records, and then inverting on these fields. Correspondingly fewer rules are imposed however, thereby increasing data independence.

Conclusion

The data independence features of data base management systems are intended to minimize the impact of change on existing programs. Changes can be either to the content of records or to the relationships which exist among the records. For content changes, there are two methods of providing data independence: field requests and subschemas. For record relationship changes, the basic data structuring capabilities of the systems are often the limiting factors.

The issue of how much data independence should or even could be included in a data base management system is the subject of much debate. In their evaluation of the CODASYL proposal, the Guide and Share organizations found the degree of data independence lacking. On the other hand, there is a definite cost trade-off for increased data independence, analogous to executing programs in an interpretive mode. There is no question that current data base systems provide greater flexibility through data independence than existed in the past. Yet there are many changes which will still have a high impact on existing programs. It would be a serious error for a prospective data base user to abandon his planning efforts in anticipation of unlimited flexibility. We just aren't there yet. □



Mr. Curtice is a consultant with Arthur D. Little, Inc., specializing in data base systems for manufacturing, insurance, and other industries.

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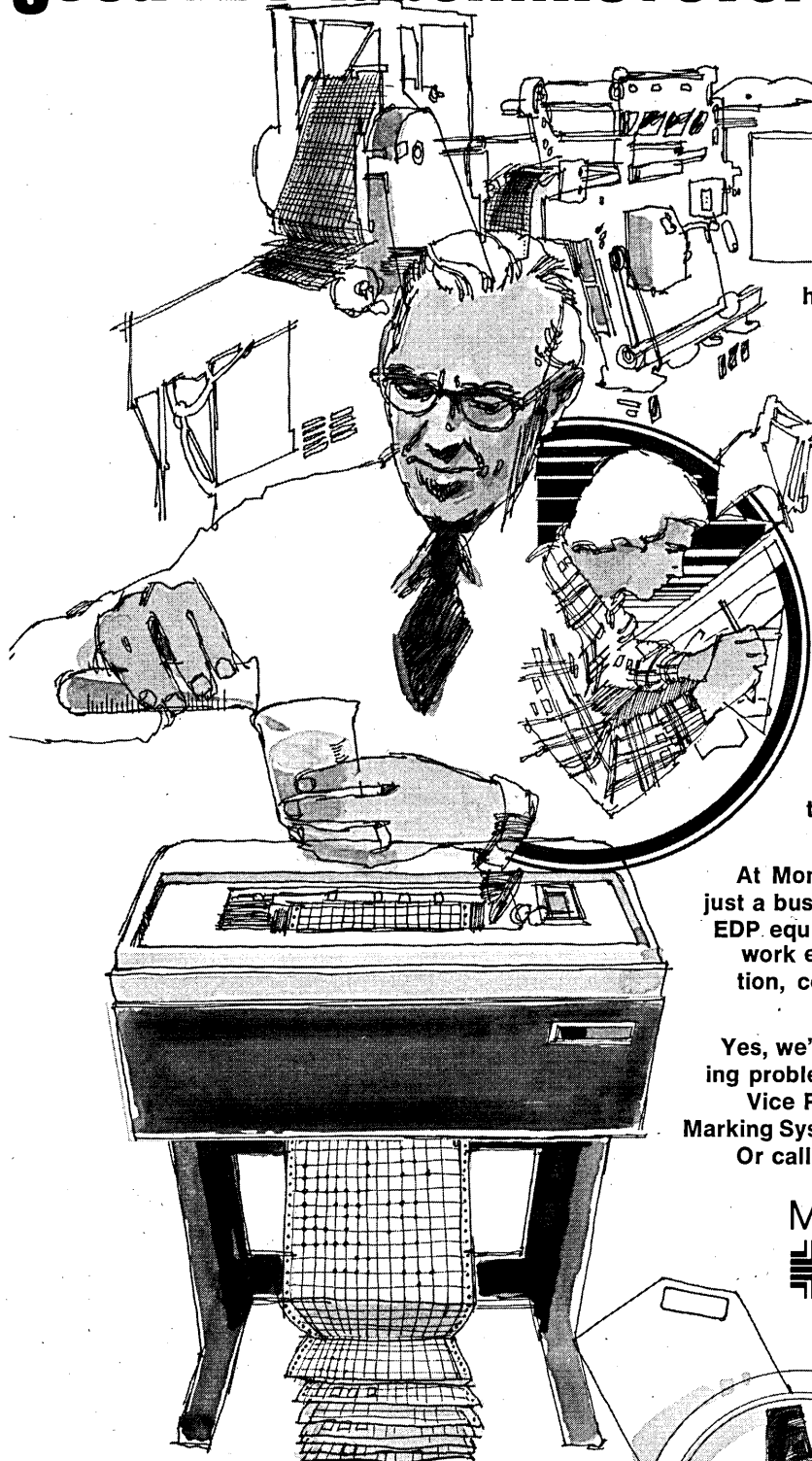
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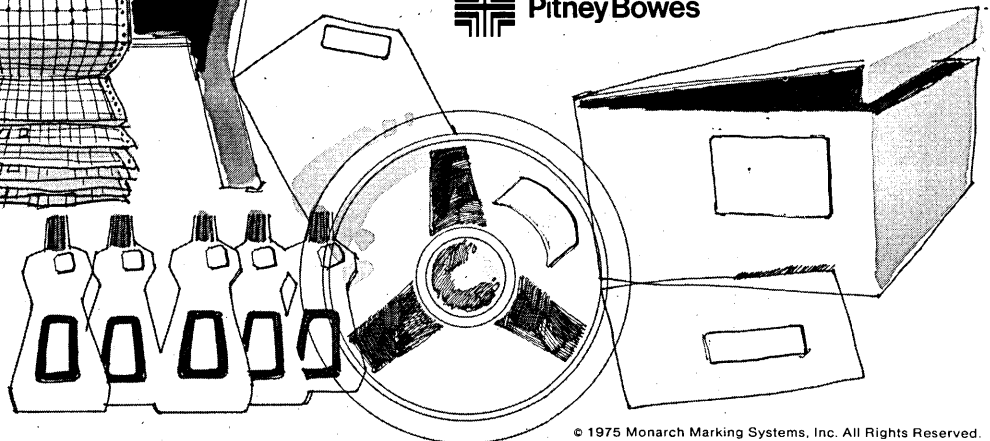
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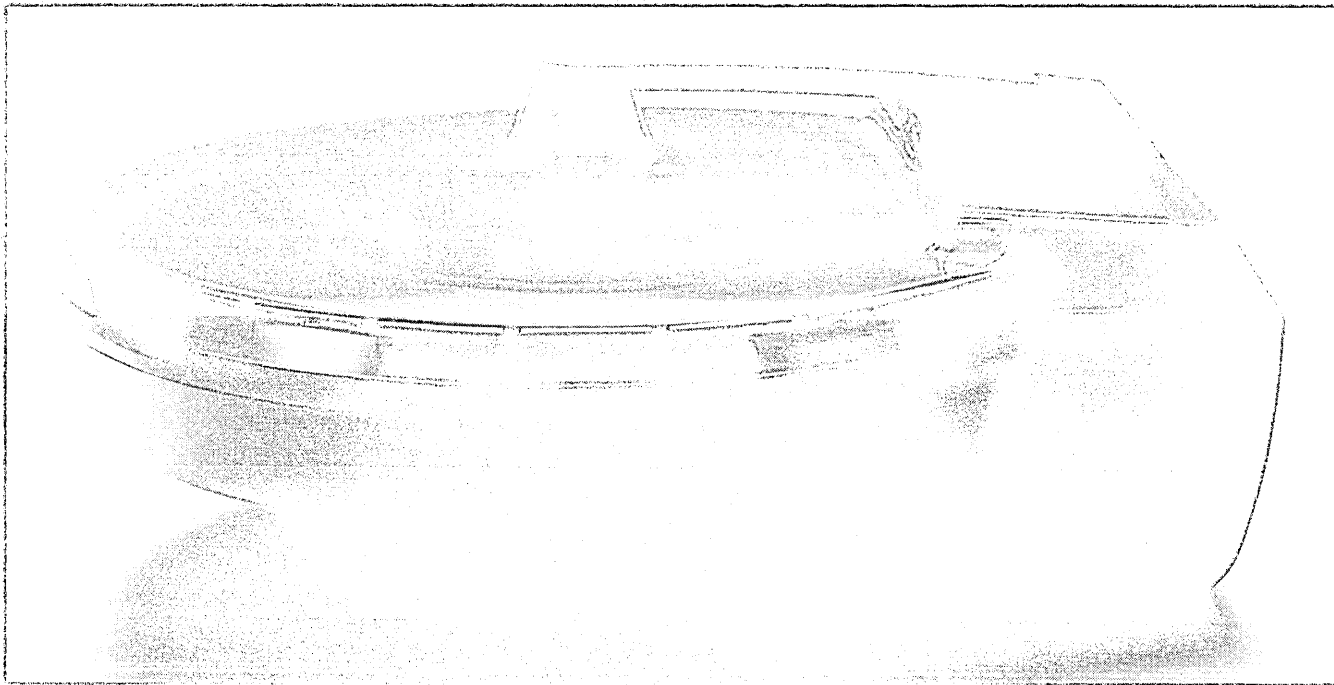
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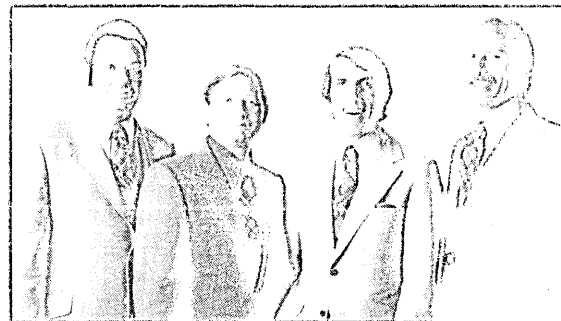
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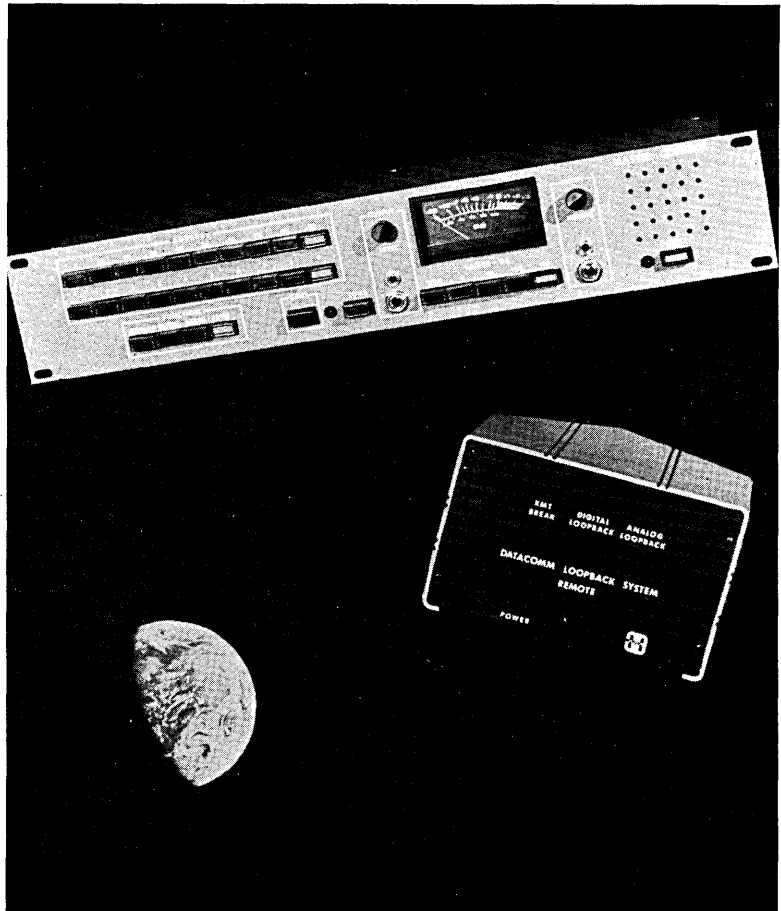
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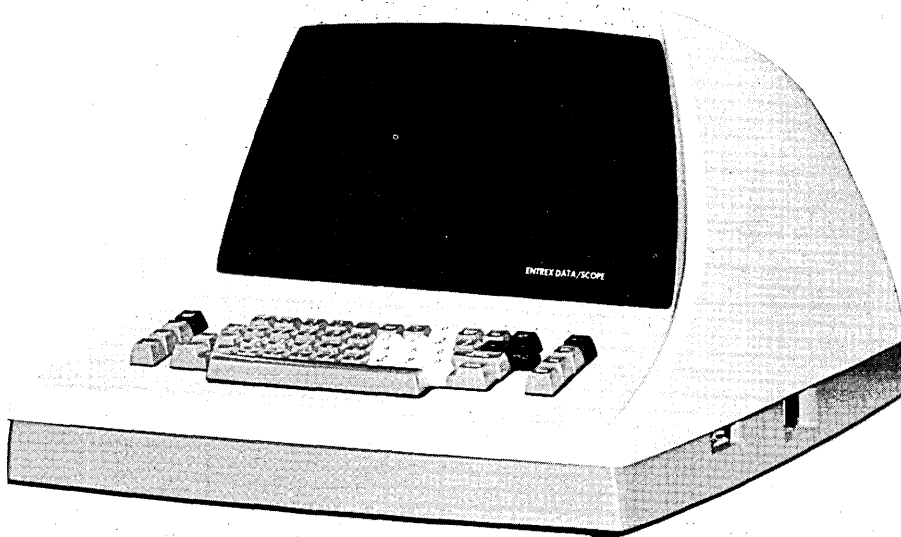


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Cobol isn't really self-documenting, but the right choice of symbols can make it nearly so.

STRUCTURED SYMBOLS

Currently attention is being focused on that elusive but real program property called *readability* or *understandability*. In particular the subject of *Structured Programming* has been advanced and enthusiastically received. Among other things, structured programming suggests the application of a formal methodology to program design. This methodology of formal notation may be called *Structured Symbols*. It is founded on a few principles: some obvious, some not, and some heretical. These principles are:

1. Programs are lists: lists of things to do and of things to do it to. They are *not* novels or detective stories.
2. The key to comprehensibility is organization, not language.
3. Acronyms are all right to a point, but large numbers of acronyms become counterproductive. For large systems, numbers are better. Numbers are easier to recall *correctly* than acronyms. Data is easier to file and retrieve with numeric labels than with acronyms.
4. The nomenclature (symbols) used in a related set of programs should indicate the structure and relations of those programs and the strategy behind their processes.

In support of these principles, a specific technique was conceived by Allen Keller of the General Electric Co. and has been in continuous use for the past 16 years in that company's Medium Steam Turbine Dept. at Lynn, Mass. This technique was first applied to large systems (100,000 instructions) coded in assembly language for the IBM 704. It proved so effective in supporting large business systems with a small group of programmers (7 to 10) that it was carried over with minimal adaptation when the shop "went COBOL" in the mid-'60s. It is used at this shop for all programs, small or large, as a matter of policy and habit. As will be obvious, it assumes top-down design.

This particular application of the

principles is hardly the ultimate; it has served well but a concerted effort could surely produce a better one. However it is presented here as an example of what can be done in this direction. It could obviously be adapted to any language.

Structured symbols for COBOL

There are three areas of a COBOL program where symbols are applied:

File areas (input and output)

Working storage

Procedures

In *File areas*, individual files, records, and items within each record must be labeled. In *Working storage*, we must also label

- records and their constituent items
- report lines
- tables and other "clusters" of data
- counters, pointers, status indicators, etc.

In *Procedures*, we must label paragraphs and sections, and we utilize the nomenclature applied in the *File* and *Working storage* areas. This utilization aspect is important; we should design our data nomenclature to promote the readability of the procedures which reference the data.

The rules for nomenclature are:

Files. Each file is assigned a unique number at time of conception. The number is obtained from, and an entry completed in, an office log book. The number is preceded by the letters FL, as in FL128. Specific occurrences of the file in COBOL programs are named FLI128 or FLO128 or FLIO128, depending on usage.

Records. Each record is assigned a unique number from the log book preceded by the letter R, as in R419. Specific occurrences of the record in COBOL programs are named according to location or usage in the program: I419 for an input file, O419 in an output file, S419 in working storage, and S419A, S419B, etc., for additional occurrences in working storage.

by Richard A. Butterworth

Reports. Each report is assigned a unique number such as in REP929. In a COBOL program, REP929 refers to the report as a whole. REP929H1, REP929H2, REP929A, etc., refer to specific line formats within the report.

Similar rules and conventions apply to tables, subscripts, counters, etc. In general the symbol consists of

- a *prefix* letter or letters indicating genus and usage;
- a unique *serial number* identifying the thing specifically;
- a *suffix*, where appropriate, to further particularize the thing.

Items within records are given short mnemonic names. We endeavor to be consistent, using the same name for the same item regardless of where it may occur. (PAYNO is always PAYNO, whether in I316 or REP487.)

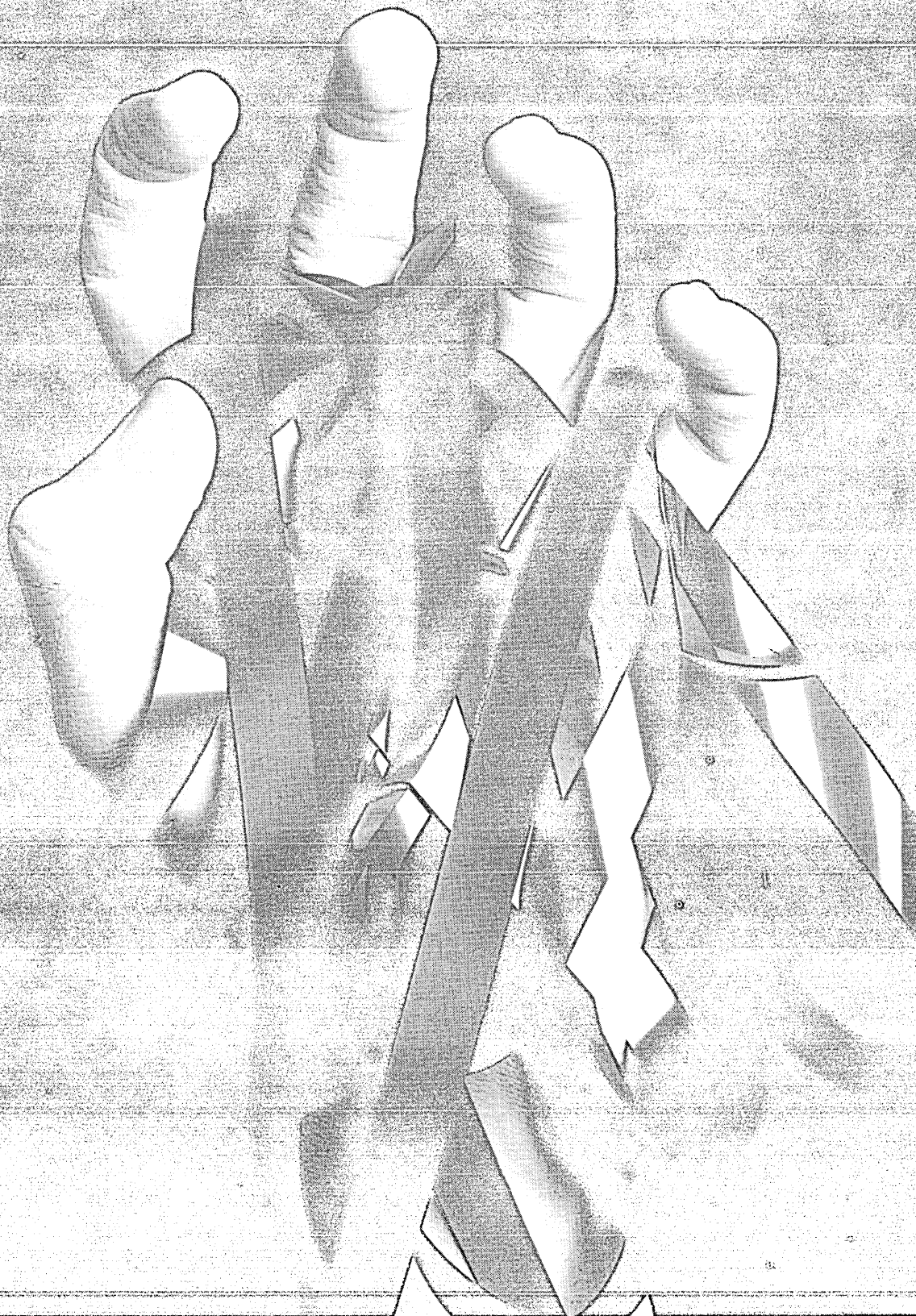
Procedures are always organized as a hierarchical structure of subroutines. These subroutines are closed (single entrance, single exit) and are executed only in response to a PERFORM from a higher level. Each subroutine is assigned a unique number via the log book. The prefix letter indicates the subroutine's position in the hierarchy: A is lowest, B next, etc., to whatever height is required. Each subroutine is coded as a SECTION. The paragraphs within the section are labeled with letters A, B, C, CA, etc., in no required order, although a well-designed subroutine tends to flow in alphabetic sequence (see subroutine skeleton below).

Characteristics obtained

The application of these rules yields programs with certain properties worth examining. For example, we demand qualification of data names appearing in the procedural statement

IF PAYNO OF S101 = PAYNO OF I228

Without reference to flow charts or to the DATA DIVISION, and with no prior knowledge of the program, one sees that the PAYNO of a record in



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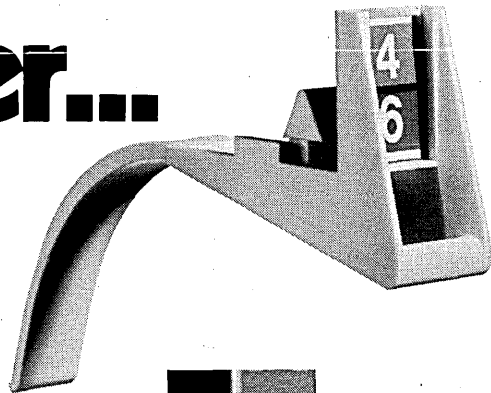
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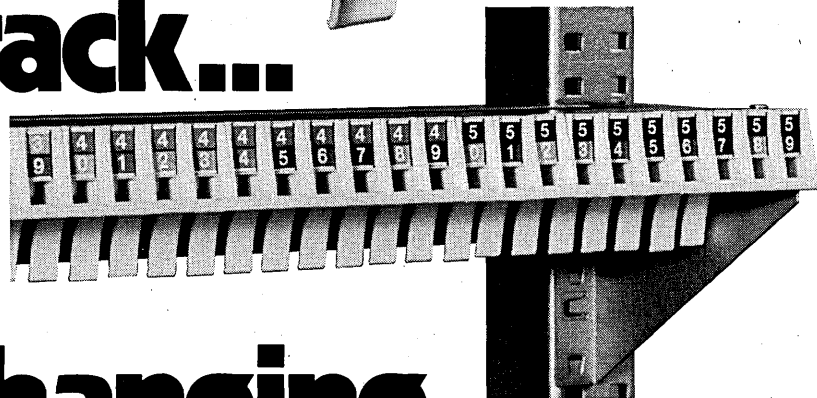
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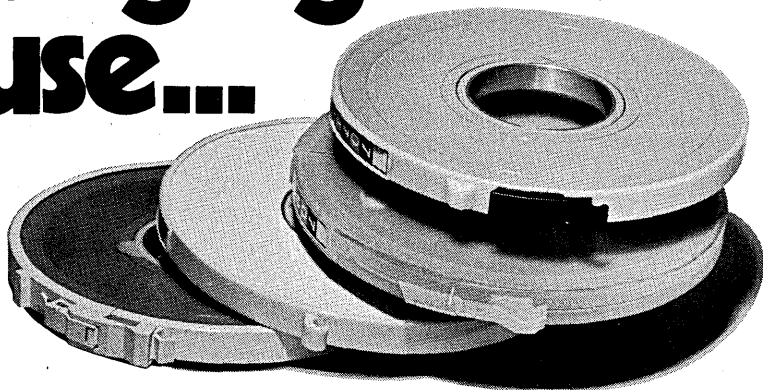
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STRUCTURED SYMBOLS

WORKING STORAGE is being compared with the like item of a different kind of record in an input area. This may not be an earth shaking revelation, but it is distinctly helpful in relating the statement to the program's strategy.

Similarly

MOVE IDENT OF S77 TO IDENT OF REP419D

conveys general contextual intelligence about the specific data items mentioned.

Again, the structural distinction between

WRITE 0228 FROM S228

and

WRITE 0228 FROM 1228

is obvious.

Consider now the subroutine skeleton:

C419 SECTION. NOTE ESTABLISH STATUS OF S2 ORDER.

A. IF BLAH-BLAH . . .

•

•

C. PERFORM B2127. NOTE SEE IF ORDER IS 'ADVANCE'. IF . . .

D. . . .

Z. EXIT.

The bounds and structure of the subroutine are easily seen. More important, the supporting documentation associated with C419 and B2127 (tables, diagrams, explanations, history) is easily referenced.

Documentation takes on a different and more useful form when applied to systems whose programs adhere to structural rules. Just as the programs are modular, so may be the writeup, as individual documents can confine themselves to well-bounded subject matter. This is a property of structured programs in general; its application is enhanced by the structured symbol, which provides a readily classified and indexed handle.

In our shop's system, each program or set of related programs is supported by writeups describing files, records, nonobvious storage arrays, and procedural sections using whatever explanatory technique is appropriate to each case. These writeups are filed using the Structured Symbol as the reference key. Such writeups are usually created *during program design* and are used to desk-check the program *before* coding. Obviously the symbols are being created as part of the design process.

Conclusions

Basically the point is that significant attributes of the data and of the procedures can be inferred from the structure of the labels used. Readability is enhanced at the procedural level where these attributes are apparent to the

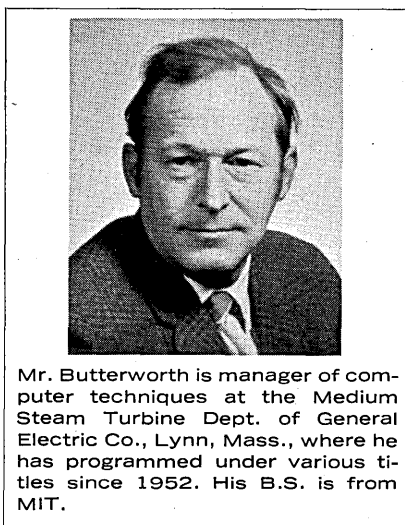
reader of the program, and at the documentation level where the supporting writeups are easily located.

Of course the programs do not read like novels. No doubt some will object to the loss of English-like characteristics. Now for the heresy: we have no evidence that the attempt to simulate English enhances the understandability of programs above the Mickey Mouse level. We have plenty of evidence to the contrary, namely, the whole sorry history of most programming to date, and the rare successes that surface here and there.

We have no productivity comparison with other notations because we haven't used any other notation in our shop for years. Any comparative measurement of course reflects those program qualities the measurers deem desirable. Our applications are characterized by logical complexity and frequent demand for changes. We thus have a high maintenance load and tend to associate productivity with response to change requests. This places a high value on program understandability, amenability to change, and usable documentation. It was in response to these qualities that the Structured Symbols concept evolved.

Structural notation also brings with in sight several fascinating growth avenues with respect to automatic program restructuring and automated documentation, but these topics are beyond the scope of this article.

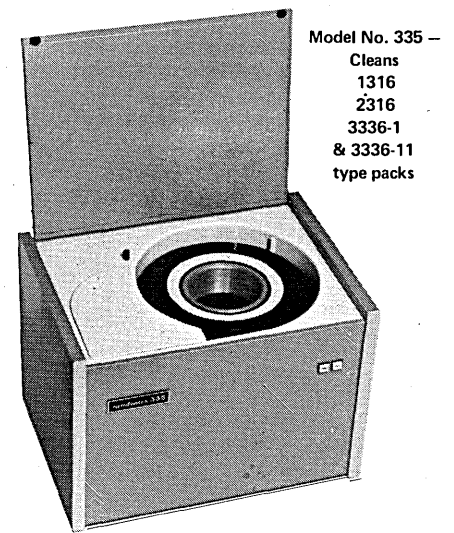
Someone has pointed out that one of the most valuable offshoots of structured programming is the mental discipline it imposes on the programmer. Structured symbolism complements this discipline and helps promote the most essential characteristics of the quality programmer: orderliness, consistency, and precision. □



Mr. Butterworth is manager of computer techniques at the Medium Steam Turbine Dept. of General Electric Co., Lynn, Mass., where he has programmed under various titles since 1952. His B.S. is from MIT.

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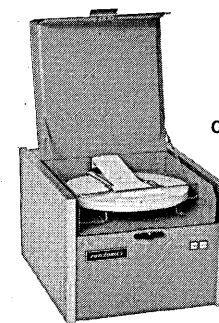


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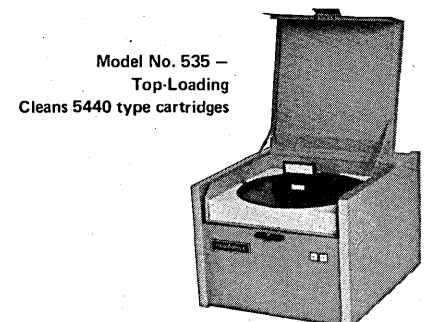
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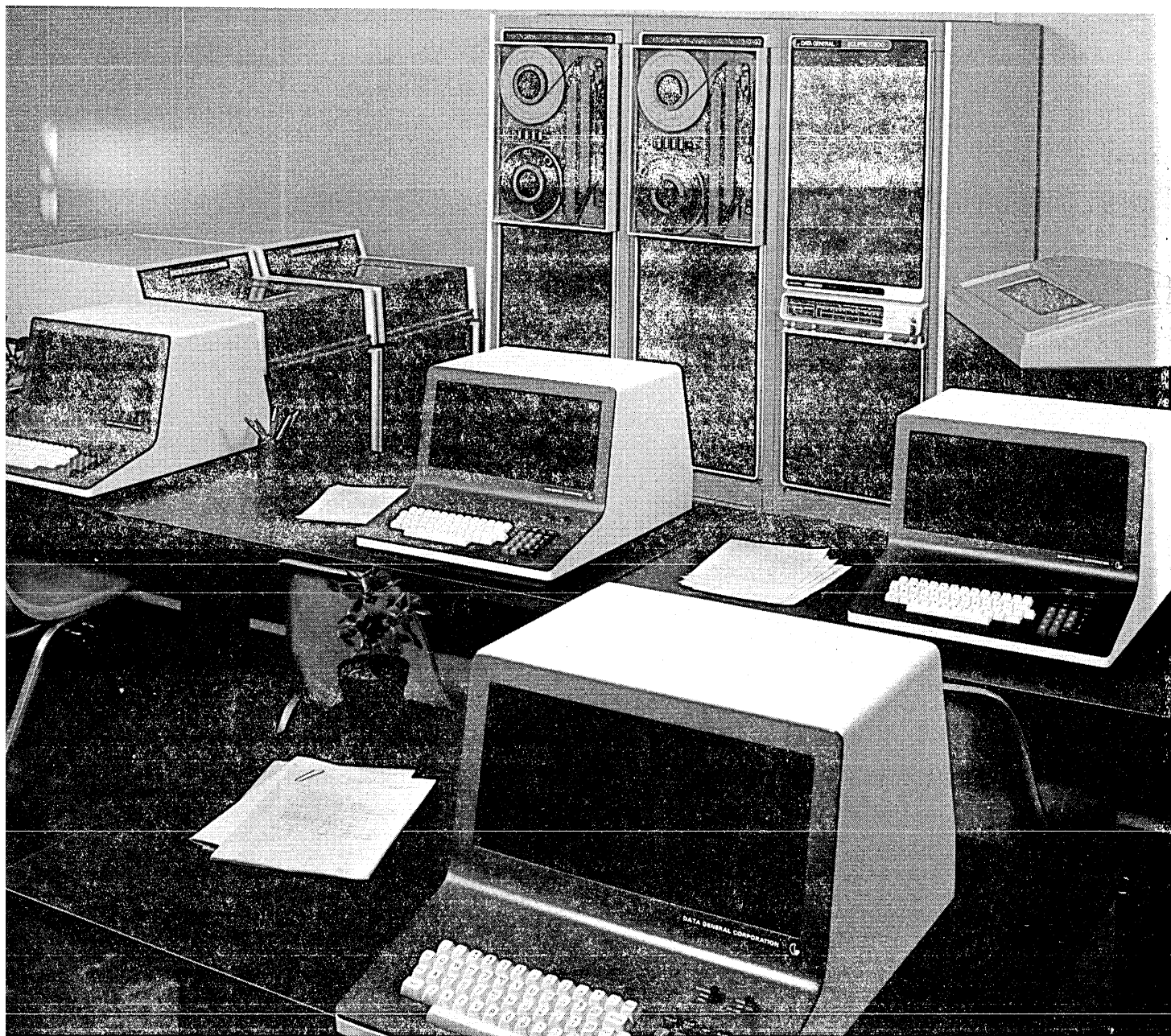
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It has a data base-oriented file system called INFOS™ that has all the conventional access methods: SAM, RAM, ISAM. Plus an unconventional method called DBAM (Data Base Access Method).

DBAM has such advanced features as data base inversion, dynamic space management, hierarchical key specification, partial records, generic and approximate keys, and relative position processing.

INFOS works with our Mapped Real-time Disc Operating System (MRDOS) which supports dual operations such as multiterminal on-line activity at the same time as batch processing or direct communication to other computers.

Our new, easy-to-use RPG II generates planned and unplanned reports.

You also get our re-entrant multitasking FORTRAN with full INFOS data manipulation capabilities that make it ideal for on-line multiter-

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And to communicate with your 360/370, our multileaving, interleaving HASP emulates IBM's remote job entry workstation.

The computer is the state-of-the-art Eclipse C/300. The one with 256K byte memory capacity, a comprehensive commercial instruction set, optional Error Checking and Correction (ERCC) that automatically corrects errors in main memory, and support for a mammoth 700 megabytes of on-line storage.

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D

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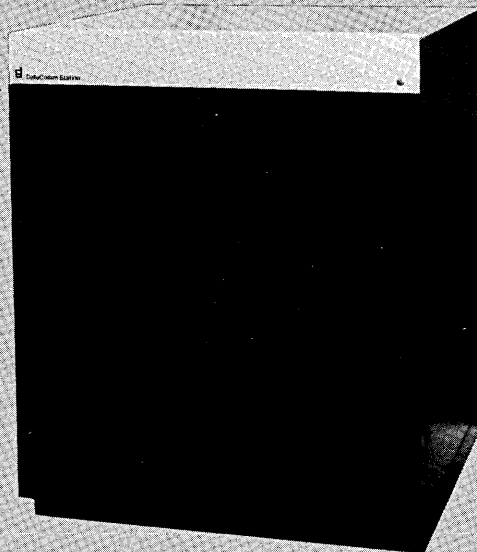
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It's the workhorse asynchronous channel packer. Use our modems and FDM to extend channels on voice lines beyond DDS cities.

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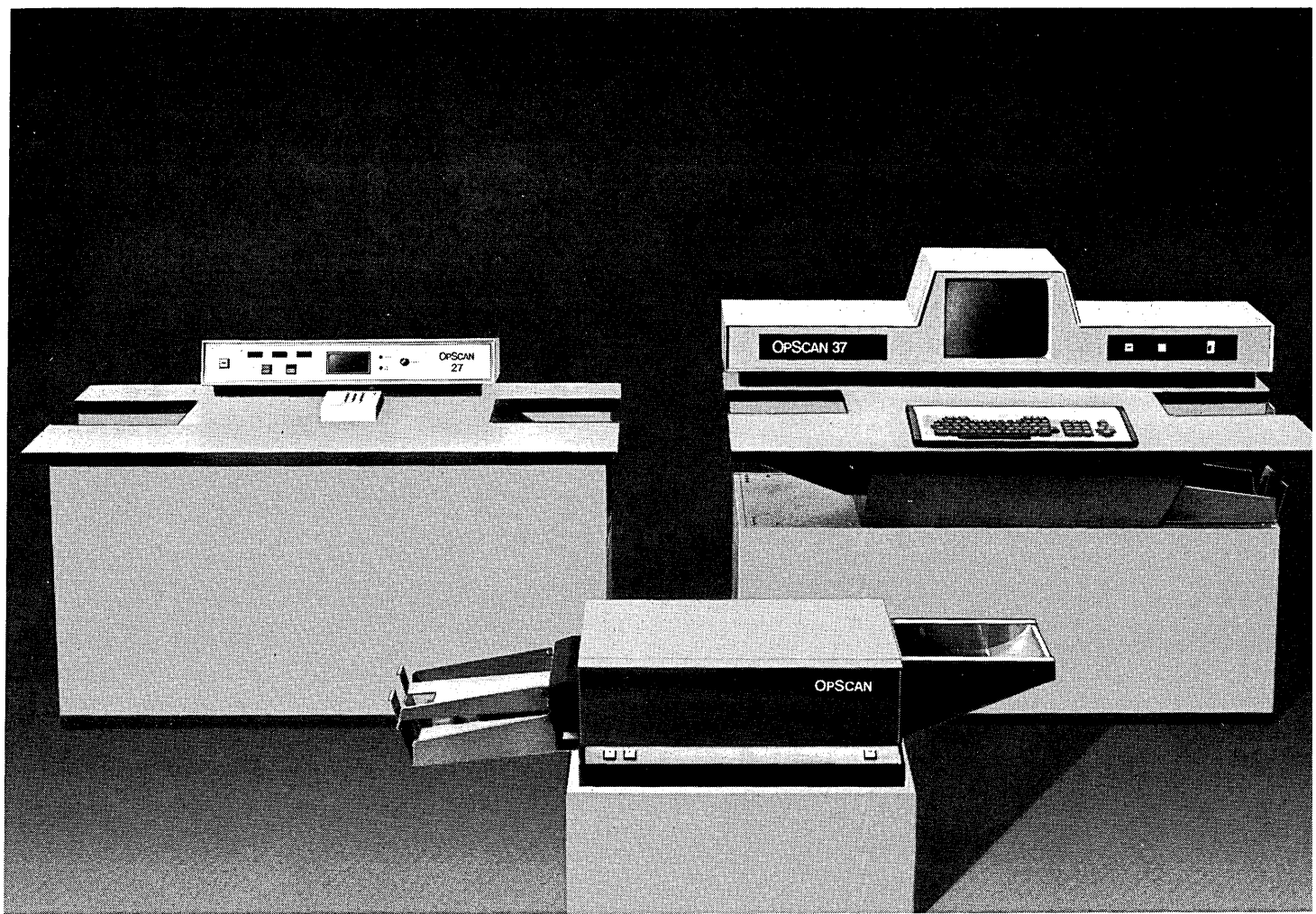
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IF THE 3 BEARS A RUSCARD SECURITY COULDN'T HAVE GOTTEN



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In today's complex society, business and industry have much more to lose than porridge as the result of uninvited guests.

In 1974 alone, thefts and other crimes against American business and industry totaled in the billions of dollars as the result of inadequate security precautions. Clearly, locks and keys and guards alone are not getting the job done.

Ruscard systems have brought the world of security out of the woods and into the 20th century. Manufactured by Rusco Electronic Systems, the pioneer and leader in development of sophisticated access control products, Ruscard security systems control who goes where and when—in elevators, offices, plants or wherever the need exists. Security access control in parking areas is provided through Rusco's Park-O-Matic division.

Ruscard systems monitor from one to 100 entrances, one to 20,000 cardholders and one to 7 work shifts—at any distance. They provide over-lapping time shift zones, complex mastering capabilities and an automatic print-out of all activities, with date, time of day, access point, I.D. number and status level. The Ruscard system's ability to collect and store either fixed or variable data permits such applications as

automated payroll, job cost accounting and inventory and production control.

Heart of the system is the cryptically-encoded Ruscard. It's the same size and shape as a standard plastic credit card and doubles as a photo I.D. badge, compatible with Polaroid and other I.D. systems. Unlike a lost key that com-

promises an entire security system, a lost or stolen Ruscard can instantly and easily be "ruled out" of the system so it will never open anything again.

The cost of Ruscard systems is surprisingly low. For less than the annual cost of hiring one guard, Rusco provides the

most advanced security system on the market; so advanced it's currently used by Exxon, Conoco, Standard

Oil, Xerox, GTE, Pacific Telephone and other companies, large and small,

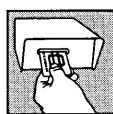
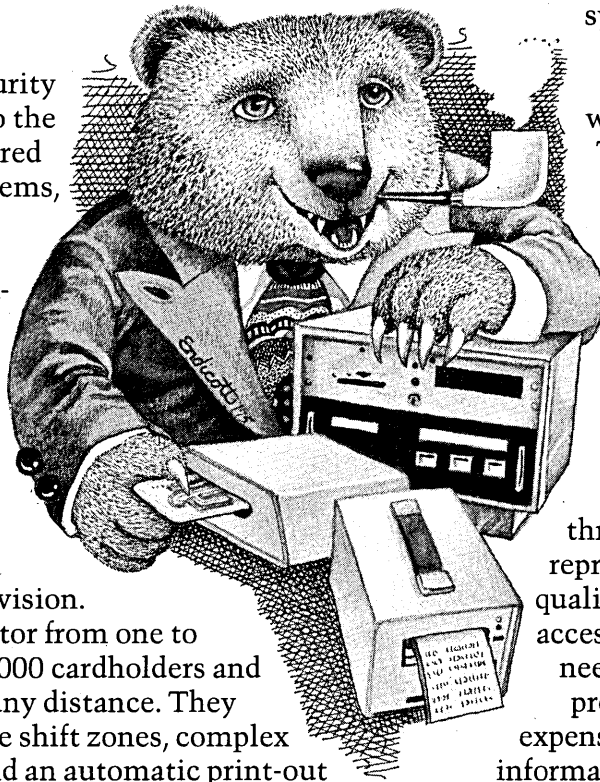
throughout the world. The Rusco representative in your area is fully qualified to recommend a security

access control program to suit your needs and budget. Whether you're protecting valuable inventories,

expensive equipment or proprietary information, you owe it to yourself to

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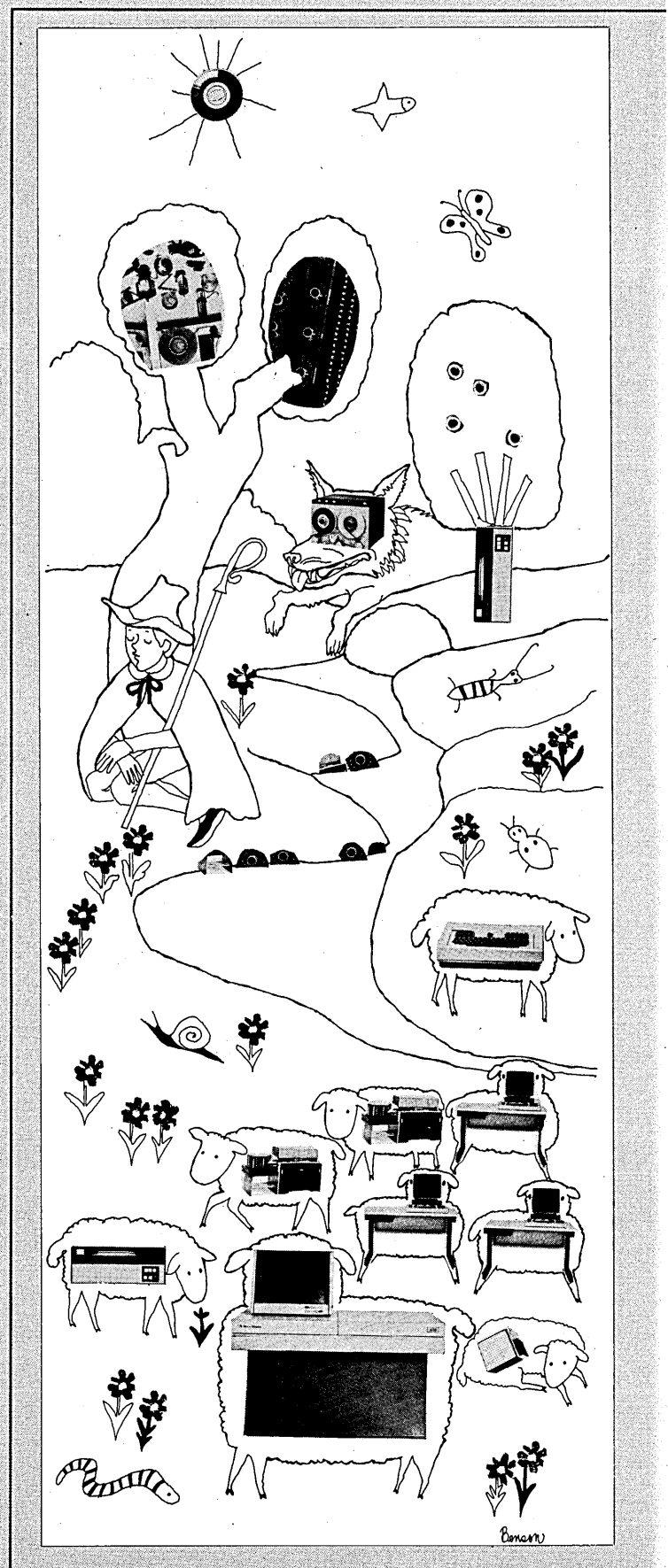
J.C.L. Guest

Bob McKenty

William J. Wilson

James P. Rubin

ules Haberman & Sergio Bernstein



THE by Jack Ludwig

CPU WHO CRIED SWAP

Many nanoseconds ago in a TSO queue in protected paging sets, a super resource scheduler built his control blocks. His most valued possession was a flock of vs-UCB's. They gave comfort for reading, writing, and swapping as well as data for table lookups. And the master scheduler activated them very carefully in foreground and background under MVT, MFT and VS.

Often he took his young allocator to the rural registers where the UCB's paused near Big Swap. The young allocator liked to go with his master scheduler. He liked to play at start I/O time. When he was inactive he chain linked from job stream to job stream that ran through the bubbling memories.

One day his master scheduler queued the young allocator to load a spool job from a waiting list and to play little tasks upon it. Many cycles passed and one sunny nanosecond the master scheduler said to his young allocator: "You are old enough to activate the page sets now and there are other tasks about the mainframe that I should do. Go with them to the rural registers and activate them as I have queued you to do."

At first the young allocator enjoyed taking care of the flock of UCB's. He kept the fluffy buffers from straying and found new memories when the get/puts had filled all the available areas with data. To vainly display himself, he made up dummy requests to fill his task list. But after awhile the work became tiresome and boring. "Here I am," he mumbled, grumbling to himself, "with only UCB's for company. I'd like to hear the sound of a modem voice once in awhile, but all I hear is the silly deleting of a flock of completed I/O seeks—Get. Put. Read. Write. Open. Close." He complained to his monitor the master scheduler. "I am tired of spending all my milliseconds with a silly flock of seeks." "I am busy, young allocator," the master scheduler replied, "and there is no else to send. For many 3rd generation cycles I have watched the flock, but now because of virtual capability there are working sets which need attention. In a few releases your brother accessors will be old enough to activate as you are now. For the present there is no one except you with whom I can trust the UCB's."

The young allocator felt ashamed. He knew how hard his master scheduler had worked to give his family a large capacity storage and enough bytes to keep from swapping out. So he tried hard to take an interest in the I/O seeks and for a time he was content.

Then he began to feel sorry for himself again. "No one ever queued such a stupid list as mine," he thought, "I wish a poisson arrival would come from the network. That at least would give me a little excitement." Then an invalid parity check came into his

status. Spring. Glitch*. Zap\$. . . "The channel schedulers will heed me if I BLEEP," he said to himself, and raising his ID he interrupted, "Help. Help. Wild Device. Wild Device." The schedulers instantly came masking with spare buffers and status words, but when they reached the rural registers, of course there was no wild device. The young allocator told them that the device had returned to normal. Some of the schedulers doubted him, but a few felt sorry for the I/O seek herder and linked to him for the rest of the shift.

A few days later he decided to try the same stunt again. He stuffed an invalid parity bit into his status and was ready. "Help. Help. Wild Device. Wild Device." He interrupted, and again the channel schedulers came to his aid along with some main circuits. This time, however, the few who had been so friendly earlier were suspicious when they again found that there was no wild device. "If there had been a wild device here," said the main logic unit of the chief processor's office, "there would be some trace of his data stream in the device controller's log." The young allocator pointed to some loose bits and bytes in response, but the arithmetic unit said they had been left by the double precision registers from their last parade and not by the device. No one linked to the young seek herder this time, and as they went back to their work the schedulers were extremely angry. "I believe that that young allocating I/O seek herder was deceiving us," said a sysgen job handler. "I'm sure of it," another agreed. "If he bleeps to Interrupt again," said the look-ahead register, "let us pay no attention to him. We'll just let his wild device toss its bits upon the deaf ears of the excess bit bucket and make him start his tasks over again."

A few days later a wild device really did send invalid parity bits into the young allocator's frightened status, and exploded into the middle of its close macro destroying all chance for control. "HELP. HELP. WILD DEVICE. WILD DEVICE. HELPPP . . ." The young I/O seek herder interrupted in terror, for he had nothing but an old device busy status word to use as an attention getter, and he knew he could not overcome such a huge wild data cell with just a busy signal. The channel schedulers paid no attention to his cries for interrupt but went about their business. The young allocator started to load data beyond all reasonable bounds, attempting to interrupt all the way. When he came to the main registers and the chief processor, he found the main logic unit standing at the head of his queue. "Why did you not swap when I bleeped?" the youngster demanded. "A great wild data cell came and clobbered

more

THE CPU...

several of my seeks and gobbled up all of my UCB's and even disabled my access module." "I am sorry to hear that," the diagnostic logic unit replied, "but you had deceived us twice and we calculated to the 13th decimal place that you were deceiving us again. If you want help when you are in need, you must call for that help only when it is necessary." No one believes a liar even when he speaks with even parity.

Alfred, Lord Tennyson

GENERATION GAP

For I dipt into the future, far as human eye could see,
Saw multitudinous computers of generations yet to be;
Heard the wailing, moaning, muttering of users
all nonplussed,
And the cry of corporate officers faced again
with going bust.
Heard the salesmen speak of throughput,
and controllers mention dough,
And the engineer-designers saying this way we must go.
All the dusty old equipment standing here upon the shelf
Reminds us constantly that history will repeat itself.

—Jackson Granholm

COMPUTER CHIC

Here's How To Tell When It's Got You

Computer Chic is a relatively recent phenomenon in the industry. As with Radical Chic, it refers to those enviable circumstances in which one can enjoy the luxury of an adversary stance toward the Establishment without abrogating any of the privileges associated with, or even giving up, membership in that same establishment. How can one tell for sure when Computer Chic is on the prowl? As with so many of our neo culture traits, the signs are often ambiguous. However, here are some tell-tales that the diligent may find useful in applying the label.

An individual immersed in Computer Chic is very likely to have done some of the following:

- Contributed at least \$25 to the "Save Telex" Foundation—and claimed a tax deduction for it.
- Allowed his hair to grow below the collar, with its ultimate length being directly proportionate to his age.
- Slipped at least one confidential document to a Washington reporter relative to the dangers implicit in government computer data files.
- Delivered at least one talk on industry standards in the same style and at the same decibel level as William Jennings Bryan in his "Cross of Gold" speech.
- Has a framed copy of the 1956 IBM antitrust consent decree hanging on his wall, with a scribbled notation, such as "Big Deal!", at the bottom.
- Is fond of congregating with his peers at computer industry shows to form ad hoc groups to promote various worthy causes, none of which relate to the computer industry.
- May sometimes be seen skulking on

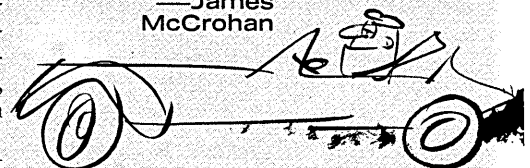
the fringes of the UC/Berkeley campus.

- Refuses to deal with any IBM marketing representative below the rank of vice president.
- Claims membership in the original programming team for the IBM 650 (one trying for the ultimate Chic will claim to have worked on ENIAC with Mauchly and Eckert).
- After years of waiting for the right investment opportunity, put his bundle in Viatron stock just before the plug was pulled.
- Has a masterful command of number theory but finds it absolutely impossible to keep his checkbook balanced.
- Prefaces remarks at industry conclaves with statements like "Other than the Catholic Church, IBM has got to be the best managed organization in the world, but the question is, is Sainthood our goal?"
- Has more international airline stories than anyone, all of which end in some sort of personal triumph, based on his superior knowledge of human psychology and his refusal to back down before witless authority.
- Will hire kempt counter-culturalists for the computer room but bans headbands and exotic tobaccos.
- Is a heavy, heavy name dropper, reaching back, if not to Babbage, sometimes to Turing, certainly to Goldstine, Shannon, von Neumann and all contemporary industry celebrities.
- Is completely with it so far as woman's lib, gay lib, etc., are concerned but in fact associates professionally, and is comfortable, only with others like himself with Computer Chic.
- Suffers severe internal agitation at

the prospect of IBM becoming five separate mega companies as a result of all his boos and hisses.

- Dislikes successful computer company entrepreneurs, especially those he's helped along the way, but admits to a grudging respect for them.
- Is especially fond of travel in Eastern Europe and the Soviet Union (or, even more Chic, to mainland China).
- Dislikes capitalists and capitalism, but then dislikes equally any known system used to generate and control production.
- Has strong, usually negative views about the major (if that is the word) competition to IBM, and conveys the implicit notion that only he, in a proper command situation, could effect salvation of any particular company.
- Has long been determined, by God, to make his mark in the world of commerce, which he dislikes, of course, but that's where the action and the money is.
- Nurtures the secret wish that the industry would slow down so he could get his bearings, nevertheless will brazen an opinion through in any public circumstance.
- Often thinks of that small liberal arts college somewhere in the hills as his ultimate goal but first will have to straighten out the mess in software standards before he can think seriously about going back to the academic life.

—James McCrohan



SYSABEND DUMP

On either side the printer lie
 Fat stacks of paper six feet high
 That stun the mind and blur the eye.
 And lo! Still more comes streaming by,
 A fresh SYSABEND dump.
 Ye printer clacketh merrily.
 "Complecioun code is 043"
 Alack! What can the matter be
 That made SYSABEND dump?
 My TCAM hath no MCP?
 My data cannot OPENED be?
 Consult my neighborhood SE?
 The devil take thy dam and thee,
 Thou vile SYSABEND dump!
 Assemble modules on the fly
 And link for yet another try.
 With SUPERZAP a patch apply.
 This time THOU SHALT NOT DUMP!

On either side the printer lie
 Fat stacks of paper twelve feet high
 That blow the mind and blast the eye.
 Gadzooks! How shrill yon varlet's cry
 As sixteen megabytes go by
 In yet another dump.

—J. C. L. Guest

Isaac Watts

HOW DOTH THE LITTLE BUSY CHIP

How doth the little busy chip
 Denote each nanosecond,
 With bits which swiftly flying by
 Make clocking pulses reckoned.

—Jackson Granholm

THINK

That Pharoah was a wicked one;
 Goliath worse than any Hun.
 Delilah burst poor Samson's bubble
 And Jezebel was 'Lijah's trouble.
 Your People have been plagued, you see,
 By male and female equally.
 Today our nemesis is *neuter*.
 It's the digital computer—
 That maze of complex circuitry
 With billion bit core memory.
 With electronic speed imbued,
 It sends me bills with promptitude;
 Its dunning letter soon appears
 Whene'er my payment's in arrears.
 Its perforated cards, I'm told,
 I dare not mutilate or fold,
 And in its data bank on disc,
 I'm labeled "LOUSY CREDIT RISK!"
 IBM's malicious blob!
 How soon will it usurp my job?
 The darned computer gives me fits.
 Lord, save me from that ton of bits!

—Bob McKenty

SCOPE

This document is designed as a reference guide for in-house Redundatron staff in day-to-day nonwork situations during working hours. The text is written for the entire gamut of technical and nontechnical employees who anticipate the need for simulating Business Mode (BM) when actually operating in Personal Mode (PM).

REFERENCES

The following reference material was NOT used in the preparation of this guide. However, they may be consulted from time to time when PM is permitted, such as during lunch hour, before lunch hour, or after lunch hour.

The New York Times
The Wall Street Journal
The Daily Racing Form
The Classified Telephone Directory
Datamation
Playboy/Playgirl
Archie Comic Books

INTRODUCTION

The ILU 9-2-5 (Inconspicuous Loafing Unit) is the Redundatron equivalent to the IBM 9-2-5 WE (Work Emulator) or the DEC PDP 9-2-5 (Play, Daydream, and Pretend). The ILU 9-2-5 may be used in a stand-alone configuration, or as an intelligent front-end to a not-so-intelligent supervisor.

In the front-end configuration, the actual connection between the ILU and the supervisor depends on the bored rate of the ILU and the sex of both the ILU and the supervisor. In the case of a male-to-female or female-to-male connection, standard communications are available, such as the Bisynchronous Stare via a WINK/L or WINK/R. In the case of male-to-male or female-to-female connections, Redundatron IYT (It's Your Thing) adaptors may be obtained at a nominal cost to the reputation of both ILU and supervisor.

In the stand-alone configuration, the ILU is left to its own resources in the fulfillment of BM responsibilities, especially if the supervisor is not responsive to attempts to set up a communication link.

The stand-alone configuration may at any time be converted to a front-end configuration, depending upon communication characteristics of the ILU. Conversely, a front-end configuration may revert to stand-alone mode when a breakdown in communication occurs.

FUNCTIONAL DESCRIPTION

The ILU is designed to provide Redundatron management with a false sense that steps are being taken to expedite the business of selling and producing Redundatron products. Although it is not true that the ILU is incapable of accomplishing any productive work in BM, the productive ILU is the exception rather than the rule.

How does the ILU manage to stay with Redundatron? There are four reasons for this phenomenon:

1. The ILU Supervisor has a vested interest in keeping the ILU around because:
 - a. a connection has been established between the ILU and the supervisor, or
 - b. the ILU is necessary to justify the

MOR

IF WE CAN'T HELP YOU MIND YOUR OWN BUSINESS, NOBODY CAN.

What would it mean if your key people could know the status of every department in your company any minute of the day? No matter where the department is or what it does? No matter what kind of business you're in?

On top of that, what if each individual department not only knows where it stands on an up-to-the-minute basis, but also knows the status of all related departments?

What if we told you General Automation has a brand new answer for these questions and a lot of others just like them?

A new ending for an old story.

Data management, or the lack of it, isn't a new problem.

What we offer is a totally new network approach. One that replaces a lot of time-consuming, non-productive status meetings, paperwork and guesswork with simple, economical, automated systems that tell everyone who needs to know, everything they need to know, whenever they need to know it. No matter where they are or what they do or how they do it.

Right about here, it would be wonderful if we could stop philosophizing and tell you

about a magic computer that does everything. But, it's not that simple.

Don't buy a computer.

Buy a solution.

Forget about mini vs. maxi, batch vs. real-time and first decide what you want to accomplish. What kind of information has to flow? Where is it coming from? Where is it going? What are you going to do with it when you get it?

What can be processed in batches? What do you have to know right now?

Do you want to do a few jobs fast? Or a lot of jobs not-so-fast?

And so on.

When you've pinned down all the questions, we know where you can get all the answers.

We've got data management surrounded.

General Automation can approach your data management requirements from your point of view.

If you're interested in high-performance systems offering decentralized control and custom applications software, our new DM-100 family is the right way to go.



If moderate performance, more centralized processing and a vast library of standard applications packages will work for you, you'll be interested in our DM-200 family.

The performance-oriented family.

Our DM-100 family consists of systems for remote job entry (DM-120), satellite processing (DM-130) and powerful central processing centers (DM-140)—each built around our high-performance SPC-16 computer. When tied together, they form a compatible network of products that can communicate with each other and provide upward expandability where you need it when you need it.

A number of specific industry-oriented application programs are available for use with the DM-100 family. We also offer general libraries for statistical analysis, operations research and financial planning. If needed, we'll work with you to develop custom solutions for your particular applications.

We also make a special low-cost, highly interactive system. It's called the DM-130/2 and has just about the same specs as the DM-130, but without the range of expandability. (It is available through a separate, nationwide network of distributors established to handle the special turn-key business system requirements of first-time users.)

The application-oriented family.

Lots of applications and less decentralization calls for our DM-200 family. It is based on our 18/30 computer and a vast library of standard software for applications in manufacturing, distribution, finance, engineering and publishing. To name just a few.

The DM-200 family includes systems for data transfer (DM-220), high-throughput batch processing (DM-230) and basic batch processing with on-line interaction (DM-240). We also offer the DM-230/2—the world's number one IBM 1130 replacement system.

One answer for a dozen questions.

This ad only scratches the surface of our new approach to data management.

So, in the space we have left, we'd like to impress you with the heart of our message:

General Automation is the only computer company that offers total as well as isolated data management solutions at a price that makes sense. Someone else may claim to be the expert at solving the piece of the puzzle troubling you today, but what about tomorrow?

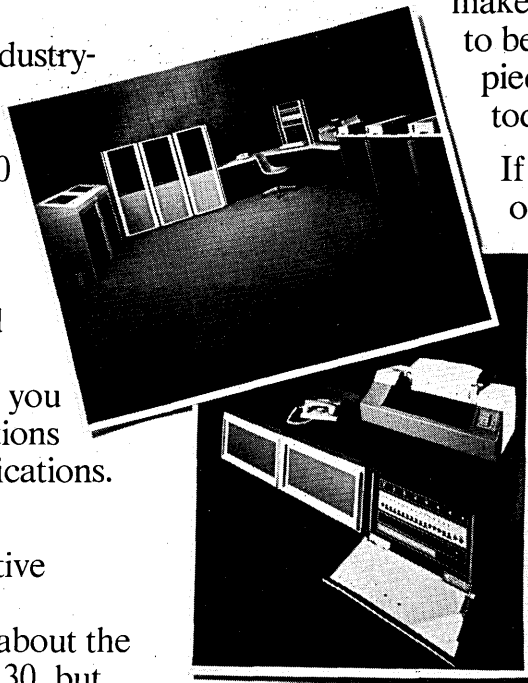
If you consider the total package of system growth, compatibility, stability, power, software, field support, manufacturer involvement and price, nobody can beat us. Nobody.

Challenge us to prove it.

Write for specs.
Talk to our salesmen.
Compare us with our competition.

For further information

on data management systems, write General Automation, 1055 South East Street, Anaheim, California 92803. Or call (714) 778-4800. In Europe, write General Automation, S.A., 24 rue du Sergent Bauchat, 75012 Paris, France. Telephone (1) 346/7973. In Canada, G.A. Computer Ltd., Ontario.



DATA MANAGEMENT SYSTEMS BY GENERAL AUTOMATION

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bluenose.
NCR Paper
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you one.**



Switch your business forms from old-fashioned carbon and bond to modern NCR Paper. Unlike carbon, NCR Paper cannot smudge. It can't smear. This means your NCR Paper copies are easier to read, and your typists won't have to wash up as often. Best of all, since handling steps are reduced, your forms "use" costs are lower (and "use" costs run 90% and more of total forms costs). Now in your choice of a blue or black image color, carbonless NCR Paper makes sense for companies which must reduce costs to maintain profits. You should clean-up with NCR Paper.

Nobody else offers a choice
deep blue or **black print**

NCR *Paper*[®]

Today it makes sense to stretch all your business forms papers — even ours. We have a free poster and booklet with a number of paper-saving and money-saving tips. Write "Paper-Stretchers," P.O. Box 348, Appleton, Wis. 54911.

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MANUAL

existence of the supervisor.

2. The ILU has managed to take credit for the functions performed by other ILUs or PEs (Productive Employees).

3. The ILU is a relative of the boss.

4. No one even realizes that the ILU exists.

Thus, the purpose of the ILU is mainly to take up space in the office in order to give the organization an appearance of viability and purpose. Attendant to this main feature of the ILU are the optional capabilities of boosting employee morale, generating gossip, improving the esthetic qualities of the office furniture, and giving the supervisor something to supervise.

—James P. Rubin

TOP DOWN CALCULATING by Dr. Jules Haberman and Sergio Bernstein

The multitude of ills plaguing today's world could be resolved quickly, simply, and economically, if we all took the proper view of things. None of these ills, of course, can be attributed, even minimally, to wrongdoings and failures perpetrated by members of the computing community. However, in this time of crisis, the vast pool of latent talent lying dormant among the members of this community should be tapped to solve these problems. How will become clear, if we take the right perspective.

Consider the rising interest in the occult arts, magic, and numerology. All of these can lead us toward happiness and a trouble-free existence, subject of course to the rules and regulations pertinent to any serious discipline.

Numerology has been selected for our topic since it is the scientific discipline most closely related to the computing arts we use every day. With the proper interpretation, our results will give us a better insight into our world, and lead us to the solution of its problems. Numerology has been neglected too long after its rise to enlightened peaks during the dark ages. It needs to be restored to the forefront of knowledge, and to its rightful place in our bag of tricks. This is especially true today when the vast proliferation of miniature calculators makes it possible for all of us to have the necessary tools on hand.

Numbers have a personality of their own, a fact too often overlooked. This article will try to reveal how to uncover hidden meanings. As with any new subject, care, patience and the willingness to view results from the proper angle, is of prime importance.

For example, the decimal 0.0791 is not meaningful to inhabitants of temperate and tropical zones. To inhabitants of the polar regions however, it represents a restful haven. The numbers 17717.07734 or 3773519.14* are proper forms of greeting to the girl

*For those who have difficulty finding the right perspective, the translations for this and succeeding numbers and computations appear on page 99.

next door. She may be quick to decode this message while you 5937.3790 in 3504.37517 and 57334.4914, pleasantly, or not in case of 5937.08.

The basic principle should be rapidly uncovered as it is relatively simple to understand after some reverses. It must be pointed out however that if your handwriting is 318193771, your 0.93 may be bruised, and you may be considered just another 8075.35380. Hopefully 54915.345, and may even consider you 37819173.

Public persons and occupations have a mystique of their own:

Adlai Stevenson:
[23173² + 55116]/10,000 (1)

Fred Astaire and Ray Bolger:
11874.70014/2 (2)

Vital measurements of famous personalities are of prime importance, and can be juggled to reveal interesting attributes:

[41 × 29 × 37]² × 3
488143229]/1000 (3)

as in the case of Gina, Ursula, and Raquel. (Please note that no underly-

ing male chauvinistic term enters directly into the expression.)

Now that General Motors is no longer *Fortune's* #1, its managers may well ponder over those busy

(4 × 11! / 3 + 158153) / 10000 (4)

No erudite dissertation is complete without a short table of transforms. This list must, perforce, be incomplete, as more research funds are needed to complete the project, **BOX BELOW**.

The entire subject is much too theoretical and involved to be presented in a short space. However the distillation of many hours of hyperbolic computations and parabolic extrapolations is offered here for the uninitiated. Further self-study and meditation will soon reveal other useful interpretations. Possibly an entirely new discipline will be born and attract many researchers, all eager to publish their contributions. It is only fair to warn potential candidates that their 5508.918918 may raise 7734.1704. □

lots more 

| COMPUTATION | RESULT |
|--|---|
| [(6547 ² - 1114) × 18 + 8] / 10,000 | (5) Absenteeism |
| (508 ² - 16 ² + 5 ² + 2) × 0.03 | (6) The market is dropping! |
| 0.357085857/5 | (7) Happy tune |
| 199 ² - 283.6463 | (8) Louis XIV |
| (2 ^{0.5} + .0041672476) / 20 | (9) Companion of the evening (M) |
| [(70000909 × 15 + 1) × 3 + 1] / 10000 | (10) Companion of the evening (F) |
| 3849023 × 15 / 1000 ; 38489689 × 15 / 1000 | (11) Tongue twisters |
| (120 ⁴ + 32 ⁴ - 13 ⁴ + 8 ⁴ - 16 ² - 17) / 1,000,000,000 | (12) A friend in a billion! (Name changed to protect the guilty) |
| e ^{20.09197824} + 7.4 | (13) The birds and the bees |
| (237 × 451 × 139 × 371 - 44 ⁴ + 12311) / 1,000,000 | (14) The Godfather |
| (.844561) ^{0.5} | (15) Familiar principle |
| 50 × 125 ² - 269 ² + 120 | (16) That's a BIG one! |

Can our single source computer service be cost-effective and price competitive? Ask our competitors.

Better still, ask the companies that are Raytheon Service Company customers. We proved it to them and we can prove it to you: Mixed vendor system service by RSC is both cost-effective and price competitive . . . with any type of competitor.

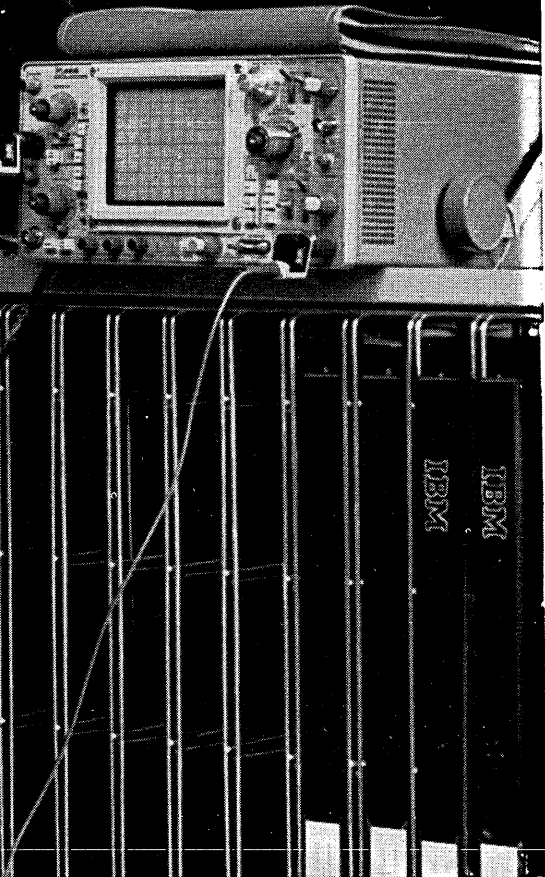
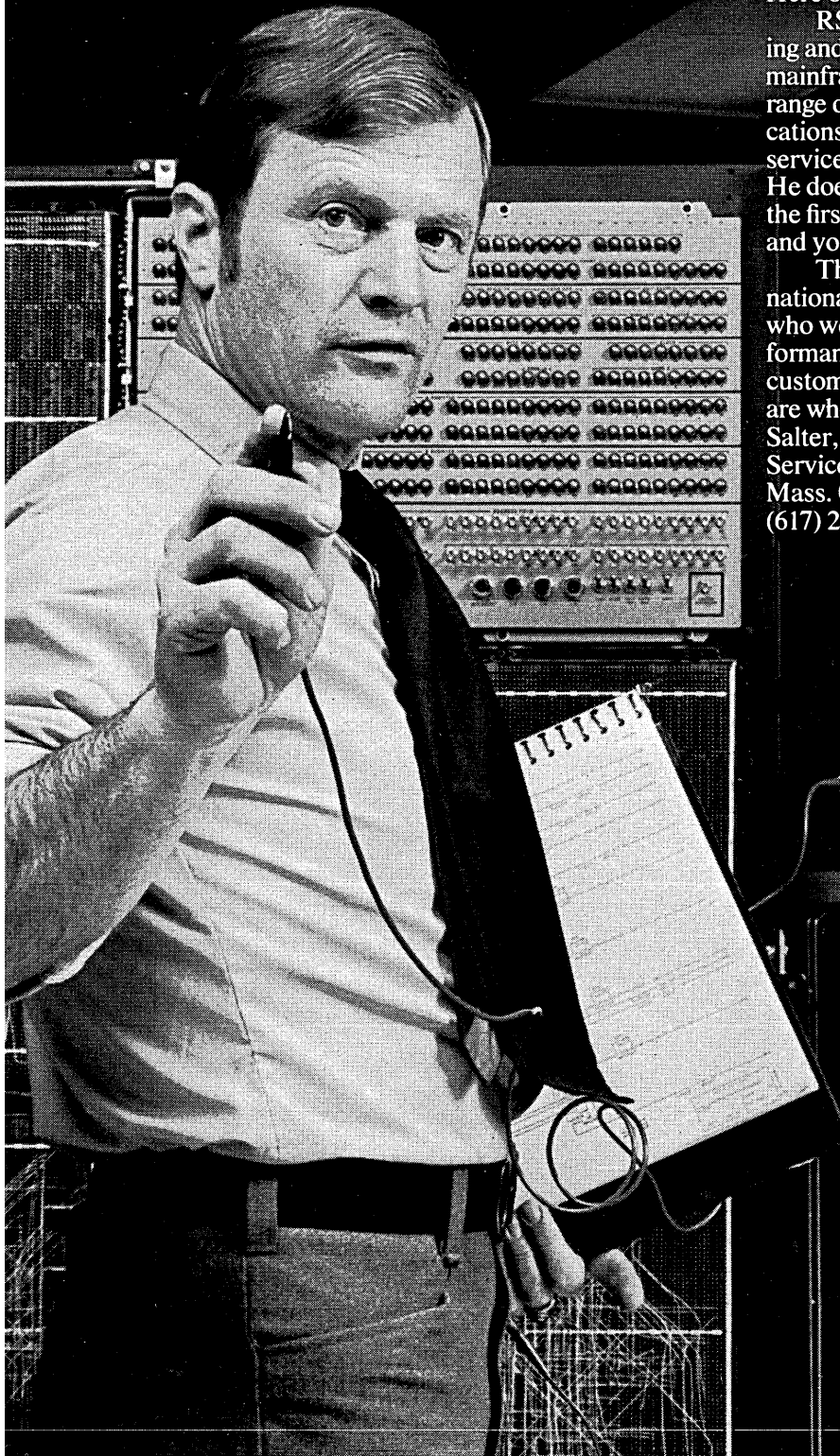
Here's why:

RSC service representatives have solid training and field experience with 360, 370 and other mainframes. And equal experience with a wide range of peripherals, mini computers and communications terminal networks. That means an RSC service rep can handle the problem the first time. He doesn't waste time waiting for the expert. He's the first team. That's what makes our prices lower—and your service contract more cost-effective.

There's a growing lineup of industrials, international airlines, government agencies and others who were convinced by the facts, figures and performance. They're all Raytheon Service Company customers. Ask them why. We'll tell you who they are when you get the full story from us. Call Mike Salter, Commercial Marketing Manager, Raytheon Service Company, 12 Second Avenue, Burlington, Mass. 01803
(617) 272-9300.

RAYTHEON

CIRCLE 43 ON READER CARD



APRIL FOOLISHNESS

Geoffrey Chaucer

PROLOGUE TO THE POUGHKEEPSIE TALES

Whan that Wattson with his doller bills
Ye mid of Huddson hath purchased to
the hills,
And rounded each building with
swich asphalt
Of which parking lotte engendered is
the fault.
And radials of rubbre by Good-Riche
and Good-Yeare
Ye grasse hath smashed from there
to here;
And smale fowles maken no melodye
From aught not sweete ye eyen to see;
Then goon engineers on pilgrimages
Seeking ye holy digitale mirages;
Ye vastley intricate new circuitrey
to speque
And earn, eftsoons, an inflayed
paye cheque,
And specially, from every burgs ende
Of USA, to Poughkeepsie they wende
Ye blissful euphoria there to seke
In suburbia, yclept Wappingers creke;

George Gordon, Lord Byron

YON CONSOLE

It twinkles as the starry night.
O, what a beauty is in thee!
Through eons, neons shining bright,
For an admiring world to see.
And should there be a program plight
'Twill guide us to the glitch with glee.

Samuel Taylor Coleridge

FOREIGN MANUFACTURES

In Xanadu did Kubla Khan
A vast core memory plant decree:
With furnaces and testing stands
Where U. S. bu:ks ran through the hands
Of Mongolian inscrutability.

Henry Wadsworth Longfellow

THE ENTREPRENEUR'S RIDE

(From tales of the Ticker Tape)
Listen my children, and you shall finch
At the current economic pinch:
It was eighteen April in sixty-nine
When over-the-counter went into decline.
Dreams of electronic financial heaven
Went down the tubes via chapter eleven.
Many a thriving entrepreneur
Was cast adrift in fresh manure.
Scarcely a man is now still sane
Who suffered loss instead of gain.
And those who touted computing stocks
Are pumping gas, and picking locks.

—Jackson Granholm

Ode to the Indomitable GOTO

I think that I shall never see
A program from all GOTO's free;
One that after such ablation
Is freed of every convolution
Whose nested modules at a look
Read exactly like a book.
A program saved from coder's guile
Replete with simples like DO-WHILE,

Of purest code whose modules tout
A single IN, a single OUT,
Exempt from all the sins of Sodom
And structured carefully from top-to-bottom.
Where dwells so potent a software genie
Worthy of Boehm and Jacopini?
Programs are made by fools like me—
Not even God is GOTO-free.*

—William J. Wilson

*In his first recorded GOTO in *Genesis* 11:7 he said, "Go to, let us go down, and there con-

found their language that they may not understand one another's speech."

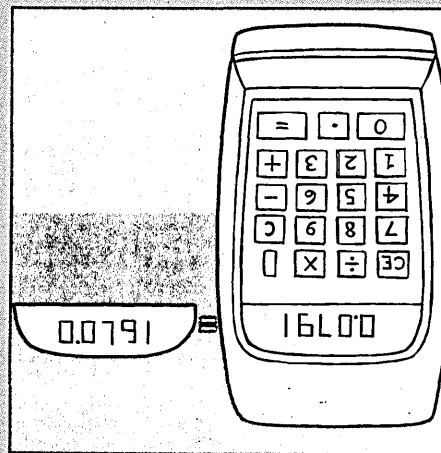
COFFEE MACHINE

Coffee lovers, learn a lesson
From this mediocre brew:
It's a taste of automation
From the *user's* point of view!

THE CONSULTANT

The Prophet with honor from alien borders
Transforming our chaoses into disorders.

—Bob McKenty



ANSWERS TO TOP DOWN CALCULATIONS

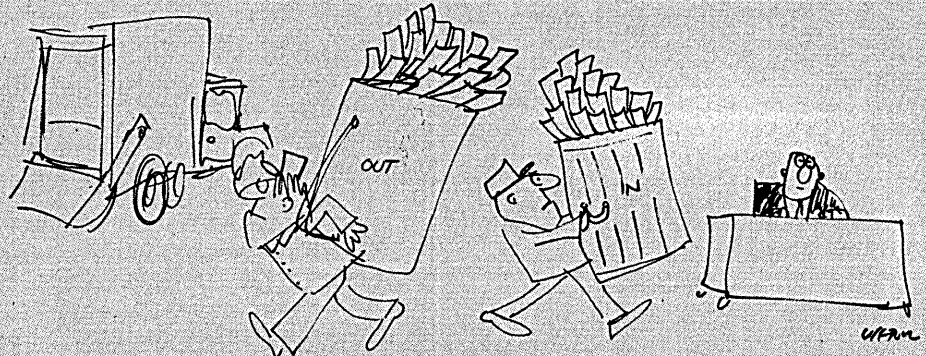
THE KEY



Other answers:

- | | |
|-----------------|-----------------------------|
| (1) 53704.3045 | (9) .0709190405 |
| (2) 5937.35007 | (10) 315004.0909 |
| (3) 5318008.918 | (11) 57735.345 ; 577345.335 |
| (4) 5338.0553 | (12) 0.208383838 |
| (5) 77151.7718 | (13) 531907018. |
| (6) 7735.05 | (14) 5508.319918 |
| (7) .0714171714 | (15) 0.919 |
| (8) 39317.3537 | (16) 709009. |

To get the message, the calculations should be done on a 10-place calculator.



continued next year

Hello, IBM.

ADDS introduces the first truly low cost CRT terminal for the IBM user.

We've been waiting a long time to say this:

Hello, IBM!

There, we finally said it.

You see, IBM (we almost feel like we should call you "sir") Applied Digital Data Systems (that's us) now has a terminal for IBM users. Wait'll you see it.

It's called the 980A. And, it's packed with the features that helped ADDS carve a reputation in the Teletype® compatible market. Sharp, readable screen with upper and lower case character display. Line as well as character insert/delete. Not to mention blinking, formatting, and patented graphics.

Compatibility?

The 980A looks just like a 3270 to the telecommunications access method (BTAM, TCAM, etc.) and to such real time monitors as CICS. It can even operate on the same phone line as 3270's.

However, since your 3270's don't have blinking, lower case, graphics (or most other special 980A features, we might add), applications software developed to support the 3270 won't support our 980A. So we don't think we'll be replacing many of your 3270's.

But, the IBM user can develop new applications around the 980A. And the reason we think he should (here's where you get

nervous again) is quite simple. The 980A offers unmatched features at an extremely low cost. Namely, \$3200.00 to purchase, \$90.00* a month to lease.

And all of our units are serviced by NCR.

That's pretty much why we think if our shoe fits, the IBM user's going to wear it.

Because even though you're very, very good, IBM, there's always room for a little improvement.

Sir.

Hello, ADDS.

I may have a new application for your 980A.
Please send additional information.

Name _____

Company _____

Address _____

Zip _____

Applied Digital Data Systems Inc.
100 Marcus Boulevard, Hauppauge, N.Y. 11787

ADDS

*3 year lease-purchase not incl. maint.

CIRCLE 11 ON READER CARD



Datadial Lets You Send a 10 Second Burst of Data 600 Miles at 9.6 kbps for 3 Cents.

DATTRAN's Datadial service permits the user to do exactly that... and a lot more. With Datadial you receive unprecedented cost savings because you pay only for the time you are communicating. Connected time with the entire DATTRAN network averages less than one second and billing is in increments of one cent.

Other reasons for Datadial's unparalleled performance:

FAST
 Non-blocking time division circuit switching completes calls between any two terminals or computers in less than a second. No waiting. Full range of speeds up to 19,200 bps.

ACCURATE
 Significantly improved level of error free transmission.

AVAILABLE
 Full-duplex digital data channels on demand. Immediate availability of the entire DATTRAN network. Wherever you need it.

RELIABLE
 Datadial allows computers to communicate across thousands of miles as accurately as if they were in the same room. Users get a "good" channel every time... instantly.

ADAPTABLE
 Datadial service is designed to meet the user's needs. No limits other way around!

Data dollars go further with Datadial. Find out how.

DATTRAN, Data Transmission Company,
 7200 N. Stemmons, Suite 800, Dallas, Texas 75226
 (214) 347-890

```

REPORT ON M0000
PNT 0125 SEL DM00 CMB SWA 2
PNT 0126 SEL SV-CMB SWA 2
PNT 0127 SEL DM00 CMB SWA 2
PNT 0128 SEL SV-CMB SWA 2
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PNT 0197 SEL DM00 CMB SWA 2
PNT 0198 SEL SV-CMB SWA 2
PNT 0199 SEL DM00 CMB SWA 2
PNT 0200 SEL SV-CMB SWA 2
  
```

```

PNT 0126 STATUS= ON
START SYSTEM
COMM OUT AT HOUR09 RX
NCC COMM FAIL
CDH00 PNT 0065 STA DOOR OPEN
  
```

```

ST003 PNT 0065 ST003 STA 3003
ST003 PNT 0069 STA 3003
  
```



See Us At Interface '75 in New Orleans,
 April 21-23, Booth 332/431

The Data Communications Center

CIRCLE 15 ON READER CARD

IBM and the structure of the industry

In our February and March editorials we invited reader comment about IBM and restructuring the computer industry. Here are some of the replies:

Stalking the Short-term Lease

Your invitation for opinions about restructuring IBM was irresistible. Here is mine:

1. Separate all computer activities from the copiers, typewriters, and other incidentals, including data transmission.

2. Separate the computer activities into hardware, software, and maintenance.

3. Last, and by far most important, prohibit hardware and software divisions from renting, leasing, or any other marketing other than outright sale of equipment or program licenses. Further, prohibit them from taking trade-ins. The aspect of short term acquisition of computer facilities (not just hardware, but software, too) has brought more grief to the data processing community than any other facet of IBM's activities. If users had to commit for the full value of the equipment and software, in either pay-out lease or purchase, there would be much better planned data processing.

Systems are an investment, and to make a short term commitment is to delude one's self. Systems demand and deserve

**Systems are an investment,
and to make a short term commitment
is to delude one's self.**

the same type of caution and consideration that any other major investment gets. No other major type of capital investment has a short term acquisition plan, and no other area of capital equipment has the dominance of one firm that IBM has in its industry. A technique that may have been appropriate to develop an infant industry now threatens to strangle it.

A firm that is going to compete effectively with IBM has to have some help. These provisions would force the competition to be on the merits of the products offered, not on the ability to finance an unrealistic and terribly expensive marketing mode, or on the ability to blanket the market with all of the services that the user might want. The market would still be greatly dominated by IBM, but there would be room for others that I don't see now, in hardware, software, maintenance, and used equipment.

—Robert M. Clawson

Mr. Clawson is the president of Management Reporting Services, Inc.

What's Good for IBM . . .

I try to read a lot—for two reasons. One is to find out what my competitors are up to. The other is to find out what IBM's future plans are. In the latter case, there are clear indications that IBM would like to be doing the things they did in the 1950s and 1960s. That is, market an entire system (a "solution") to its prospects. From the prospects' point of view, it sounds attractive—all of us have problems, and anyone with a solution gets a sympathetic ear. And from IBM's vantage point it's ideal—they'll have complete account control again, they'll be able to dictate how problems are solved, and they'll

be operating in a fully-bundled environment again.

Most probably your first reaction is that IBM is currently moving in the opposite direction. It's true that today they've unbundled most of their software and services and that there's a healthy number of companies selling plug-to-plug replacement hardware and peripherals. And there are hundreds of software product companies competing with and/or complementing IBM software. So, if things are so good, then why all the gloom, you might ask. Only for the following reasons: IBM's 360 generation of computers began in 1964 and its 370 series in 1972. By 1975, after about 11 years, there is some semblance of a free, competitive market within the IBM computer world. Today a prospect: a) selects his IBM hardware and software, b) selects his plug compatible IBM hardware, c) selects his IBM software products from the independents, and d) puts it all together. He buys this equipment from IBM, leasing companies, software companies, peripheral companies, etc. IBM monopolizes these areas, but there's still an awful lot of purchases not made from IBM. Fine! It's tolerable. Except it may not last too much longer.

There are all kinds of indications that IBM will, in its next generation of computers, put currently-defined software components into firmware or hardware; for example, a reentrant compiler that operates in read-only memory, or the accessing and retrieval logic of an IMS-type data management system. Or it may make certain portions of the operating system exclusive to IBM software only, or put some of the operating system logic in hardware and make it inaccessible to standard programs. It seems obvious that such changes to the structure of the existing computer hardware and software architecture will not improve the state of the art but will only serve IBM's attempts to drive out competition.

I have heard many debates on the quality and performance of IBM's third generation of computer software (360s and 370s). When they were first introduced, they were defended as "new" technology, and therefore, we had to accept the errors, delays, inefficiencies, and instabilities that existed during those early years. That I might accept. But today we have the same state of confusion in IBM's Program Products and vs operating systems. Poor is poor—and for some evidence of quality, I suggest you read the user evaluations of IBM vs. non-IBM software that appeared in the 1974 DATAPRO report entitled "User Evaluation of Software Products." IBM's software products were consistently rated significantly lower than non-IBM produced software products.

But, you may argue, there has been a high degree of success in the use of computers today. I agree, and attribute that success to products of independent software companies that either complement or compete with IBM software. Today, a user can get complex systems on the air quicker and with more reliability than he could several years ago. Sure, it's on IBM hardware, but in all probability it's not exclusively with IBM software. And that, I believe, is the difference between success and failure, between the 1970 and 1975 era, and between professional and amateurish systems . . . But will it continue?

IBM and the industry

Today there are reasonably clean (though still somewhat fuzzy) lines between IBM's hardware, operating systems, data management systems, accessing methods, systems software, applications software, communications hardware and software, and the users' programs. IBM's new vs operating systems are attempting to change these lines and IBM's new hardware and software (FS and Q) will, in my opinion, try to erase the lines completely. Not eliminate the problems, mind you, just erase the lines. And IBM hopefully will be there to help you use that super-complicated, but powerful all-encompassing "everyman's operating system" and computer. The mythical Q operating system has been promoted as easy to use (for the layman as well as the professional), capable of assisting in debugging, and having facilities that eliminate user concern for memory or space requirements. They are beautiful goals, but not so easily achievable and if so at a very high cost.

Modules, or building blocks, are as basic as the one-celled amoeba. They are the formulation of just about everything that has been created—from people to buildings, to machines, to systems, to programs. Over the past decade, computer systems have been developed that are basically modular. Not all the modules fit together perfectly, but they do work. There are hardware modules such as memories, tape devices, disc

I fear . . . change in the name of progress . . . a step backward for the users and a step forward for IBM stockholders.

devices, and terminals, and interface modules for communication between devices. There are software modules for communication, data accessing, and data security. And there are software package modules for report writing, file management, program preparation, etc. ad infinitum until we get to user-written program modules that work together with all the others. What all this means is that there is finally some sanity in the data processing world. I hope it will get better. My fears are that it will not. Rather, I fear the big, jolly giant will introduce change in the name of progress, with the result that it will be a step backward for the users and a step forward for IBM stockholders.

My plea is simple. Make the lines and modules more clear and more standard. Then the full use and effectiveness of computers, I believe, will be achieved. We're very close today to using computers reasonably well. But to have to follow the Pied Piper down a dream world where problems will go away is sheer lunacy. It is certainly very difficult for any company or individual, let alone for the Justice Dept., to judge when the benefits of new technology outweigh the problems. I am not trying to pre-judge the future plans of IBM. What I do believe is that there finally is some order to computer usage. It has taken about 11 years to achieve that order. Let's not let it be undone in the next 10 years. Rather let's use the next 10 years to build and solidify what has been achieved today. And that to summarize, is new evolutionary hardware, new evolutionary software products and a modular approach to developing a system. We've had enough revolutionary changes to kill an army. It's about time the computing world had an era of stability and minimum change.

—Martin A. Goetz

Mr. Goetz is a senior vice president of Applied Data Research, a past president of the Software Industry Assn. and ADAPSO, and the holder of the first U.S. software patent.

Detroit Revisited

The most equitable way for the Justice Department to handle IBM is as follows:

IBM should be broken up like the automobile industry with the branches as separate corporations, not subsidiaries, similar

to a dealership.

The parent company should remain the same as far as Data Processing is concerned, and sell the equipment to the branches. The branches should be large enough to be self sustaining and should be set up with enough capital so that they can pay for new equipment. If they ever need to use financing they should use normal financing channels, not borrow from IBM.

Their installed base would be transferred to them at IBM's depreciated value. The branch should only be able to buy products manufactured by IBM. This would accomplish a number of things:

1. The size of any one branch would not be larger than any competing company.
2. It would give the customer a choice of proposals on a given quotation if they want to deal with IBM.

(Today when a new machine is announced which is theoretically less expensive and faster the salesman will propose a system more expensive than what is installed because he is paid on the net increase in rental income. Therefore, a number of customers have more capacity than they need. A computer should be used three shifts, seven days a week. A number of customers do not use their equipment one shift, five days a week.)

Something else that should be done is to allow a customer to assign an on order machine to a third party so that a third party can purchase the equipment directly from IBM.

If IBM should offer quantity discounts they should be made available to anyone that can purchase the same quantity within the time period.

There should be some restrictions in time before branches could merge, and then only in different marketing areas.

I think this plan would satisfy the computing companies, be more beneficial to the customers, not hurt the stockholders, and offer more opportunities to the employees in the branches.

—Philip F. Burns

Mr. Burns, an IBM salesman for 17 years, an advocate of third-party leasing with MAI and as a founder of GAC Computer Leasing Corp., is now head of Burns Assoc. in Wellesley Hills, Mass.

Competition—Not the Courts

Since the passage of the Brooks Bill in 1965, IBM's share of the Federal government market has gradually declined to the point where it is no longer the number one supplier of Federal systems. The reason? Competitive bidding and, in marked contrast to the private sector, an objective and disciplined bid evaluation procedure for most buys. The selection procedures aren't perfect, of course. They're costly and time consuming, and procurements are sometimes mishandled, even rigged. But Federal system selection methodology is, by and large, equitable and it *does* foster competition.

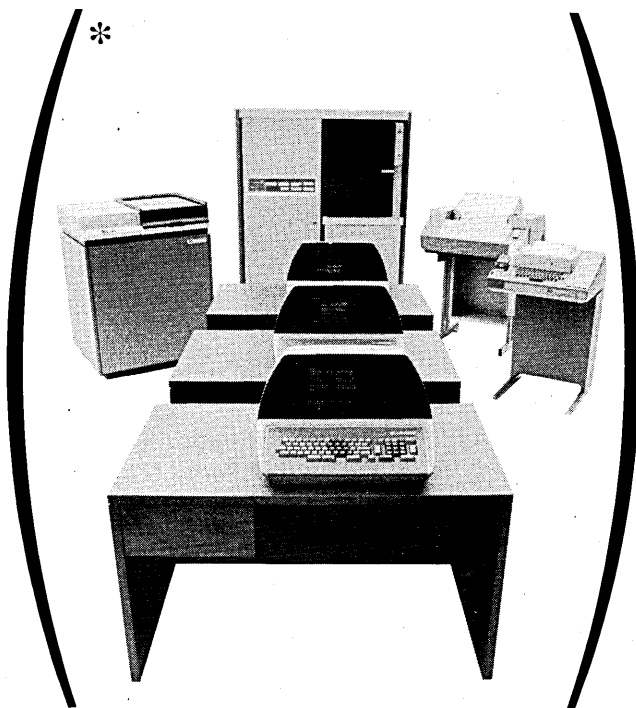
In contrast, lack of competitive bidding is more pronounced among commercial users today than it was, say 15 years ago in the IBM 705 era. In those days, there was no established computer supplier, and competitive hardware selection was the normative course of action. Nowadays, with program conversion to consider, plus the crutch of upward compatibility, the decision to perpetuate an established vendor constitutes the line of least resistance.

If private sector users, especially the big ones with the resources to run competitive procurements, abandoned the sole sourcing of IBM equipment, they could do more to foster competition than all the lawsuits, consent decrees, reversals and other dreary legal paraphernalia that now encumber both IBM and its competition.

—Robert V. Head

Mr. Head is a special assistant within the Dept. of Agriculture and has served as a contributing editor of DATAMATION.

GREAT COMPUTER SECRETS*



We've been so busy developing our powerful GCS 2100 system, we've never taken the time to tell enough people what a great system it is.

How efficient it is (average of 80% reduction in errors — 35% to 85% faster document handling). How reliable it is (less than 1% downtime). How simple it is (operator training time less than 8 hours). Or how economical it is (10% to 40% savings in data preparation costs).

And our competitors have loved us for keeping it such a secret!

The GCS 2100 is a complete data entry system: it lets you collect and edit data at the source (data is actually edited while it is being keyed); store the data on disc; then transfer the clean data to an output media like magnetic tape. (Data already on tape or cards can be

re-submitted to the GCS 2100 for editing, reformatting, etc.)

The GCS 2100 can interface up to thirty-two Touch-Tone® telephones. Card readers. Medium and high speed line printers. Four-tape drives. Four fixed or moving head discs.

All on a single system.

The GCS 2100 provides extensive I/O functions so you can transfer data to and from disc storage and other I/O devices.

The GCS 2100 can accommodate up to 64 local or remote terminals: local terminals can be located up to 2500 ft. from the system's CPU. You get faster, more accurate data entry for functions like payroll, shipping, receiving and manufacturing, because the person most familiar with the data does the keying.

The GCS 2100 also offers data entry from remote terminals (it can handle up to five remote terminals over one dedicated telephone line).

A Programmable Extension Package (PEP) extends the power and the flexibility of the 2100 system: up to 255 PEP tables provide capabilities like automatic data insertions; range and value checks; table look-ups; logical tests; character expansion; and data dependent format switching.

These tables are not job assigned, so they can be used on several different jobs.

A library of over 100 special edits is also available. (If there isn't an edit for your needs, we can design one.)

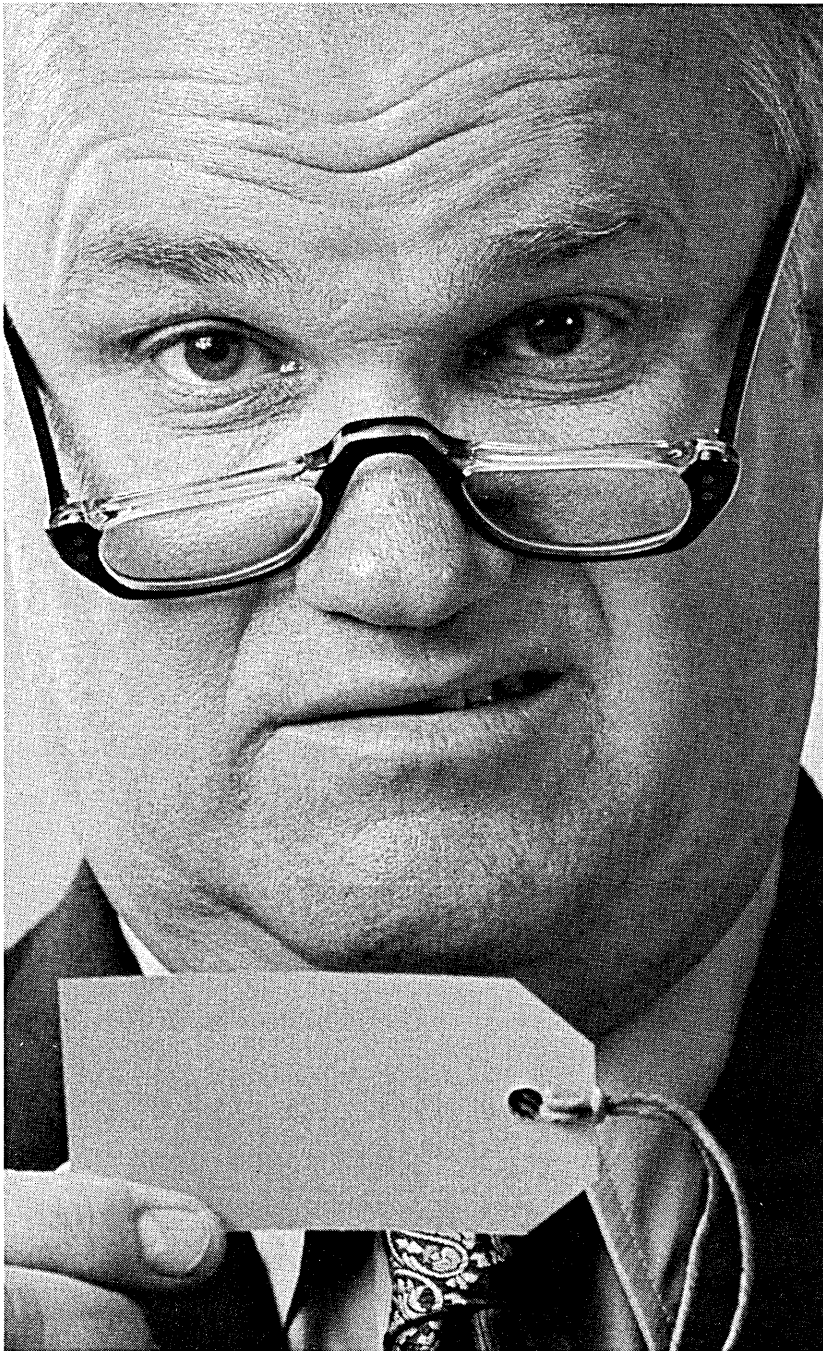
The GCS 2100 also provides up to 99 format levels per job; up to 255 balance accumulators; variable length record and blocking factors; and up to 255 jobs stored in the system.

GCS 2100 Peripherals: GCS DataTone — data entry via Touch-Tone® telephones. GCS Data Tel — remote batch communications.

For more Great Computer Secrets, contact Agent 2100 at General Computer Systems, Inc., 16600 Dooley Road, Addison, Texas 75001. (800) 527-2568 toll free. In Texas (214) 233-5800.

GCS 2100
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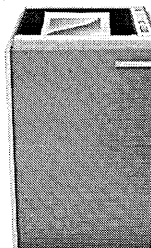
There's the unique micro-programmed controller that makes the high resolution 4211 a lot smarter. It performs many routine control functions, saving valuable computer memory for other tasks. No other printer/plotter has such capability.

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*Based on published prices of November 1, 1974.

Security

Computer Security: Each Case is Different

How secure is "certifiably" secure?

And now, from the folks who penetrated MULTICS, a "certifiably" secure computer system.

But how secure is "certifiably" secure? Maj. Roger Shell, member of an adp security team in the Air Force's Electronics Systems Div., which has penetrated Honeywell's MULTICS (Multiplexed Information and Computing Service) on a number of occasions and subsequently worked with Honeywell, MIT, and the Mitre Corp. to develop the "certifiably" secure system, says in terms of the operating system it is penetration proof; it is algorithmically secure BUT, there is no protection against hardware failure or people failure. And these two factors are a big part of the total security picture.

It's a picture that is beginning to take on subtle hues. Prior to the social and campus unrest of 1969 and 1970, computers were displayed in street level, glassed-in enclosures like prized toys. Then came the bombings, followed by an almost paranoid rush to hide and protect.

Quantify risk

Today's data processing manager is more educated in his approach to security problems, says Guy R. Migliaccio, assistant vice president of Marsh & McLennan, New York City, and an expert in data processing insurance. "He has learned that it is possible to quantify risk and every case is different."

In the case of the Air Force, Maj. Shell said his team's project got its start back in 1971 because lack of computer security control was costing \$100 million a year. This was the cost of two procedures which were deemed necessary because security control was missing. One was "periods processing" in which data of different degrees of confidentiality were processed during different periods with "the machine scrubbed down" in between. The other was "systems high operation" in which expensive crypto-

graphic equipment, guards, and other costly procedures were employed in processing all data whether it was confidential or not.

In 1971, Maj. Shell's team was asked to provide security for a GE 635 operating in the Pentagon. They found it a hard task. They convened a panel of experts to give them advice on why it was so hard. The panel concluded that the Air Force did need a highly secure system but that none was available.

And so began the project which led to the "certifiably" secure system. It's a system based on what the Air Force calls "security kernel technology" with the security resting in a combination of hardware and software techniques.

Promising, but not secure

When Honeywell introduced MULTICS in January of 1973, the team was interested. They decided it was essentially secure. "We penetrated it to demonstrate that MULTICS as it stood was not secure, that we could not depend upon it as a solution but it was most promising and a reasonable base from which to work."

Shortly after the penetration, Honeywell joined the Air Force team in its efforts, bringing in MIT and the Mitre Corp. The Air Force had already committed to a DEC PDP-11/45 for the pilot system and that wasn't changed, but Shell says the techniques can be adapted to a larger system, including the Honeywell 68.

Shell said his team used a variety of techniques to penetrate MULTICS. He cited as among its weaknesses the fact that the method used to change arguments allowed arguments to be changed after a check had been made and the fact that there were incomplete character access controls in the hardware. After the initial penetration, he said, specific problems were fixed but new problems came up, like an error made in the control of the kinds of routines

users could call, allowing any user to call up privileged routines. He emphasized that his team's penetrations of MULTICS were done not to a 68 but to a 645.

Kernel technology

When Honeywell became involved in the Air Force effort, it dubbed it "Project Guardian." The Air Force has no name for the pilot system, only for the "kernel technology."

Webster's dictionary defines kernel as "a central or essential part." Maj. Shell defines it as "a small set of hardware and software that provides a sufficient guarantee of internal security." With the kernel technique, he explained, you start small but can parallel the technique on any machine.

One of the keys to the system's security, Shell said, is the fact that address translation is done right in the hardware.

The team currently is building a data base management system on top of its secure laboratory system to demonstrate the same security capability. That work is expected to be complete in July.

What the Air Force will do with the technology has not been decided, "because of the current low level of military budgets." Honeywell is applying kernel technology to MULTICS. Other manufacturers could follow suit because the technology is in the public domain with no restrictions on its use. Shell said one major manufacturer considered it but chose not to pursue the idea because of the expense involved. He said a secure version of any kind of a system would cost from 5-8% more than a non secure version. He named the IBM 158 as a likely candidate for kernel technology with only minor hardware modification.

Mini add-ons

Also in the public domain is a by-product of the team's efforts, an architecture study which identifies hardware add-ons that could be applied to most

news in perspective

minicomputers to give them the capability to support security and at the same time, would improve their performance. A report on this study is expected to be published in six months' time.

Even kernel technology, however, cannot protect against systems failure, natural disasters, and people problems and these are the things Marsh & McLennan's Migliaccio likes to quantify. When he sets out to do this for a client, he starts out with an abbreviated questionnaire. Next come work sheets and a sit down interview. "We talk to the data processing people, not top management. We ask, what do you do if . . . ? What would your loss be if . . . ? When we come up with an absolute number, we then recommend procedural changes which can reduce the risk. Then we have residual risk and we negotiate for insurance."

\$100K of deductible

There are several kinds of insurance a data processing installation might need or want. There's Data Processing Errors and Omissions Liability insurance which protects service bureaus and others who process data for third parties against claims against them by those parties. Migliaccio says there are some 15-18 companies who will write this kind of insurance for companies who can take a high deductible, like bearing the first \$100,000 of loss. For those who can't absorb a high deductible the number of carriers available goes down to about a half dozen. Then there is Fidelity insurance which protects against the kind of thing that happened at Equity Funding, and Business Interruption insurance which can protect against computer problems which halt normal business procedures.

Migliaccio is one of seven advisors to a new Computer Security Institute, headquartered in Northboro, Mass., a profit organization formed to be kind of a clearing house for security information. Its founder, John O'Mara, sees it as an activity for which "a need has been clearly demonstrated. There had been no single source for security information and the average data processing manager is a very busy guy. He doesn't have time to spend more than 5% of his time thinking about security. There was a void and we're trying to fill it."

The other advisors, all chosen for different areas of security expertise, are Robert Abbott, Manager, risos Project, Lawrence Livermore Laboratory; Lindsay Baird, Jr., General Manager,

Advanced Computer Techniques, Security Consulting Div.; Robert H. Courtney, Jr., Manager of Data Security and Privacy, IBM Corp.; Robert V. Jacobson, assistant vice president, Chemical Bank; Belden Menkus, management consultant; Donn Parker, Senior Information Processing Analyst, Stanford Research Institute; and Joseph Wasserman, president, Computer Audit Systems, Inc.

Among other things, the Institute conducts seminars. Its first, in New York City in December, attracted more than 100 people from all parts of the country. Another function is publication of a buyer's guide to security equipment and this promises to be something that will have to be updated regularly with more and more of this appearing on the market with regularity.

Premise access control

A DATAMATION research report of October 1974 identified premise access control as the fastest growing segment of the computer security market. In this market, card control entry equipment, used alone or in conjunction with other measures, is probably the most popular equipment although voice response systems and even a system which identifies

a person via hand geometry, are seeing some use.

Gibraltar Savings and Loan Assn., Beverly Hills, Calif., sixth largest s&L in the country, chose card control in conjunction with a man trap and closed circuit tv. Prior to November of 1974 Gibraltar's only access control protection had been not to list the computer center on the building directory.

Leslie Luby, vice president of Gibraltar's Computer Services Div., views the access control system as "customer service."

"Because of the importance of our computer system in providing service to customers, maintaining the function and integrity of the system is like sitting on a powder keg."

Gibraltar has installed an on-line card operated access control system manufactured by Rusco Electronic Systems, Pasadena, Calif. The system, called Ruscard, consists of one control console, six card readers and a system printer which records all attempts, authorized and unauthorized, to enter the computer center. Entry to the computer system is through one door equipped with a card reader which is backed up by an intercom system. Entry through this door leads to a man-trap area which is sealed off from the computer area by bullet-proof glass. A second door leads to the computer room. To get through this door requires a valid card plus identifi-

Does Your Data Security . . .

Common sense can play a big part in a security program.

Everyday behavior of employees, who often function according to their own established "routines" is worth observing.

For example, many firms use controlled-access doors and other com-



. . . and end here?



start here . . .

mon security precautions, only to have secretarial-level personnel leave oversized mail (often containing sensitive company or client confidential data in the form of bulky cards, tapes or printout forms) next to an unprotected mail bin, located in a busy uncontrolled lobby. These pictures were taken in mid-March in the lobby of a large West Los Angeles computer user by Stephen Levine, a security conscious consultant. They could suggest a question for every dp manager: "Isn't it time to ask yourself whether your installation is physically secure or only *appears* to be secure before turning to sophisticated hardware or software-resident security systems?" □

cation over the intercom via closed circuit tv.

Robert Fox, president of Rusco, says his company can provide entry for roughly \$150 per door. Again, it's a question of quantifying the risk.

Fox says the card operated access

Communications

Innovators Carter and Goeken Now Think of Moving Data Over Electric Power Lines

Jack Goeken, who founded the specialized common carrier industry, and Tom Carter, who did likewise for interconnect suppliers, are off on a new caper.

They've formed a partnership, Carter-Goeken, Inc., which plans to offer several innovative communication services—like transmitting data on electric power lines.

Goeken said in an interview last month that a typical power line can carry up to 2400 bps at a monthly cost to the terminal user of \$5 to \$10 a circuit. AT&T, by comparison, charges \$35 to \$70 for a conventional local access line. A terminal can be adapted to transmit data over a power line for "less than \$50," and the cost of modifying the line itself is "nominal."

Some utilities already are transmitting meter readings over their power lines on a test basis, Goeken says. He expects that "within two years" Carter-Goeken will be using the technique to handle other types of data.

Microwave system planned

In the meantime, the company is preparing to ask the Federal Communications Commission for authority to build and operate a microwave system between Chicago and Milwaukee. This system will be connected to Western Union's satellite system—and they hope with AT&T's broadband terrestrial lines also—to provide a specialized common carrier service operating nationally and perhaps internationally.

Another innovation involves microwave local loops that promise huge savings to large users of telephone company local loops. "You can multiplex 250 voice grade channels on a 2GHz (gigaHertz) microwave link and transmit the signal 25 to 30 miles between small rooftop antennas," Goeken explains. "A 12 GHz channel can carry 1800 channels up to 15 miles. A 40 GHz link has the same capacity and transmits about two miles."

For larger companies this technology promises huge savings, he says, since they now must lease individual local loops from the telephone company for each terminal location. One large firm,

control market is running at \$100 million a year now and will double within a year. "Bad economic times are good for us because people become more worried about protecting their assets."

—Edith Myers

switch circuits from voice to data transmission or vice versa, so it can be done during normal business hours—when ever regular telephone traffic is light—as well as at night and on weekends.

High-speed facsimile is one obvious application for this alternate voice/data circuit scheme. Carter-Goeken is "looking into" equipment capable of transmitting an 8½ x 11 inch page in eight seconds or less and costing \$200/month.

Credit card network

"We're also planning to offer a common user credit card network, based on a charge of about five cents per transaction," adds Goeken. "We will supply standard terminals for about \$25 a month, and hardwire them, without modems, to a shared network linked to local computers located at banks, oil

which Goeken declines to name, is now spending about \$80,000 a month on local loop facilities. Each line covers seven to 22 miles. By replacing these facilities with a multiplexed microwave network that provides switching as well as transmission capability, the company



NEW VENTURE: Jack Goeken, left, with Tom Carter says of their new communications services, "we're patient, but we're persistent."

could save \$20,000 a month. "We're talking to them and they seem interested," says Goeken who does not know how soon this system might be installed.

Put idle lines to work

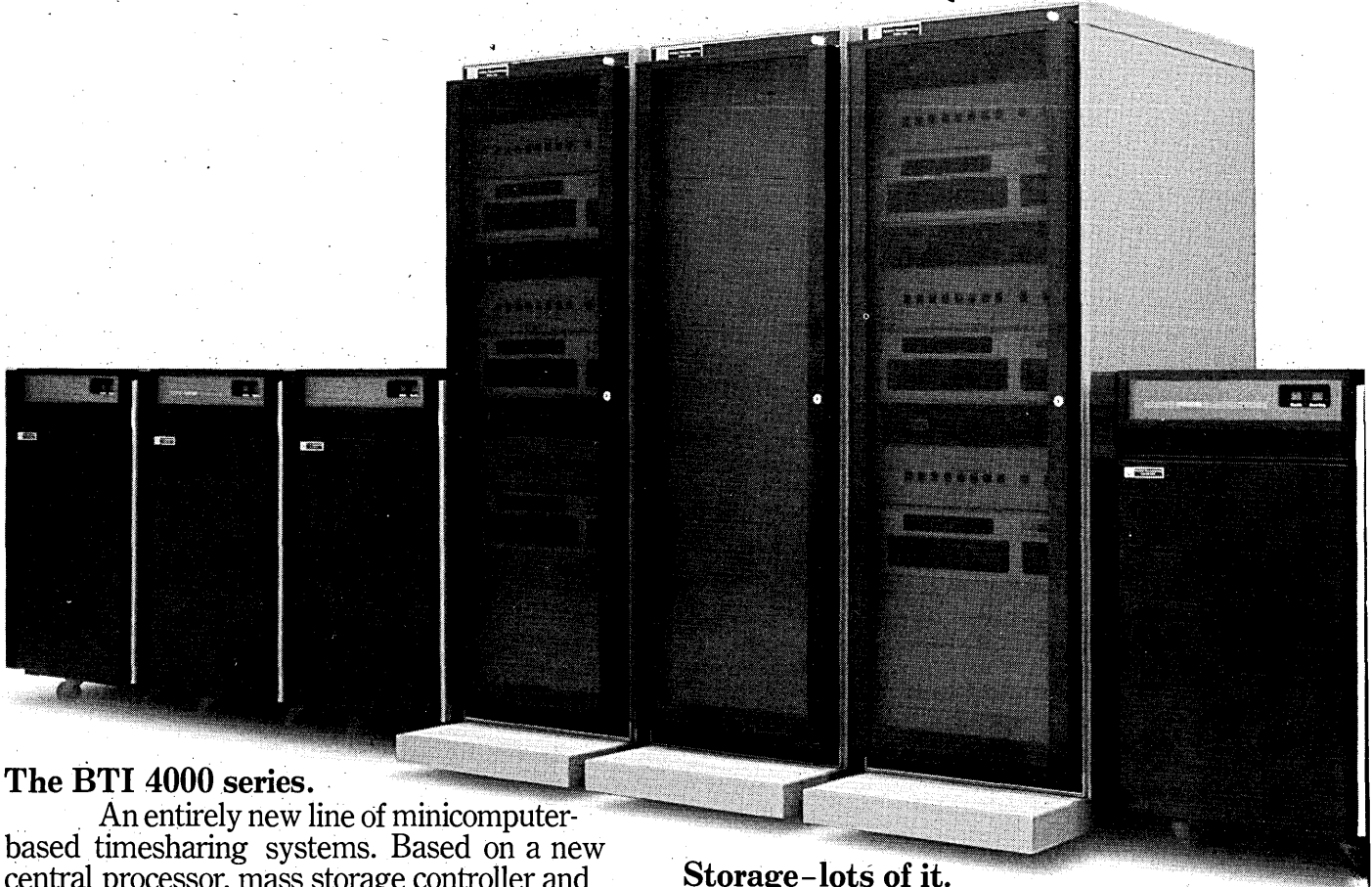
Alternate voice/data transmission is another idea Carter and Goeken are working on. They plan to combine standard voice grade private line circuits, when these circuits are not being used for regular telephone calls, into a broadband communications pipe that can transmit data at high speed. Goeken says "it's relatively inexpensive to combine circuits dynamically so that anytime you have, say, four idle voice grade lines, you can convert them into a single 19.2 kbs data channel. While the lines are being used for data, people who pick up the attached telephones can be transferred to other voice circuits." He adds that "very little time" is required to

companies, department stores, and similar processing centers. We'll also be able to interconnect with other credit card networks so that a merchant using a single terminal can accept several cards and access the related processing centers on-line."

Maintenance will be provided by independent interconnect contractors. "They generally offer better service than the big companies in this business," says Goeken. A customer's service order goes through fewer hands. Also, there are fewer established ways of doing things, and thus fewer people say 'no' when a customer has a special requirement. Most of these small interconnect companies are operated by their chief investors, who have a special incentive to do a good job."

Goeken says the proposed credit card network is particularly attractive to smaller volume retailers. "They can't

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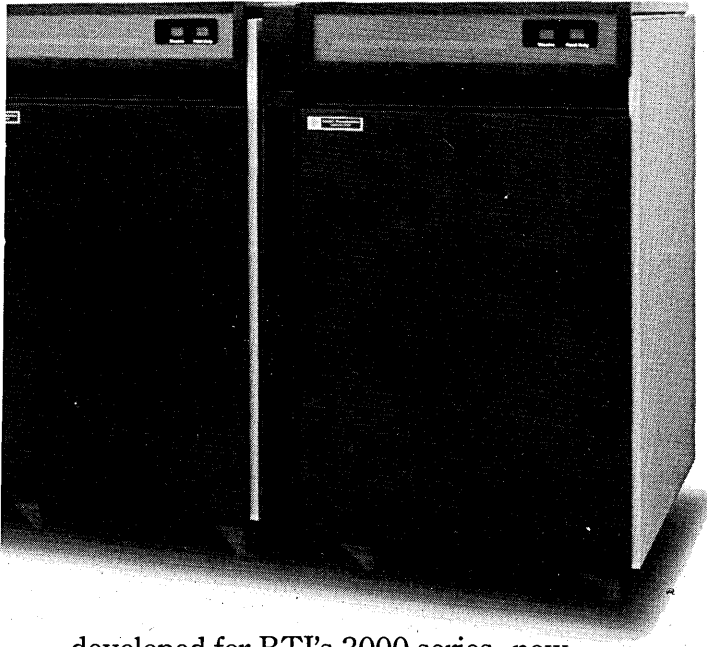
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developed for BTI's 3000 series, now augmented for the 4000, BASIC-X has string arithmetic, providing extended precision for the accountant; a flexible file-handling structure with powerful features like non-interfering shared read/write access, and many other niceties that make the programmer's job easier and faster.

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Because central processor and disk storage facilities can be deployed dynamically, you can pull a CPU or disk drive out of service for any reason, while maintaining system availability to all your users. Something to think about if your application can't tolerate any interruptions.

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See a 4000 at the Computer Caravan

news in perspective

justify on-line data terminals now because of what the phone company charges for private line service. Dial-up versions of these terminals are beginning to appear—AT&T's transaction telephone is one example—but they're expensive. While the costs are bound to come down, we will control both the hardware and the communications facilities, so we'll be able to offer a lower-cost package than our competitors. Remember that everybody else has to design their system to satisfy the requirements of the telephone network connecting the retailer's terminal to the local credit card processing center. The phone company could change the specs to make the system more efficient, but that isn't likely—the present arrangement is very profitable."

Carter-Goeken is negotiating with "a number of organizations" for system development contracts. One prospect is "a large retail organization" interested in a nationwide transaction-processing network. It would tie several thousand specially-designed terminals equipped with function-type keys, to a processing center through a shared network. "If we win this one," says Goeken, we'll have a revenue base for developing microwave and power line local loops. And there will be enough spare capacity to support the other applications we want to get into."

Considering the competition they face, not to mention the present state of the economy, Carter-Goeken has a rather difficult job. But neither partner is worried. Goeken, who was president of MCI until last summer, when he became disenchanted with the way the company was being operated, had to struggle for eight years before he won an operating permit from the FCC, and he recalls that at times "money was so short we had to borrow time on other people's Xerox machines." Tom Carter spent seven years explaining to the commission that AT&T's total ban on "foreign attachments" should be loosened. The FCC finally agreed in 1968 by issuing its Carterfone decision. Carter sold his interest in Carterfone Communications, Inc. shortly after the FCC decision and formed TelePhone Communications, Inc. in Dallas and headed the North American Telephone Association (NATA) which represents the interests of the interconnect industry. He has since turned over TelePhone to his son-in-law Wallace M. Hammond to devote all of his time to the new venture with Goeken.

"We're patient," says Goeken, "and we're persistent."
—Phil Hirsch

World Accord Sought To Lock Out SNA

Communications officials from six nations are working on a common, non-proprietary network communications protocol which they intend to promote as an international standard.

Officials from Canadian Bell and common carrier representatives from France, the U.K., Spain and the U.S. Bell System were to meet in Ottawa late last month to begin work on a draft standard. Their aim is get the protocol officially adopted next year by CCITT, an international standards making group that encompasses most of the world's communications carriers.

A good deal is at stake, not only for the carriers but also for data communications users and systems suppliers in several countries, including the U.S.

Users of the new, carrier-provided data networks now springing up in these countries could reduce their costs significantly by sharing access lines, concentrators, multiplexors and similar facilities with each other. They also could migrate more easily to other makes of hardware. But neither benefit is now possible, except in a very limited way, because IBM—which has installed the bulk of the on-line systems around the world—has designed its equipment to operate on proprietary protocols, the latest one being SDLC/SNA (page 51).

Loss of control

Competing terminal makers eventually can make their equipment compatible with an IBM protocol, but the great gray giant—by controlling the pace and character of subsequent changes—controls or at least limits its competitors' market share. Once IBM accepts an independently-developed protocol, however, it loses this control. All of which helps to explain the company's reluctance to support independently-developed protocols.

This problem has come to a head in Canada, where the protocol being developed for a new packet-switched network called Datapac is incompatible with SNA, the network control scheme IBM announced late last year. This is a rather serious drawback, since about 60% of the computer installations in Canada were supplied by IBM. Two months ago, the Canadian government issued a "blue paper" which, among other things officially advocated development of a common user data net connectable to "a wide variety of computer and terminal equipment." The govern-

ment opposes the present "tendency for communications processing and data processing functions to be intertwined so that it is difficult to use the equipment of more than one supplier."

Strength in numbers

Officials of Bell Canada, one of the eight Canadian carriers developing Datapac, are now meeting with IBM Canada technicians in an attempt to resolve the incompatibility between SNA and "SNAP", the name given the Datapac protocol. Until now, the company is understood to have been arguing that it doesn't make sense to alter VTAM, NCP, and the other software elements of 370 communications-processing chain to satisfy the Canadian market alone, because that market represents only a small part of the world total. The Canadians hope to get around this objection by convincing their CCITT colleagues to adopt a format for the proposed international standard which follows the SNAP scheme.

A draft standard containing a proposed format hopefully will be completed in time to be presented at the next meeting of Study Group VII, the CCITT subcommittee responsible for initially considering packet network standards. Study Group VII meets in Geneva, May 28—June 6.

Next step

If the protocol format is approved at that meeting, the next step will be to agree on the specific functions to be performed by each field. The final standard would then be submitted to a CCITT plenary session in Geneva, Sept. 27—Oct. 8, 1976. The standard could be adopted officially and released for use by network operators and systems suppliers at that time. If a final agreement isn't reached in 1976, however, the standard might not be promulgated until 1980, when CCITT will hold its next plenary session.

The Canadian and IBM protocols consist, essentially, of three parts—a link control scheme, a section for network control, and another for controlling communication between the data processing devices at the ends of the message path. Typically, these consist of a central computer and one or more remote terminals.

The link control doesn't pose much of a problem, since SNAP utilizes HDLC, the international version of IBM's SDLC protocol.

The network control portion of SNAP is basically similar to SNA, although there are several differences. In each case, this section begins with the 25th bit of the format, and provides fields for indicating the sender's and receiver's address. A nearby field indicates

whether the message is a request or a response. However, in SNAP, this latter field precedes the one devoted to addresses, while in SNA, the address field comes first. There are a number of other differences, mostly involving control functions.

Bell vs. IBM

The biggest problem, however, involves the methods used by IBM and the Trans-Canada Telephone System (TCTS) to assign the computer/terminal ports through which a message is transmitted. In SNAP, there is a "virtual call header" where "source reference" and "destination reference" (i.e. port numbers) are recorded. This is done either manually by the sender and receiver, or automatically by their terminals. In the IBM scheme, explains a knowledgeable source, "this function is supervised largely by VTAM, more specifically by the SSCP module of VTAM, which resides in the cpu." A basic part of the disagreement between IBM and the Canadian phone companies has been the former's unwillingness to modify VTAM, and the latter's belief that such changes could be made at relatively low cost.

—P.H.

Datran Mulls Rate Cut, Seeks Service to East

Datran, the data transmission subsidiary of Wyly Corp., Dallas, will escalate its competition with AT&T.

In a request to the Federal Communications Commission for authority to extend its network to the East Coast, Datran said it "is currently evaluating the possibility of making an appropriate rate response to AT&T's dataphone digital service (DDS)."

The present Datran network extends westward from Chicago to the West Coast, partly over facilities shared with Southern Pacific Communications Corp. Pending approval of a request in March to extend the network eastward, Datran said it would lease analog channels from Southern Pacific and DDS channels from the telephone company. Switched point-to-point leased services will be provided to Boston, New York, Philadelphia, Baltimore, Washington, Pittsburgh, Cleveland and Detroit at 2400, 4800 and 9600 bps and possible other speeds.

The lease of DDS circuits is somewhat ironic, since it was the commission's okay of AT&T's new service that forced Datran to extend its network to the East Coast before originally planned. "This course of action is required to mitigate the effect of DDS on Datran's viability as a nationwide specialized common

carrier," said the company in this month's request to the FCC. Datran added that the DDS rates authorized by the commission last January are as much as 40% lower than those charged by Datran.

Retailing

Things Look Good for POS in '75

Howard J. Brackett, vice president for operations and stores for F.A.O. Schwarz, a national toy store chain, was asked by a friend what it cost to get his firm's point-of-sale system up and running.

He repeated his answer for fellow retailers attending the National Retail Merchants Assn. convention early this year: "Four years, millions of dollars, six ulcers and two heart attacks!" He subsequently admitted that this was somewhat exaggerated but added, "it hasn't been easy."

Hardly encouraging words for retailers facing, at best, meager sales gains and at worst, sales declines. But Brackett had some encouraging things to say too. He made it quite clear that he felt his

store's investment in POS has been worthwhile.

"Studies right around Christmas, 1974, for example showed there was a trend toward fewer sales of items over \$50. Of course, in the economic climate at that time, you could guess higher price items would decline in demand, but our studies pinpointed the price range and eliminated the guesswork."

And he had some advice for retailers considering getting into POS. "First, take a realistic approach to what you want and need. Don't get caught up in computer terminology or fancy concepts; what you want is a system that will do what you want it to do—and you're the only person who can decide what that should be."

Given today's economy with its slump in consumer spending, Brackett's advice is very likely to be followed. POS marketers face an eager but wary market, one in which potential users will weigh the value of every component of a system against what they need and needs vary greatly.

Chose service bureau

F. A. O. Schwarz, with 11 branch stores and a mail order operation, opted for a system of electronic registers polled by a service bureau's central computer.



THE UNIVERSAL Product Code can be read at virtually any angle as the item is passed over the scanning window of NCR's electronic checkout system now in operation at a Marsh supermarket in Troy, Ohio. Prices appear on display panels at the top of the Model 255 checkout terminal.

At last. A system that puts transaction processing first. DECcomm 600.

Until now, transaction processing has been a secondary feature of most computer application systems.

Well, thanks to Digital, all that's changed.

Because now you can get a system that puts real-time transaction processing right where you want it.

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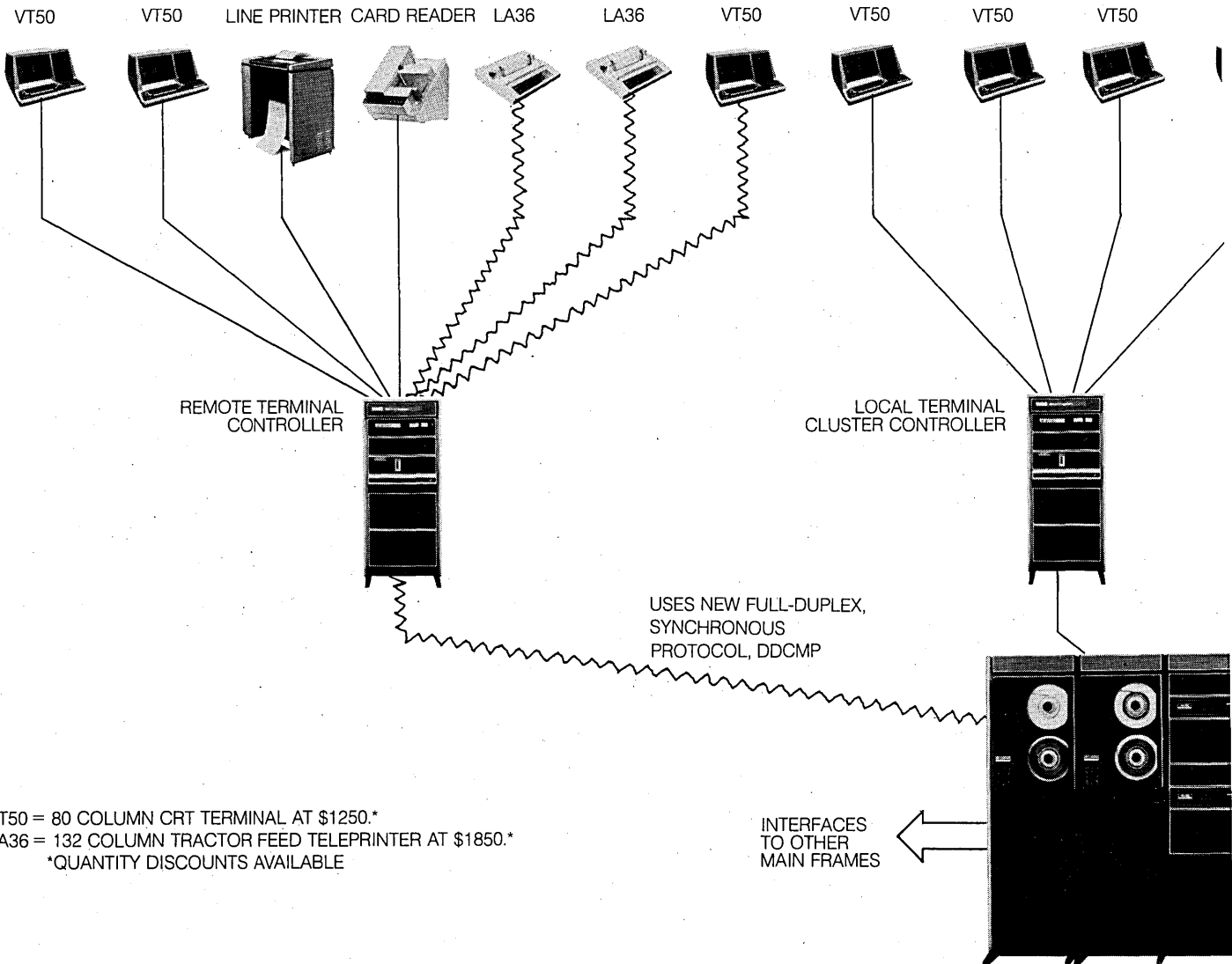
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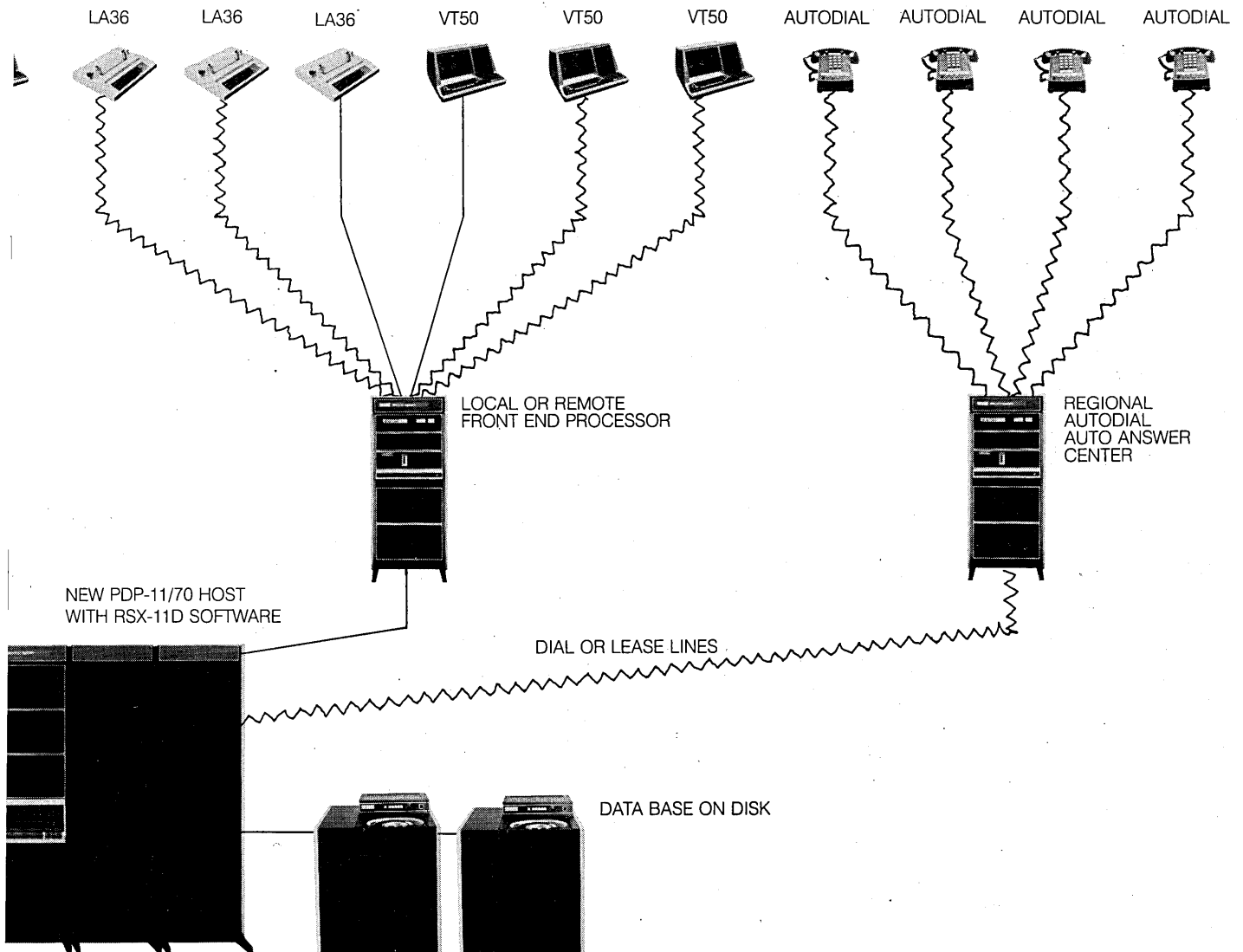
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They felt they didn't need on-line inquiry to a point that would justify its cost. The service bureau is Androcor, Inc., a subsidiary of Boeing Computer Services, Inc., which markets a computer services system to retailers in the \$10 to \$25 million annual sales range. F. A. O. Schwarz has \$17 million. The store's 32 registers were purchased from Singer.

Singer, generally acknowledged as the POS leader, had 52,000 POS terminals installed at the end of 1974. The firm declined to disclose orders figures. NCR, seen as playing a catch up game, claimed in mid-March to have a total of 140,000 POS terminals installed and on order. Neither firm feels the current economic climate will slow down the market. Major retailers seem to feel the same way.

Creative Strategies, Inc., a San Jose, Calif. research and consulting firm, surveyed 25 retail chains on their POS plans at the NRMA convention and found that 30% are moving ahead as planned; 25% are slowing down due to cost of capital; 15% are slowing down due to hardware problems; and 30% are planning additional analysis. But CSI still predicts 1975 will be another record year for POS with sales approaching \$325 million, up from \$210 million in 1974.

The three biggest users, Sears (Singer), Montgomery Ward (NCR) and J.C. Penney's (Singer and NCR) are going ahead with ambitious long range plans. This in the face of a 33% profit decline for Penney's in fiscal 1975 and Sears experiencing the first monthly sales decline in February since April 1961.

And new installations continue. New York's famed Gimbel Brothers, Inc. is installing a 1,500 plus terminal General Instrument Unitote system in its New York and Philadelphia stores. Installation is expected to be completed by the end of 1976. The contract is valued at more than \$5 million.

World's largest store

Gimbel's arch rival, R. H. Macy Co., said it will convert its New York Herald Square store, the world's largest department store, to 425 NCR 280 terminals valued at more than \$1.5 million. The completed system, which Macy says will be the largest POS system under one roof, also will include two NCR 725 support processors, and 11 NCR 751 data concentrators. The Macy Co. already has NCR terminals installed in its divisions in Atlanta, Newark and Kansas City.

Dillard's department store in Lub-

bock, Texas, in February became the first store in Texas and the second in the Dillard chain to install IBM's 3650 retail store system. The system includes 44 POS terminals with hand-held wands that read magnetically encoded price tags. In choosing a magnetic code, IBM is going against the recommended standard of NRMA and the two leading POS users, Sears and Montgomery Ward. They prefer OCR. Scanning by department stores isn't catching on fast yet, possibly because retailers are waiting for an industry standard.

In supermarkets, with the Universal Product Code (UPC) already adopted as the official code for scanning, and appearing weekly on more and more products, there is much more interest evidenced in scanning, despite some consumer concern over the absence of price marking of individual products.

Several states have legislation pending which would require markets to continue price marking and last month similar legislation was introduced in the House and Senate by 43 sponsors.

At a symposium conducted by the Senate Consumer Subcommittee on the benefits and drawbacks to automated checkout in supermarkets, one suggestion to get around the price marking problem was to provide customers with grease pencils so they could mark the prices on any items they wished.

Systems in test

IBM, Univac, and NCR have test scanning systems installed in supermarkets

and other POS manufacturers are planning to follow suit. MSI Data, Costa Mesa, Calif., which recently made a \$2.5 million commitment for scanners to Schiller Industries, Warren, Mich., said it will get a test going in at least one store by mid-year.

NCR's test scanning installation, in a Marsh supermarket in Troy, O., was the first to do UPC scanning in an in-store environment over a long period of time. The test started last June 26 and is still going on. A Univac Acuscan system was tested with the UPC earlier in a Finast store in Framingham, Mass. (April '74, p. 148) but this test lasted only a day and one-half, was in one checkstand only, and only 30-40 items were source marked at the time. A second NCR test scanning installation will be going into a store in the Northeast in the near future.

Supermarkets operate on a very low profit margin and the need to reduce operating costs is great. These stores are looking more for immediate savings than are the department stores which are interested in long term management control.

Gary Liebl, vice president, marketing for MSI Data, which has its Astros POS system (non-scanning) installed in 11 medium sized grocery chains, said the chains are achieving payout (the point at which the system has paid for itself) in from 14 to 24 months with the majority reaching this point in from 14 to 16 months. Presumably the efficiencies of scanning could cut this time. All MSI Astros systems can be retrofitted with scanners as they become available.

Not so severe

Legislation requiring price marking

Standards Group Sidetracks Third Track

Development of a third track standard for credit cards will take a while longer.

At a meeting in March of the American National Standards Institute X4A11 subcommittee, the group responsible for developing a U.S. standard, a "difference of opinion" arose among the terminal makers "as to whether the proposed bit density tolerances are viable from a total interchange systems viewpoint," according to a subcommittee press release. Translated, this means that use of the proposed tolerances will increase the cost of some terminals, at least according to some manufacturers — one of whom is IBM.

The affected terminals are those to be used primarily by savings and loan associations. The S&Ls want to read

account balances and similar data, process it, and then re-encode updated data. Most commercial banks, by comparison, will update computer-resident records. So all they need is a read-only card from which the customer's account number and/or personal ID can be obtained.

"Resolution of this density tolerance problem requires that additional information be compiled and studied" by the manufacturers, said X4A11. It recommended that the standard, when ultimately developed, should provide separate specifications for a third track used in read-only and read/write systems.

The subcommittee didn't say when the manufacturers would complete their study of the bit density tolerance problem.

would reduce the efficiencies to be gained from a scanning system somewhat but not as much as many people seem to think. A Frost and Sullivan market study of the POS market says price marking is .7% of a supermarket's operating costs or .15% of sales. "If such marking were accomplished by the manufacturer, it would reduce the marking costs of \$5 per 1,000 items to \$.33 per 1,000 items."

While store operators are concerned about the legislation, they are not being deterred from planning for scanning systems. "No market is going to do away with price marking if it drives customers away," says Audrey McAfferty of Kroger stores. Kroger pioneered the use of scanning with one of its Cincinnati stores as the test installation for the RCA system later acquired by Univac, from July 1972 to September 1973. The chain will install an IBM system in one of its Indianapolis stores this month. Kroger also is looking at systems of "several other vendors."

"Our plans have always called for continued use of individual price marking," said McAfferty. But she said Kroger considers the price marking legislation to be "anti-consumer. Operating savings can and do affect food prices."

The big savings for supermarkets from POS systems will come at the checkout stand. The Frost and Sullivan report notes that this area represents labor costs of 20% of a store's payroll or over 2% of sales. It cites as savings which may be realized at the checkout area: reduced checkout lanes; reduction of cashier errors; elimination of imbalance of cash registers; reduction of bad checks; improper handling of coupons; and the improper calculation of multiple prices.

Price drops predicted

The study sets terminal costs for a 10 checkout system at \$10,000 to \$15,000 and predicts this will drop to \$9,000 per terminal in 1977, \$8,000 per terminal in 1979, and \$7,500 per terminal in 1982.

Frost and Sullivan sees a big potential for POS in the hypermarket or combined discount store and supermarket, long popular in Europe but just getting started in the U.S. "These stores," says the market research firm, "offer general merchandise and food under one roof, thereby allowing the food retailer to increase his profits by the more profitable non-food merchandise."

One such one-stop shopping chain, Fred Meyer, Inc., of Oregon has out-hypered the hypers. In addition to providing, under one roof, groceries, drugs, clothing, home improvement and sporting goods, and toys, the chain has added savings and loan services at three of its centers. And the chain is merchandising

the financial services much as it does its other commodities. A specialty of the week for a \$25 S&L deposit can range from a loaf of bread to a bottle of perfume. The chain's savings and loan counters already have terminals provided by TRW-FDS/i and it plans to add POS terminals at checkout stands in the future. It estimates its total integrated EFTS (Electronics Funds Transfer System)-POS system, when complete, will have cost between \$7 to \$9 million.

The economy notwithstanding, it looks as if 1975 is shaping up as a good year for POS.

—E. M.

Companies

Singer Co. Favored By Banking Network

A massive European computer buy could ease the pressure on troubled Singer Co., one of the more conspicuous victims of the recession. The company has been given the inside track to supply

implemented it would enable member banks in 13 European countries, the U.S. and Canada to cope with the 10-day international float problem as well as with the difficulties in establishing and maintaining relative currency values. (Banking industry authorities have suggested that one cause of the recent widely-publicized bank failures was the inability of their management to obtain current asset status information. When SWIFT is fully operational, its member banks expect to be able to get up-to-the-minute asset and liability reports with relative ease).

Three selected

Singer, Burroughs Corp. and General Automation were selected in a competition with 18 other European and U.S. manufacturers as "qualified vendors" to supply intelligent terminal systems specifically designed to meet SWIFT's standards. Burroughs also emerged as the computer supplier. Duplexed B-4700 systems are to be installed at switching centers in Brussels and Amsterdam. General Automation also won the competition for concentrators to be installed



TWENTY CENTS: Carl Reuterskiold, general manager of SWIFT banking network project, thinks 260 member banks in 15-nation network could use it at a cost of 20 cents per transaction. Network will run at 9600 baud with each country concentrator having at least two paths to reach computerized switching center. Reuterskiold is photographed at keyboard of Singer terminal.

intelligent terminals to a banking network called SWIFT, for Society of Worldwide Interbank Financial Telecommunications. If successful, Singer could install close to \$75 million worth of systems over the next two years.

SWIFT is a consortium of 260 banks established in 1971 to develop a private, computerized switching network for transmitting financial data. When fully

in the 15 participating nations to handle the network interfacing.

Although Singer was not given a monopoly, it is expected to be the primary source for the intelligent terminal—a modified version of its model 1500 line—because the Burroughs and General Automation entries are substantially higher priced. And Singer's director of multinational accounts, H. Richard Cos-

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saboon, Jr., points to Singer's established service facilities in most of the 15 participating countries and to its experience with the 1500 system in 17 of the member banks.

The market, according to Singer estimates, will reach 6,000 terminals before the last members come on stream in January, 1977. The new revenue would nearly double the \$39 million Singer wrote off last year for planned discontinuance of its electromechanical billing and accounting line and other unprofitable operations. The writeoff wiped out the company's 1974 earnings of \$29 million which already were a disastrous drop from the previous year's net of \$94.5 million. Compounding its recession-driven losses was the investment community's adverse reaction. Its stock, traded in the \$70s in 1973, was being sold in the low teens this year.

The SID

Singer's SWIFT terminal will be called the SID—SWIFT Interface Device—a modified version of the standard 1500. For SWIFT use, Singer has offered three standard configurations: a Teletype replacement, a High Volume Transmission Controller, and a High Volume Terminal Controller.

All are based on an 8K, 1502 processor with a 960 character display station, communications capability, a keyboard

for data entry, two minitape drives and a low speed printer. With that basic hardware, the system can be expanded to 32K and might include a high speed line printer, up to 19.6 MB of disc, slave terminals and numerous other peripherals as required. The basic system for SWIFT members could be priced at approximately \$10,000—14,000 in conventional configurations.

Apart from the much-needed revenue, a SWIFT buy could add credibility to Singer's Business Machines Div.'s drive into financial markets. Division president R. O. Baily has told associates that banking is a key industry to pursue following the company's relative success in the retailing point of sale business. Early this spring, the company dispatched an international marketing specialist, Richard Sprague, on a six month world tour of banking organizations to investigate such categories as electronic funds transfer, branch banking changes, post office and retail services.

Singer, having installed more than 2,000 of the 1500 units, has most of the engineering and development costs behind it. So, success with the SWIFT buy could have considerable impact on the company's 1976 and 1977 earnings. Most of the installations would be made early in 1976 in preparation for its operational status in March of that year.

—Philip H. Dorn

Government Procurement

Government's Buying Agency Tightens Policy on Sole-Source Computer Buys

Federal dp users who like IBM systems usually have been able to acquire them without much trouble. But the General Services Administration (GSA)—the government's purchasing agency—has started to tighten its control significantly. One indication is a so-called "delegation of procurement authority" the agency recently negotiated with the Army, covering upgrade of a system called BASOPS.

In the "good old days," these delegations were seldom more than a few paragraphs long and left the system operator free to exercise his imagination, and biases, in selecting a vendor. The BASOPS delegation is several pages long. It allows the Army to procure an "interim upgrade" IBM system, provided third-party lessors and used computer dealers are allowed to bid and that the RFP permits system maintenance to be contracted separately.

Furthermore, the life of this interim system is limited to three years, unless a longer period is "mutually agreed to" by the Army and GSA. At the end of that time, there must be a "fully competitive" procurement of equipment to replace the interim upgrade system. Beginning next July, the Army must report to GSA every quarter on its progress in developing the specs for this latter procurement, "to ensure that the replacement system is procured on a fully competitive basis."

Other provisions

Several other provisions are aimed at eliminating any leverage IBM may gain by installing the interim system. For example: if extra conversion costs would be incurred by switching to another manufacturer for the replacement system the expenditure must be discounted if it is likely to generate specified bene-

fits—such as "enhanced system capabilities" or elimination of "obsolete or non-standard software in conflict with applicable (federal) standards."

The BASOPS delegation is the latest of about a dozen that have been approved since last July, when the GSA issued Federal Management Circular 74-5, establishing new adpe procurement policies. While the other delegations aren't invariably as detailed, each forces the agency acquiring an interim upgrade system to promise a fully competitive replacement procurement within a specified time period. HEW is now preparing to go to the market for 10 big 370s. It has promised that beginning next July, bids will be solicited, on a fully competitive basis, for systems to replace each of these interim installations.

So the new policy appears to be firmly established.

Enter Jack Brooks

One reason GSA has been tightening the screws recently is because the influential Rep. Jack Brooks of Texas now heads the House Government Operations Committee, a position that gives him significantly more clout than before. Brooks, the leading dp expert in Congress, is the author of legislation passed in 1965 to centralize in the GSA the purchases of edp equipment for government agencies. He also may be getting more directly involved in the management of federal computer buys.

He was understood to have been closeted late last month with Army officials who want to procure three IBM 360/65s on a sole source basis for a logistics system called Project Alpha. Nine similar systems have been acquired already under an arrangement that enables the Army to save \$16 million—but only if it takes all 12 machines. The trouble is that the General Accounting Office has said the contract violates federal procurement regulations.

Brooks has agreed with the GAO. He said the Army should solicit bids for the remaining three computers from the third party leasing industry. The meeting last month apparently was requested by Army officials in an attempt to change the congressman's mind.

Would shed CSC pact

Meanwhile, GSA is trying to find a graceful, and cost-effective, way to get out from under a dp services contract it negotiated in 1972 with Computer Sciences. The contract can be terminated at the end of this fiscal year, but if GSA hires another vendor, several federal agencies will have to throw away \$10-15 million worth of software they've developed to support the applications now being processed on CSC's Infonet



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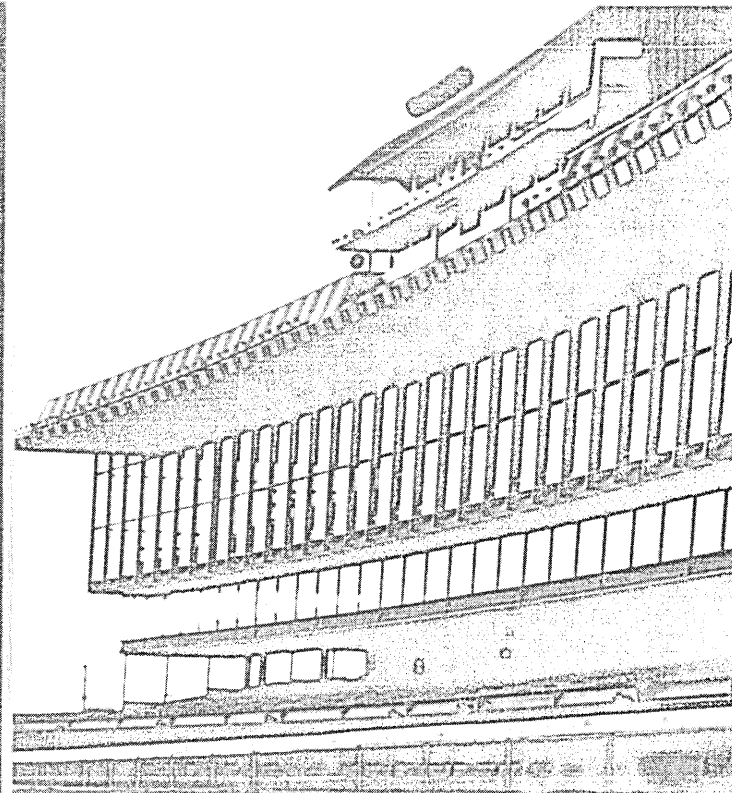
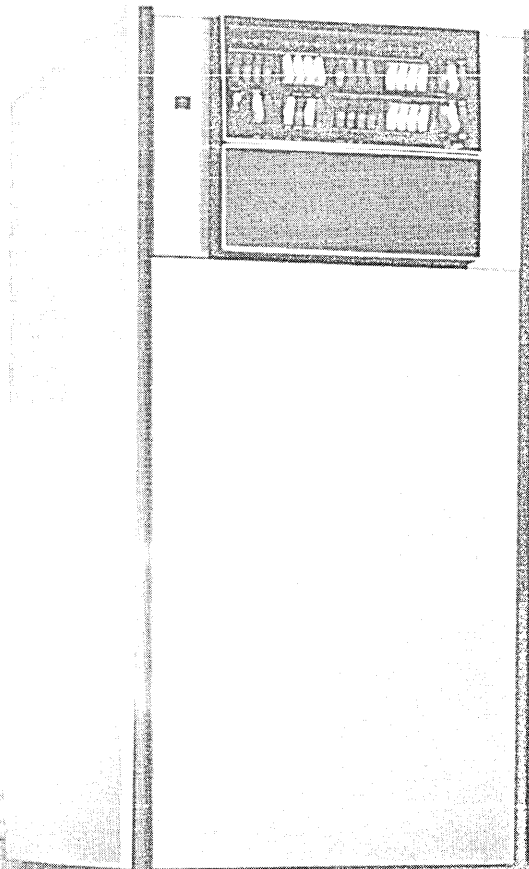
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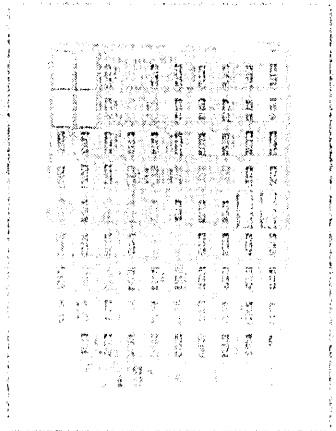
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system. Also, until new software was written, these users would have no way of getting their work done.

The CSC contract could be continued, but since it gives the company first crack at just about all new service bureau business generated within the federal government, competing vendors would be unhappy. They're already upset because the contract has lasted this long. Since 1973, the first full year that CSC provided machine time to the feds on a government-wide basis, net annual billings have more than trebled, to an estimated \$19 million in the current fiscal year.

GSA has already drafted an RFP, seeking bids from the service bureau industry for FY76, and plans to release it shortly for prospective vendors for their comments. Meanwhile, the agency will try to persuade CSC to give up some of the rights to new business it now enjoys.

Opposite direction

While these actions by GSA and Rep. Brooks reflect an attempt to make system and services procurements more competitive, there are some trends in the opposite direction, at least according to some suppliers.

The Computer and Business Equipment Manufacturers Assn. (CBEMA) is unhappy because the feds plan to let a "mandatory requirements contract" for minicomputers. Under this contract, all agencies' minicomputer needs for up to five years would be standardized as much as possible, and the orders would go to a single supplier who would offer a substantial price reduction per unit.

CBEMA, which had a long and apparently unproductive meeting with GSA officials last December on the mandatory mini buy has asked the agency's administrator, Art Sampson, to hold another meeting before issuing the RFP. But in late March it was understood that GSA has just about decided to go ahead immediately. Reportedly, the plan is to issue an RFP covering an Air Force requirement for about 20 minis, but the bid solicitation will be phrased so that other agencies' requirements can be added to this one.

Lessors unhappy

Third party lessors, meanwhile, remain unhappy about the new rules for procurement of interim upgrade equipment.

Although these firms are now explicitly allowed to bid on such RFPs, they insist they can't compete because the required delivery times are too short—of-

ten a matter of two weeks or less—and IBM can lease its systems to the feds directly at lower prices.

GSA, while insisting it can't do anything about "short-fuse" deliveries—because the system user controls that detail—is nevertheless trying to soften the impact.

Recently, the agency told third-party suppliers that when IBM is the only vendor capable of delivering a 370 within the time specified by an RFP, the government's delivery rights to this machine will be transferred to any firm which can underbid the IBM lease price.

But the real problem, according to the lessors, is that they can't line up the financing for such a deal quickly enough to take advantage of GSA's offer. Also, IBM sells computers to the feds for 8% below the commercial price, and this differential, plus the higher interest rates which lessors must pay when they borrow, makes it difficult, if not impossible, for them to underbid IBM.

GSA is preparing to ask the General Accounting Office whether third-party lessors could legally buy IBM computers at the federal price—8% under the commercial rate—if it was agreed in advance that the system would be leased back to the government at a substantial saving. A similar question was asked several years ago. GAO indicated it would go along, and so did IBM, but Jack Brooks called the scheme "a subterfuge," so it was dropped. Those who are now trying to revive the plan haven't yet talked to Brooks, or to IBM.

—P. H.

Measurement

A Warning for the 'Metric Eccentrics'

What does the United States have in common with Brunei, Burma, Liberia and Yemen? Together, those are the only five countries left in the world which do not use the metric system. This was pointed out last month as the American National Metric Council held its first annual conference in Washington, D. C. to exchange information on coordinating this country's voluntary conversion to metric.

The event was keyed by John Tabor, undersecretary, U.S. Dept. of Commerce, who warned that the U.S. "cannot afford to be metric eccentric" which this country will be labeled in the world community if it doesn't go metric soon. By 1978 American products will

face a built-in disadvantage in world markets unless the nation adopts the metric system, he warned.

The undersecretary charged that the U.S. cannot effectively compete in international trade using a different language of weights and measures and different standards for the sizes of its commodities.

"The common market countries have put us on notice that they will require all U.S. exports to be produced to meet metric standards by 1978," according to Tabor. "Thus, the changeover to metrics is vitally important to the communities, the factories and the workers whose products are offered for sale overseas."

Shift is underway

A number of federal agencies are now shifting to metrics, Tabor said. One is the federal highway administration, which has metric equivalents for customary dimensions in its latest revision of the Federal Highway Specifications Manual. Another is the Dept. of Commerce maritime administration, which has published a new federal manual of standards specification for tankers, expressed in metrics. The defense department has established a department-wide metrication panel, working towards the adoption of the official DOD policy on metrication.

IBM was among exhibitors at the conference. Its booth periodically displayed brief messages informing conference attendees of IBM's status in metric conversion. An example was, "metric conversion is a feature of IBM's 370 program products developed for numerically controlled tools. Programmers may enter their data in either inch or metric and specify output to operate either inch or metric machine tools." IBM said it is in the fourth year of a 10-year plan to adopt the metric system for designing, building, testing and servicing its products. The company noted that it expects long-term savings from metrics, such as faster design, smaller inventories, fewer errors and easier transfer from lab to plant.

Other slogans in the IBM booth proclaimed that IBM is not redesigning existing products to metric; that half-inch magnetic tape and familiar 7 $\frac{3}{8}$ inch punched cards will be retained but sizes may be translated into millimeters.

New legislation

Legislation dealing with metric conversion has been introduced into both houses of Congress. Sen. Clairborne Pell (D.-R.I.), author of S 100, the Senate bill, and two Congressmen, Rep. Don Fuqua (D.-Fla.) and Rep. Keith Sebelius (R.-Kans.) formed a panel to discuss current metric conversion legislation with metric council attendees.

news in perspective

Sen. Pell's legislation calls for mandatory metric conversion within 10 years and establishes a national program to achieve that objective. S 100 also sets up a national metric conversion board. The bill has been sent to the Senate commerce committee. Sen. Pell said his bill also provides some measure of federal government conversion assistance in the form of an increased investment

tax credit and small business administration loans and grants.

"I think the chances for congressional approval of S 100 as introduced are not rosy," Sen. Pell commented. "I was well aware as I introduced the bill that modifications and compromise would be required to gain the approval of Congress."

The senator said one reason metric

conversion legislation did not pass in the last Congress was the "quiet opposition" of labor. "I think that may be changing," he noted. Sen. Pell said Congress has been lagging behind in passing metric conversion legislation, that if the bill were passed this session "there is no doubt the President would sign it." The federal government has a vital role to play in helping plan, coordinate and facilitate the conversion to metric, according to the senator.

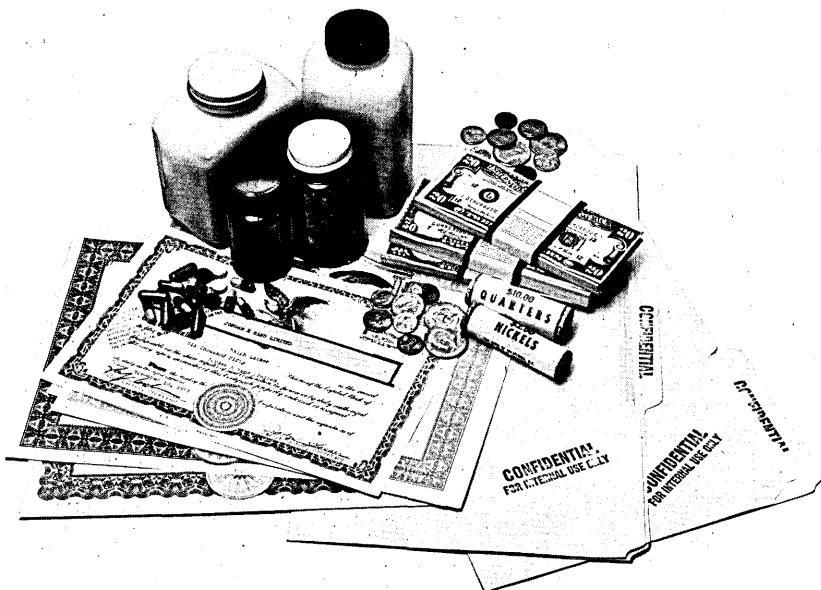
Who bears the cost?

Rep. Fuqua said House committee hearings on metric legislation will be held this spring and it is likely that some type of legislation will be passed during this session of Congress. One of the problems, he said, is who is going to bear some of the cost. "The cost involved in conversion is going to be considerable, even on a voluntary basis," Rep. Fuqua noted.

Opposition to hasty passage of legislation this session was voiced by Rep. Sebelius. "I personally feel metric conversion legislation should be put on the back burner and left to simmer for a while," he noted. The congressman cited an estimate that conversion will cost at least \$75 billion and questioned the spending of that amount of money during "a time of recession and inflation." He also questioned the psychological impact of such change on "this country's citizens, particularly older people."

—Pamela Evans

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Software

Guidelines for The Accountants

Like the weather, everyone in the computer business talks about software, but nobody ever seems to do anything about it.

The accounting business, however, through its standard-setting body, the Financial Accounting Standards Board (FASB), is at least trying. The FASB has set new parameters around what a firm can or can't do with software as it relates to accounting practices.

In essence, the FASB requires that all software that is related to a firm's research and development activity will be expensed as incurred, rather than spread out over a period of years as sometimes was the case in the past. The software edict by the FASB—which sets the guidelines for accountants who in turn keep the books of business enterprises working with software—adheres closely to another recent FASB ruling on r&d. In the earlier r&d ruling, the FASB stated

that a business enterprise's research and development expenses should be expensed as incurred.

"All costs," the FASB stated, "incurred to develop software internally for use in the enterprise's research and development activities are r&d costs."

The FASB also attempted to outline some other hazy areas that it decided constituted research and development and, as such, would come under the ruling. These would include software developed "as part of a newly-developed or significantly improved product or process," or software that "is in itself a marketable product or process." In addition, software used to develop new processes and products are considered research and development activities.

Exemptions

Excluded from the category of r&d is software used in a business' selling and administrative activities as well as software that is used "to improve an existing product or adapt a product to a particular requirement or a customer's needs."

Of more interest to software users, the FASB noted that software that is purchased or leased "by others" cannot be considered for use for r&d purposes unless actually used by the purchaser in his own r&d activities.

The ruling is another attempt by the accounting profession to set up standards from the amazingly complicated and sometimes contradictory thicket of "generally acceptable accounting practices" that have long been a bugaboo of the computer industry.

Praise for the ruling

A few software specialists and firms contacted on the new ruling generally had praise for the FASB's efforts to establish real standards, although those contacted were obviously struggling to fully comprehend the new FASB ruling.

Said one top executive of a software house: "I think software companies' new financial statements will look differently as a result of the ruling. There were a lot of abuses and this will help eliminate them"

On the other hand, others felt the ruling would tend to penalize younger companies and help older established firms. Newer firms often tended to capitalize software r&d expenses and this helped make their financial statements look better, if not necessarily more accurate.

The FASB said its ruling will be effective for "fiscal years beginning on or after April 1, although earlier application is encouraged."

—W.D.G.

Carrying Coal To Seattle

Some of the people involved are still calling it "The Great Data Base Chase."

The incident centered around IBM's attempt to install its IMS data base management system at England's National Coal Board. The U.K. computer firm ICL, which with IBM shares the installed computer base at Coal Board sites, attempted to fight back with a data base management system that would operate on both IBM and ICL equipment.

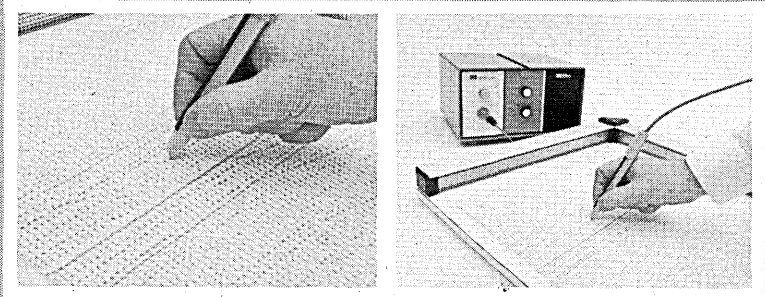
As its weapon, ICL picked the Integrated Database Management System (IDMS), a Codasyl approved system developed at the B. F. Goodrich Co., and marketed by Cullinane Corp. of Boston.

"The decision was particularly important," says John Cullinane, president of the Boston firm. "If the coal board decides to go with IMS, then ICL could gradually be squeezed out. But if they go with IDMS, then the system could work on both IBM and ICL equipment."

At any rate, ICL and the Coal Board's computer subsidiary, Computing

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Power, arranged a trip to visit IDMS user locations in the U. S. a few weeks ago with ICL having the hope that it could convince the Coal Board to go with IDMS.

The itinerary included stops at B. F. Goodrich in Ohio, Southern Railway in Atlanta, Abbott Laboratories in Chicago, RCA's Sarnoff Laboratories in Princeton, N. J., and Mutual Benefit Life Insurance in Newark. The sites had been selected as examples of users who are particularly sophisticated in their use of data base management systems.

After the group of ICL and Coal Board representatives left B. F. Goodrich locations in Ohio, they headed for Southern Railway in Atlanta. In Atlanta they encountered something they hadn't included on their itinerary—the Coal Board's IBM account representative from England. The IBMer followed the group as it continued on with its tour and, at its completion, the Coal Board members extended their tour to visit an IBM IDMS customer location at Boeing in Seattle.

How did it all end? ICL is offering IDMS to its customers and potential customers now, but at this writing the Coal Board still hadn't made known its intentions in the data base management area.

The incident, however, illustrates the intensive competition that is becoming more common in the data base management sector.

—W.D.G.

six years ago with associates Anthony Mauro and Edgar Wolf to found the Hauppauge, N.Y., company, talked recently at a New York press briefing of what she calls the "multi-function office automation system." With her at the



EVELYN BEREZIN
A \$5 billion market for
office automation in '80?

briefing was Earl D. Hilburn, president of Western Union Telegraph Co., to whose systems the Redactron equipment connects.

Berezin, whose systems connect to the TWX, Telex and Mailgram networks, talks of the economies of a single keystroking process. Development, installation and maintenance of specialized office equipment is an expensive process when extra training and equipment redundancy factors are calculated. It makes little sense, she said, to key data on one machine, edit it on a second, use a third to transmit and a fourth to reproduce.

Redactron makes word processing communicating and editing typewriters, communications devices, data converters and cassette and magnetic card transports. The basic typewriter mechanism comes from IBM, and Redactron designs and builds the MOS/LSI control circuitry. The 580-employee company has sales and service branches in 95 U.S. cities and in Canada, Mexico, Australia, South Africa and most Western European countries.

Making ends meet

Like many small organizations in an IBM-dominated world, its most critical problems relate to customer service, equipment maintenance and maintain-

ing technical leadership without sacrificing profitability. Although engineering R&D is expensive, without it product leadership is impossible. In the first half of its 1975 fiscal year which ends next June, the company reported a profit of \$67,000 on \$10.5 million in revenues, compared with a \$363,000 loss in the first half of the previous year.

Service is the key to long term installations and a satisfactory revenue base. In the labor-intensive keyboarding environment, the customer's hardware must be available five days a week, eight hours a day. It does little good to talk of reliability in terms of mean-time-to-repair or mean-time-between-failure—figures are based on a 720 hour month. To a user, the only significant period is the prime shift of 176 hours. Time after 5 p.m. is generally useless.

Although Redactron says its service personnel are trained to fix the typewriter elements and replace the other components, one customer contacted by DATAMATION grumbled that the service force spent too much time diagnosing



DESK-TO-DESK, or continent-to-continent office communications is simplified with this communicating typewriter, according to the manufacturer, Redactron Corp. Models use mag tape or mag cards.

and fixing non-typewriter problems. In fact, he said, the typewriters give almost no trouble at all. The availability of automated test equipment that would allow remote testing over telephone lines by skilled technicians with the less skilled service people serving primarily as delivery vehicles is considered a possible solution.

Singer vice president Janet Norman advocates remote testing as a solution to the service problems of dealing with 50,000 automated cash registers, teller terminals and supermarket checkout de-

Word Processing

The Automated Office: Only a Keystroke Away

Word processing—a buzz word relating to the improvement of business communications—continues to receive a lot of attention in spite of economic uncertainty. Some see it as the opening wedge to tomorrow's automated office (February, p.59). It was estimated as a \$700 million market in 1974, with IBM holding about 89%.

Evelyn Berezin, president of Redactron Corp. which claims to hold 5% of that remaining 11%, thinks that an industry is emerging rapidly and will reach \$5 billion by 1980. The rapid rise in clerical wages and the decreasing cost of technology together will stimulate the ever-increasing automation of the functions of more than four million secretaries and stenographers in U.S. offices.

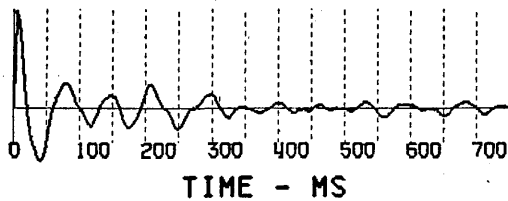
Berezin, who left Digitronics Corp.

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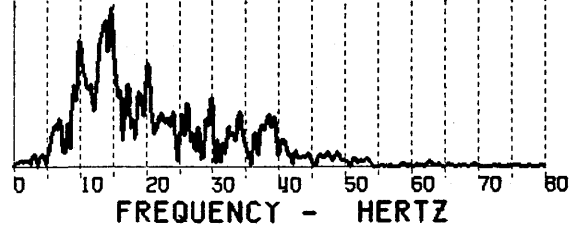
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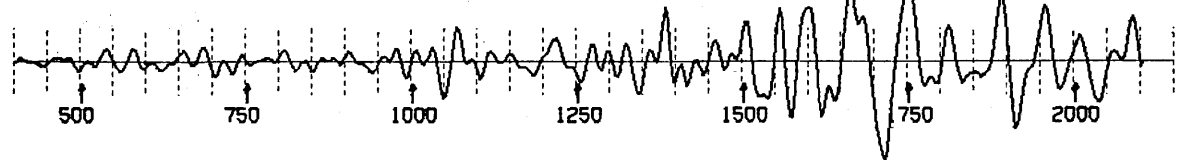
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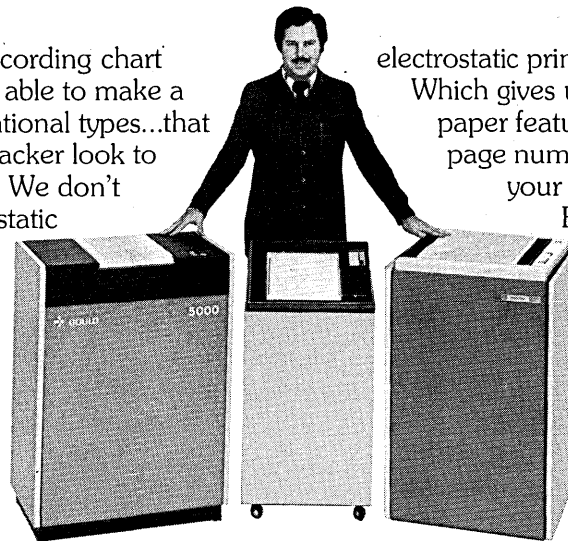


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news in perspective

vices. In such a situation simple economics rule out the feasibility of on-site repair. The service men will therefore replace whole systems and return the malfunctioning units to a central depot for diagnosis, repair and return to the field later on.

All too complicated

Berezin appeals to the edp community to forget about number crunching and begin to think about the movement of information. She noted that "... it has been an uphill fight convincing computer specialists that lawyers should be able to access legal precedents and decisions more easily, or that doctors should be able to obtain diagnostic information more quickly, or that financial people might appreciate it if they could get the latest information on pending government bills." Edp people, she says, continue to spawn new and more specialized terminals that make the multiplicity of office tasks more complicated, more expensive and less effective for the office worker. All this must change if the Redactron "Of-

office of the Future" is to become reality. Western Union's Hilburn predicted that by 1985 the mailroom and filing cabinets would all be gone; if his prediction is to succeed it will be because interconnected equipments like those sold by Redactron have become commonplace.

—P.D.

Performance Evaluation

Expansion Measured By Measuring Group

The Boole & Babbage Users Group (BBUG) drew 60 persons to a New York meeting in very bad weather in January to study an expansion of the group to include users and vendors of all other computer performance measurement products and services. BBUG president Mark Berg of Sun Oil Company said the organization of users of products made by Boole & Babbage, Inc., Sunnysvale, Calif., is considering other regional meetings and the types of subjects to be covered.

The New York meeting was the first of a projected series of regional meetings by the group which already has started to expand its membership to other users and vendors.

Opening address was given by Phil Kiviat, technical director at FEDSIM where the U. S. government's performance evaluation and measurement activities are centered, who told his audience that performance measurement is not solely a bits and bytes activity. Work flow through the machine room, operational problems and programming practices may have more influence on computer performance than cpu cycles used, Kiviat said, adding, "Facts may speak for themselves, but they do not do it very well."

An observer at the meeting said it is not clear yet if the BBUG group will become *the* measurement group and gradually encompass the ACM's SIGMETRICS, the SHARE CMR project and vendor-oriented groups, but the idea of a single group made up of academicians and empiricists, vendors and users alike, seemed to make sense.

Curiously enough, the only group not represented at the New York meeting was the subject of all the attention—the mainframe manufacturers.

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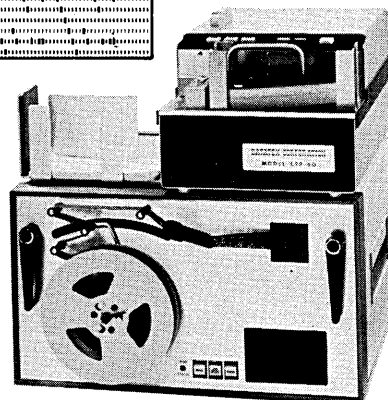
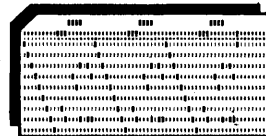
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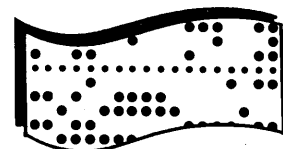
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CIRCLE 16 ON READER CARD

Austria Would Rather Spend Than Convert

When computer operators in government capitals around the world turn on their computers, the chances are that they will be IBM machines. In Vienna, the capital of Austria, it's a virtual certainty.

IBM is estimated to have more than 95% of the federal government's computers in that European country. As might be expected, the competition—if it can be called that—doesn't like that lopsided percentage. The result is that Univac has challenged the Austrian government to establish a governmental computer procurement agency that it calls an "EDP Holding" and that would appear to be similar to the United States' General Services Administration (GSA).

Univac asks that the central agency be supervised by the government audit office and possibly even the Parliament. It says, "This central office could be in a stronger position vis-a-vis computer firms because of its market surveying position. It could save about \$4 to \$5 million annually on hardware expenses alone."

Univac's Austrian unit proposed the creation of the new agency last spring and currently is continuing to pursue the idea. Univac's Austrian officials, H. K. Krumboeck and Dr. H. Schuster, have estimated that expenses for computer hardware in the federal government—exclusive of university and other R&D installations—jumped from \$8.5 million in 1971 to \$23 million in 1974.

"The market leader (IBM) today dominates the market . . . with a market share of approximately 96%, practically a monopoly," the Univac officials said. "This share is much higher than the European average of about 65%."

Univac directed its initial complaint at Dr. Eugen Veselsky, an Austrian government official, who in 1970 helped create a new governmental agency designed to increase competition among various vendors for the federal government business. The Univac officials complained that the government agency has not been successful.

Stung by the Univac criticism, Veselsky answered the Univac charges by observing that the organization of government-edp procurement was examined more than three years ago. "We found out," said Veselsky, "that although the centralization of government edp development and the foundation of a private computer center for government use would be the best solution, we

had to reject this solution in favor of edp service centers for each ministry."

Veselsky pointed out that parallel edp development by several different government agencies in one center would be "tremendously expensive." He noted the difficulties that would be created by the various governmental agencies still continuing to operate their already existing computer installations at the same time. Moreover, Veselsky said the central agency concept would conflict with some Austrian governmental regulations and principles.

While Veselsky did say that a central "EDP Holding" would save considerable expense, he indicated that the costs of conversion—from IBM to non-IBM equipment—would probably wipe out any savings.

"To prevent a dependency of the federal authorities from one single supplier," said Veselsky, "it is not necessary to create an edp-holding but only to observe a strict neutrality towards com-

puter firms interested in the government market."

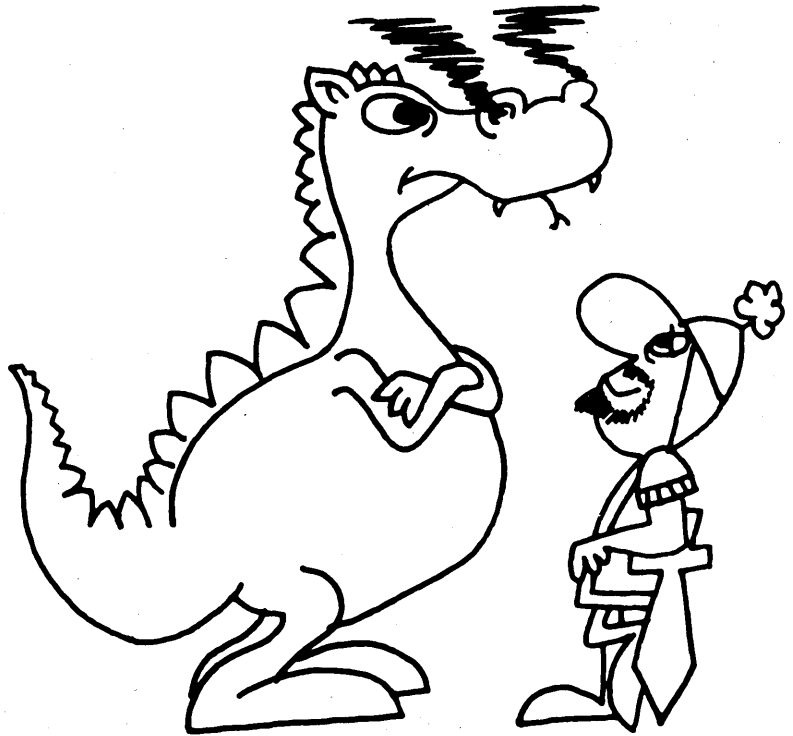
In addition, Veselsky noted that invitations to bid on computer equipment have been won in some governmental agencies by non-IBM vendors and he said that the government market share of those firms that won some of the contracts has increased. Most of the inroads, however, appear to have been made in the software and peripherals area.

The whole dispute appears to be a classic case embodying all the ingredients of computer account control and upgrading in which it is extremely difficult to dislodge a vendor once it is implanted in an installation.

IBM has remained silent on the issue, but there are indications the firm might dispute the 96% figure used by Univac. Meanwhile, Univac has indicated it will continue pressing ahead with its proposal with Veselsky.

—W.D.G.

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News in Perspective **BENCHMARKS . . .**

Agreement for Acquisition: Storage Technology Corp., Louisville, Colo. manufacturer of tape and disc subsystems may get into the small business systems market if a proposed acquisition of Ultimacc Systems, Inc., Maywood, N.J., goes through. The two firms have signed a memorandum of intent providing for the merger of Ultimacc into a subsidiary of STC on the basis of one share of STC common stock for each two shares of Ultimacc common. The agreement is subject to a definitive agreement and to approval of Ultimacc's shareholders. Ultimacc develops, manufactures, and markets integrated small business computer systems.

Production in Romania: A joint manufacturing venture between Control Data Corp. and the Industrial Group for Electronics and Vacuum Technology in the Romanian Ministry of Machine Tools and Electro Techniques (CIETV) has begun production of computer printers in a new plant in Bucharest, Romania. The venture, ROM Control Data SRL, was established in 1973 (May 1973, p. 112) and was the first manu-

facturing venture with equity investment for a U.S. computer company in East Europe. CIETV owns 55% and Control Data, 45%. The Hon. Corneliu Bogdan, the Romanian ambassador to the U.S., in Minneapolis for recent progress of the venture, said "progress of the joint venture has been excellent and prospects for its success are encouraging. This venture symbolizes the kind of new forms of economic cooperation which in our belief lay a durable basis for Romanian-American relations." The 66,000 sq. ft. Bucharest plant employs 130. Initial shipments are scheduled to go to CDC customers in East and West Europe and Africa with shipments to CIETV customers to begin late in 1975 or early in 1976.

The Wake of Reversal: The reversal by a Denver Circuit court of Judge A. Sherman Christensen's \$259.5 million award to Telex in its antitrust action against IBM, has caused the Computer Industry Assn. to move to Washington. The CIA charged that the reversal "raises serious doubt as to the future level and quality of competition within our industry and raises a spectre of ultimate federal regulation." The group said it made the move to Washington to head off the threat of federal legislation and to push

for "legislative relief from the monopolistic status of the computer industry." Meanwhile Telex has asked the U.S. Court of Appeals for the Tenth Circuit in Denver for a full court review of the three judge decision which overturned its award and upheld IBM's counterclaims of industrial espionage. The Tulsa peripherals manufacturer alleges appellate court errors that perpetrated a "substantial miscarriage of justice." Three other antitrust suits against IBM have been delayed because of the Telex reversal.

Opposes Moratorium: J. Rex Duwe, president-elect of the American Bankers Assn. came out against a bill sponsored by Sen. William Proxmire which would impose a two year moratorium on installation of remote banking terminals. Testifying before the Senate Subcommittee on Financial Institutions at hearings on the bill, Duwe said, "enactment would not be in the public interest, and we therefore oppose it." Duwe is president and chairman of The Farmers State Bank in Lucas, Kan., a town with a population of 595. "As a small town banker," he said, "I have been interested personally in some of the comments being made to the effect that small

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banks are terrified of electronic banking, and will be destroyed by the other large money-center institutions. The local market can and will continue to be best served by the local bank." He said, "the key point is that this electronic banking is new only in method of delivering the services, not in the service itself." A bill similar to Proxmire's has been introduced in the House by Rep. Fernand St. Germain.

Overseas Service: Western Union International has asked for FCC permission to conduct a one-year test of its International Digital Data Service (IDDS) and has announced rates for the service. Initially, IDDS will link New York City with France, Italy, Spain and Austria. An agreement with the U.K. is in the works and Germany and Switzerland may be added when that has been completed. Transmission speeds will range from 12.5 bps (quarter speed) up to 9600 bps. Rates are based on an access charge and a usage charge. The former will range from \$2,365 to \$6,897 per month, depending on speed. The usage charge depends on the number of bits transmitted and the time consumed.

Component Standards Assn.: Control Data Corp., Nixdorf Computer AG and The Plessey Co. Ltd. have formed an association to assist in the standardization of computer components. John D. Hayden of Plessey has been named managing director. He said the new organization will be called Standard Computer Komponenten GmbH (STACK GmbH). It will headquarter in Frankfurt. International Computers Ltd. said it will participate in STACK but participation does not, "for technical reasons, yet extend to a shareholding in STACK." Establishment of common components standards specifications and conditions of supply will be "very beneficial" both to the participating companies and to component suppliers," Hayden said. "It is foreseen that agreement on common performance requirements and on methods of test and quality control will ease the problems of suppliers in satisfying their several customers, and will ensure that genuine alternative sources of supplies are available to the participants."

A New Partner: The French government apparently is willing to go through with a plan to merge the cash-hungry French Compagnie Internationale pour l'Informatique with Honeywell Bull. Its decision may involve a complex three-phase schedule: In April or May a government-controlled holding company will be formed to buy a 51% interest in

Compagnie Machines Bull which owns 34% of Honeywell Bull. In the second phase, the government company would pay Honeywell \$50 million for 17% of Honeywell Bull, thus reducing Honeywell's holdings to 49%. In the third phase, CII and its partners in the three country computer consortium, Unidata--West Germany's Siemens and Holland's Philips—would negotiate which of the Honeywell line would mesh with the Unidata line. The Unidata contract says that members cannot include in their Unidata sales catalogs any machine that conflicts with those of partners. CII/Honeywell Bull could sell the Honeywell line separately in France, but couldn't blend the HB machines into Unidata without permission of the other partners. The unsettling question is whether Unidata would want to accept a strong U.S. partner in the first place, regardless of its minority interest in the French company. There were reports in March that Siemens and Philips were looking for other European computer firms to replace CII as a partner.

Luck of the Irish? Mohawk Data Sciences Corp., phenomenally successful in the late '60s with its key to tape data recorder, has come upon hard times of late. Unprofitable since 1970 and with a loss of \$9.1 million in the first nine months of its current year which ends this month, the company blames the high cost of money and the increased need to borrow to expand its rental base.



RALPH H. O'BRIEN

In less than a year, it's shifted its top management three times. Since the resignation in February of its founder V. E. Johnson as chairman and president, Mohawk has been operating under an interim president, James W. Hart, a management consultant. Last month,

the Utica, N. Y., company made what it hopes will be a final top management change with the appointment of a 45-year-old executive vice president of Litton Industries, Ralph H. O'Brien, as chairman, president and chief executive officer. Hart noted that much of O'Brien's experience with Litton was with the business machines and systems business which relates directly to Mohawk's business. He said O'Brien's association with the company "attests to its immediate and long-range viability." Besides his past accomplishments, O'Brien might have the luck of the Irish going for him in his efforts to turn the company around. His first day on the job was St. Patrick's Day.

IBM Feels the Pinch: IBM's treasurer, Bertram H. Wiltham, told securities analysts that the company's sales declined in the third and fourth quarters of 1974, and that incoming orders in January were a bit "softer" than a year earlier. "It is probable that this decline is going to continue," he said, "because of projected economic conditions, and because we are approaching the point in the (computer) product cycle where a lower level is entirely normal." He told analysts that IBM expects strong pressure on profit margins in 1975 as well as a continued drop in the proportion of sales to rental revenue and a "slight" decline in computer shipments.

Postal Procurements: A bill designed to make the U.S. Postal Service procurements more competitive and cost-effective has been introduced into the House by Rep. Charles H. Wilson. Among other things, it would require an annual review by Congress and the General Accounting Office of Postal Service procurement activities, and would sharply limit the agency's authority to let sole-source contracts. A House subcommittee headed by Wilson last year, found that IBM was among the chief beneficiaries of Postal Service sole-source awards.

On Plan and Ahead: Orders for Sperry Univac 90/30 computers booked as of Jan. 31 topped \$100 million, the company said last month. Frank B. Holst, director of program management, said more than 350 systems had been ordered by customers throughout the world in the seven months since the system was announced. "The entire program for the 90/30 is proceeding on plan," said Holst, "with some areas of the program including bookings, actually ahead of plan." First deliveries of the 90/30 began on schedule in February. □

LOOK AHEAD

(Continued from page 18)

contact with the Antitrust Div. and, of course, the fact that he has been sitting on the federal bench in New York for some 12 years would help because the case is in pretrial proceedings there. One of the problems in the case has been to find a high Justice Dept. official without an IBM leaning who might be able to work out a consent decree. Attorney General Edward H. Levi has disqualified himself because of family IBM stockholdings and Solicitor General Robert H. Bork has been too pro-IBM in public to be considered impartial. Thus, Tyler might just be the man to work out a consent decree in the case which finally goes to trial May 19.

CALIFORNIA'S TEALE CENTER: WHAT NOW?

The state of California's Teale Data Center (August '74, p. 104), subject of an equipment procurement controversy that lasted more than two years, ran out of money in mid-March and its equipment future is once again up in the air. An urgency bill, rushed through the legislature and signed by Gov. Jerry Brown on March 17, gave the center, which serves 32 state departments, \$2.6 million to keep it going until the start of the state's new fiscal year on July 1. It also authorized a study by an independent company of the center's equipment and personnel needs and precludes the center from purchasing or extending leases on computer mainframes until at least 30 days after the study is complete. Boeing Computer Services was awarded a \$100,000 contract to do the evaluation and report back to the state's Joint Legislative Budget Committee.

The center has been operating with two leased 370/168s which it would like to purchase. Both the state Auditor General and the Legislative Analyst's office have indicated belief that this is overcapacity since the Dept. of Motor Vehicles never was consolidated into the Teale center as had originally been planned when dual 168s were selected. DMV is still a Univac shop. Boeing has the option of recommending the dual 168s, a scaled down IBM equipment configuration, or any other equipment configuration it feels would meet the center's needs. The study is scheduled to last 45 days.

SWITCH YOUR SWITCH?

"IBM won't make a peripheral switch system that handles more than 32 switch positions unless you pay them a fortune," complains a large midwestern user. In essence, users have been bound into a maximum matrix configuration of 4 cpu's x 8 I/O devices (or vice versa) because the IBM 2914 switch has been the only game in town. This unpublicized system, which runs up to \$50K, has logged an estimated 6,000 sales in the last four years. Now it's being challenged by T-Bar, Inc., Wilton, Conn., which is offering two models that not only cost 30% less, when competing directly, but also offer the capability of handling any configuration within 64 switch positions--or 4 cpu's x 16 I/O devices. Who cares?

Obviously those with lots of cpu's and/or peripherals. That midwestern user who doesn't want to pay a fortune has eight cpu's, a warehouse full of peripherals and heavy remote batch and time-sharing applications. He needs several T-Bar switch systems to provide the flexibility and reliability he requires. With 8x8 configurations, "we can put any I/O box on any machine and switch the spare cpu into the position of any other cpu in the room." With the switch, all the cpu's can be tied together through a channel adapter.

By maximizing peripherals use, the savings can be substantial. One prospect who now has more than 15 2914s, estimates a saving of \$500K a year in disc drive rental through the T-Bar switch which is called the 3915.

RUMORS AND RAW RANDOM DATA

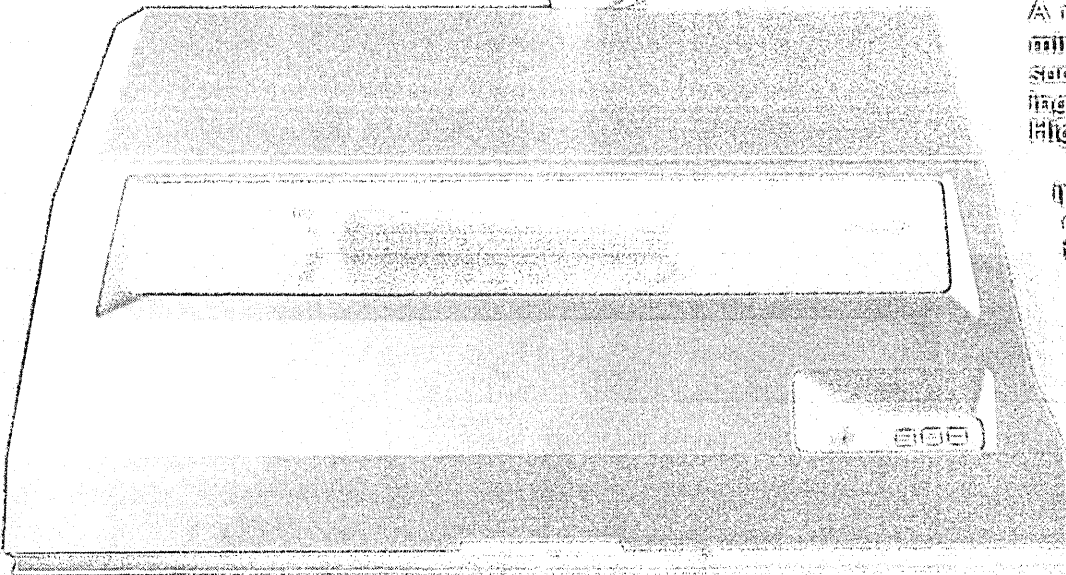
AT&T has been building a competitive analysis group--an admission that competition does exist...Meanwhile, Bell Labs is offering handsome severance to anyone who decided to quit before the end of May...Reports that Singer is the first to crack the retail point of sale market in Australia (January, p. 122) were erroneous, says NCR's Australian marketer A. L. Place. NCR has more than 60 orders for 1,000 NCR 280 point-of-sale terminals and has installed about 600 in such places as Venture Stores, Target Stores, Myer Dept. Stores and Best and Less...Veteran computer man Robert V. Head reportedly is being considered for the executive director's job on the EFTS study commission Congress authorized last year.

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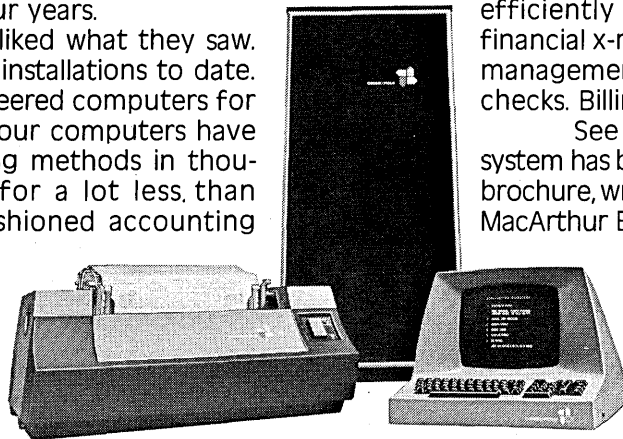
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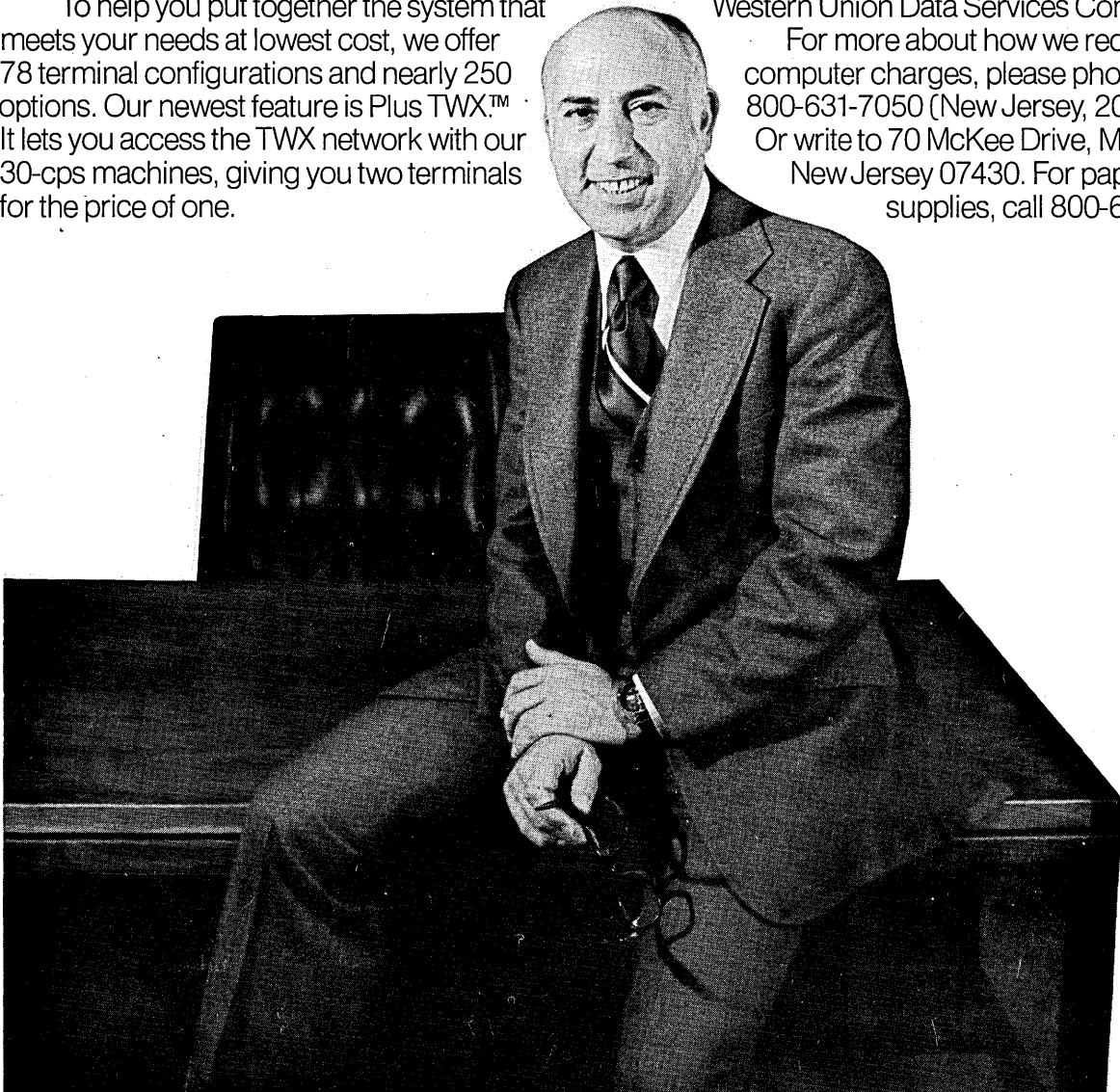
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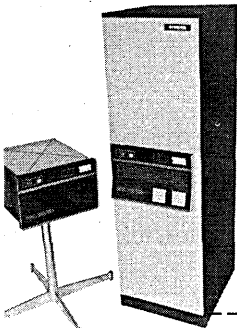
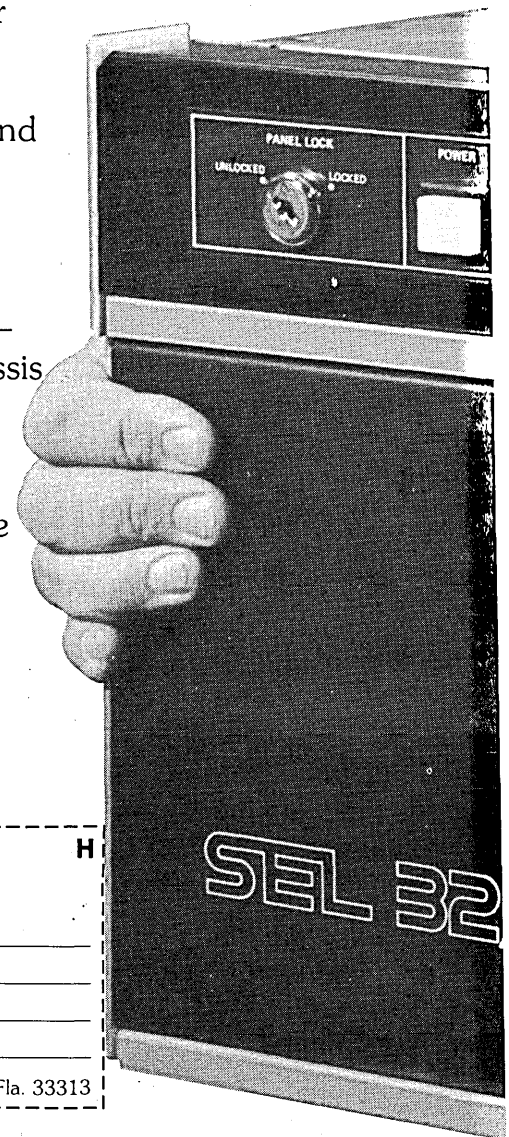
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| | |
|---------------------|------|
| PARITY ERROR | RUN |
| INTERRUPT ACTIVE | HALT |
| CLOCK OVERRIDE | WAIT |

- ATTENTION
- INITIAL
PROGRAM LOAD
- SYSTEM RESET
- CLK
DIV2
- RUN
HALT

50

hardware

Off-line

Slated for full service this month is the highest capacity, short-haul digital transmission system in the U.S., Bell's T4M link between Newark, N.J. and New York City via the Holland Tunnel. The T4M is designed to transmit 274 million bits of information per second over a single coaxial tube. A typical T4M cable containing 22 coaxial tubes can transmit more than 40,000 simultaneous two-way phone conversations.

Choosing core for the main memory on Interdata's new 8/32 computer (introduced in this section) seemed interesting to us, so we asked one of the project engineers about it. "In our opinion, the reliability of large MOS memories still isn't solved. They have a bad habit of hiccuping and giving bad data." Our source opined that this phenomenon was the reason behind the elaborate parity detection mechanisms designed into Data General's new Eclipse line. Taken together with news releases from other manufacturers protesting how reliable MOS memories are, we're beginning to wonder just how good MOS memories are at this stage in their development.

Oem printer manufacturers that were astonished at the low price of the Teletype 80-column unit announced with the Dataspeed 40 in mid 1973 may have cause to shake their heads again. A 132-column version is nearing completion that will sell in the neighborhood of \$1,700-1,800. That's darn cheap for 300 lpm performance, and competitors give Teletype high marks on the printer's design.

Hewlett-Packard, which recently has made claims reminiscent of Avis' "We're Number Two" campaign, has reached a milestone in its history: shipment of its 10,000th minicomputer. Ironically, the customer was a division of General Electric—a company that was starting to make "Number Two" noises in the general-purpose computer industry shortly before its operation was merged with Honeywell.

Three bits for a penny might just be a new industry standard. That's the price announced by National Semiconductor for its 700 nsec MOSRAM II memory system, based on a quantity of 1,000 16K x 18-bit boards. Higher speed versions are capable of read cycle times under 500 nsec.

Midicomputer

The only thing that says minicomputer about Interdata's 8/32 machine is the name chosen for it—Megamini—which tends to be misleading in an industry full of nebulous product definitions. The computer is a true 32-bit machine of fully parallel design (everything inside is organized in 32-bit fashion) capable of directly addressing any core location in the maximum one megabyte complement in one machine cycle. And although you might be able to get a very small 8/32 to fit under the generally accepted \$25K upper limit for minis most machines will certainly exceed that standard even after oem discounts are applied. Hardware features are rounded out with goodies like dual look-ahead stacks for storing instructions and enabling the processor to run along at a 240 nsec rate; memory interleaving for getting the 750 nsec core memory modules to act as if they were 450 nsec designs with 300 nsec access times; 213 basic mnemonic instructions; an optional writable control store for user-alterable microprogramming; optional double precision floating point registers for number-crunching applications, etc. About the only thing lacking from the design is provision for executing double word instructions, but there probably won't be much demand for that from a "minicomputer" anyway.

The bus size of 16-bits helps keep the 8/32 software upward compatible with the 8/32's predecessor, the 32-bit 7/32, and should be capable of supporting a higher than average number of peripherals with its 6 megabyte DMA burst rate, 3.2 megabytes multiplexed. Software includes os/32-MT, a real time, multiprogramming, multitasking operating system; and a less sophisticated monitor called os/32-ST, a single stream, batch-oriented program development system. Program development tools include an assembler with a macro preprocessor, and a derivative of the Dartmouth BASIC time-sharing system available for both single user and multiple user environments.

Complete with system cabinet, front console, power fail/restart, memory access controller, and power supply, a 128K byte 8/32 is priced at \$51,900. A full megabyte machine is priced at \$179,400. The official company line says that deliveries begin in June, but

first field deliveries may begin as early as this month. INTERDATA INC., Oceanport, N.J.

FOR DATA CIRCLE 220 ON READER CARD

Small Business Systems

What may possibly be the first disc-based small business system offered at less than \$20K is contained in this small business system vendor's latest product announcement, the Systems 800 and 900. The System 800 includes 4K of user memory in addition to the standard operating system complement; six million characters of disc storage (three million for fixed information, and three million removable), and a 45 cps combination printer/console. This system sells for \$19,500, with a 66-month lease rate of approximately \$449/month.



A second model, the 900, adds another 45 cps printer and a 960-character crt display, retaining the basic storage sizes of the 800. Both new models are field upgradable to Qantel's larger systems, and the trade-in allowance is 100%. There are numerous additional peripherals that can be added to all of the systems.

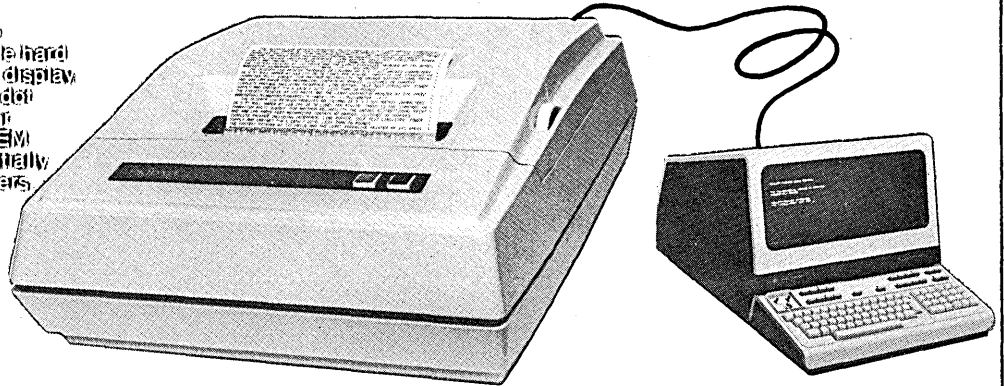
Qantel seems to have zeroed in on the wholesale distribution industry for its prime targets, offering a software package called SOLUTION for its needs. SOLUTION contains programs for order processing, order printing, accounts receivable and payable, inventory analysis, purchase order processing, sales analysis, and general ledger, all for the price of \$5K. QANTEL CORP., Hayward, Calif.

FOR DATA CIRCLE 222 ON READER CARD

OKIDATA. Working for the OEM

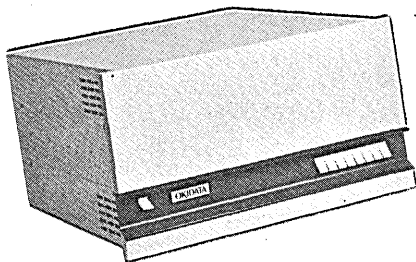
Okidata GP 110 Printer
This desktop unit, designed to complement CRT's and provide hard copy of data stored on a CRT display, produces 80 columns of 6 x 7 dot matrix characters at 110 cps or 70 lpm. At less than \$900 in OEM quantities, it is priced substantially lower than similar speed printers. Quantity 1-9, \$1250, delivery 30 days ARO. RS232 interface adds \$850. Shown here with the Hewlett-Packard 2640A Terminal.

Circle 89 on reader card



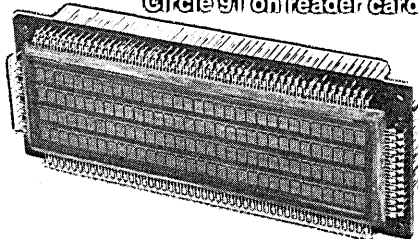
Okidata Disc Memories
"Double-density" fast-access head-per-track disc drives with capacities from one million to 36 million bits provide large-capacity storage at low cost, offering extremely high reliability, and plug-to-plug compatibility with the leading minicomputer families.

Circle 90 on reader card



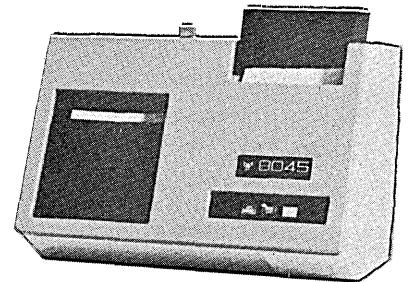
Okidata Alphanumeric Panel Display
Designed for such areas as cash dispensers, supermarket checkouts, and data entry keystations, this panel display provides larger, more legible characters than a CRT, is applicable on a wide range of data entry, remote terminal and autotransaction systems, and is available in a series of row character configurations.

Circle 91 on reader card



Okidata Card Readers
A family of card reader products that includes an 80-column reader, 96-column reader, the unique, patented 80/96-column card reader, and an optical card reader. They read lines, pencil marks, or both, at speeds of 300, 450, and 600 cpm.

Circle 92 on reader card



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See us at the NCC at Booth No. 2629

April, 1975

143

hardware

Low-cost Printer

Some competition for the wildly successful Centronics product line might just be brewing by this new firm and its three printers. The first place most of us will see the machines working will be at the NCC in Anaheim next month, but if the machine is as good as the specs and price schedule read, it undoubtedly won't be the last place they'll be seen.

The principals are ex Novar Corp. (sold to GTE) people who have formed Hydra Corp., with the Model B destined to be their first product. The printer runs at 180 cps using a 7x9 dot matrix pattern for both upper- and lower-case printing across 132 columns. A microprocessor with from 256-768 characters of storage is used to make the B run bi-directionally. In addition to handling tabbing operations, the proprietary microprocessor is used to set vertical formats, fault detection, self test, etc. Initial pricing lists the Model B at \$3,750 (single unit), and \$2,605 for very large oem orders of 1,000.

In addition to the Model B, the firm is also working on a Model A that uses a daisy print wheel for 45 cps operation, and a 300 lpm Model C more closely related to the Model B design, but using six print heads. This machine may be redesigned to use fewer print heads and operate at closer to 200 lpm, however. HYDRA CORP., Mountain View, Calif.

FOR DATA CIRCLE 221 ON READER CARD

Two Terminals

In appreciation of the fact that a terminal is of little use if it's broken, GE engineers appear to have spent a great deal of time cleaning up the design of



the TermiNets 30 and 120, with reliability being the principal concern.

In the basic KSR version, the TermiNet 30 (for 30 cps operation) contains only one electronic and one power printer circuit board. Only five LSI chips are needed for the electronics,

and most options are field installable as separate pc boards. The standard print font is 64 ASCII characters, with upper/lower case capability optional. The 30 prints one original and three copies across 80 columns, with 132-column width optional. Prices for resellers start

product spotlight



Facsimile

Applying its considerable copying expertise to the design of a facsimile machine seems so obvious that Xerox should have done it long ago, as the design eliminates almost every objection to "fax" machines we've ever heard.

First of all, the Telecopier 200 uses plain paper, eliminating the chemical odor that offended many a Monday morning stomach. The second nice thing about the 200 is that it makes so little noise while it's doing its thing that one begins to wonder whether it's working or not. Thirdly, the machine doesn't have to be continually watched, tying up operators at both ends loading and unloading documents. There are automatic feed and stacking features. And finally, if a transmission problem does arise for any reason, either operator can stop the transmission immediately, instead of having to wait several minutes to hear the operator at the other end say "it didn't take—we'll have to try it again."

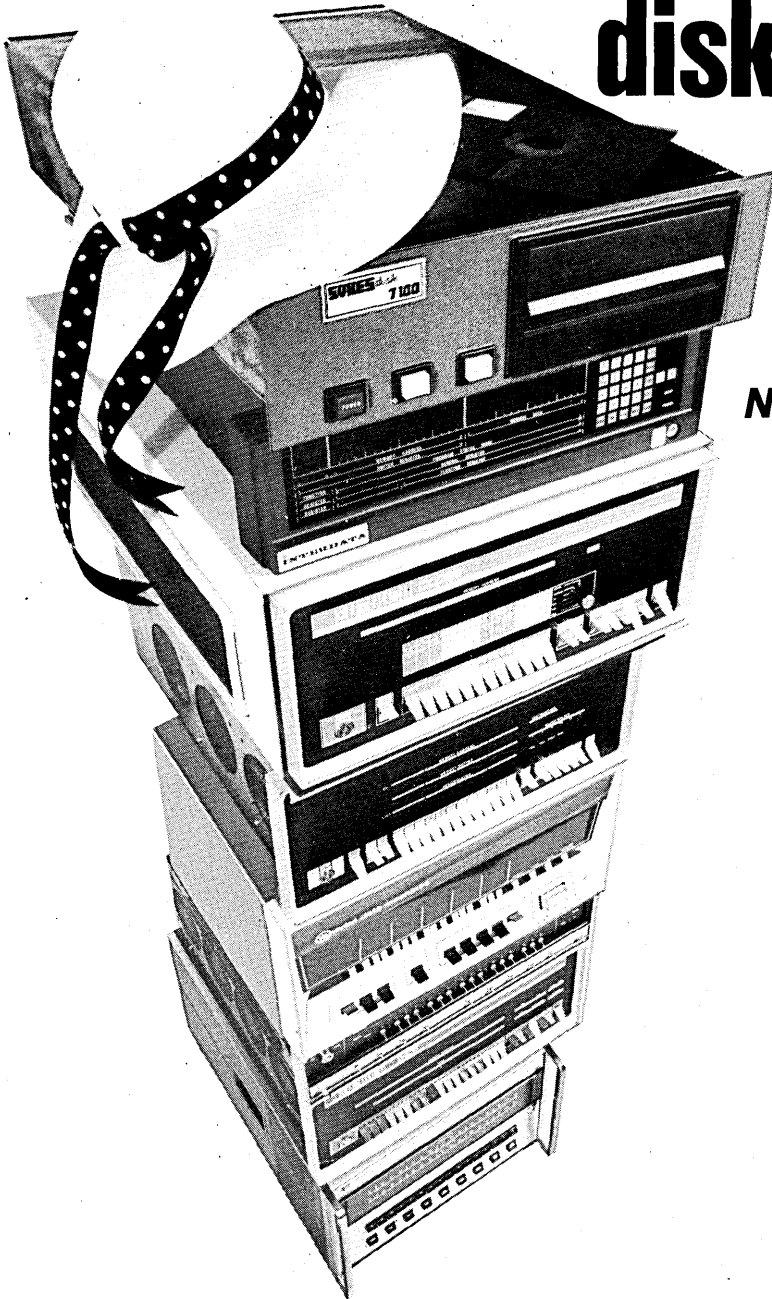
A helium neon laser is the light source of the 200. Documents measur-

ing 8½ x 11" are transmitted in two minutes, with a special high resolution feature requiring three minutes. Four and six-minute speed settings are also provided to make the 200 compatible with earlier Xerox Telecopiers. Documents to be transmitted are placed face down in an input tray having a capacity of 50 sheets. Documents can vary in size from 7-9 inches in width and 5-14 inches in length for automatic transmission. Longer documents must be fed manually. Rolled paper is used for automatic receiving, with paper rolls holding 350 feet, which would seem a safe enough capacity for unattended transmission.

The Telecopier 200 sells for \$8,500 or can be leased for \$195/month. A small transaction charge is applied to documents sent or received over the first 300 documents, which are included in the monthly rental. First installations will be in the Los Angeles and New York areas in May, with order taking in other metropolitan areas commencing in late summer. XEROX CORP., Rochester, N.Y.

FOR DATA CIRCLE 219 ON READER CARD

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Circle Reader Card 100 for PDP-8; 101 for PDP-11; 102 for Nova; 103 for Varian; 104 for H.P.; 105 for Interdata.

hardware

as low as \$1,200.

The TermiNet 120 required a few more pc boards, seven to be exact. These boards are said to be very easy to change—if your installation allows you to do that sort of thing. The 120 prints at a rate of 180 lines per minute from a 64 character ASCII complement, dropping to 120 lines per minute for 94-character upper/lower case sets. Both 80- and 120-column line lengths

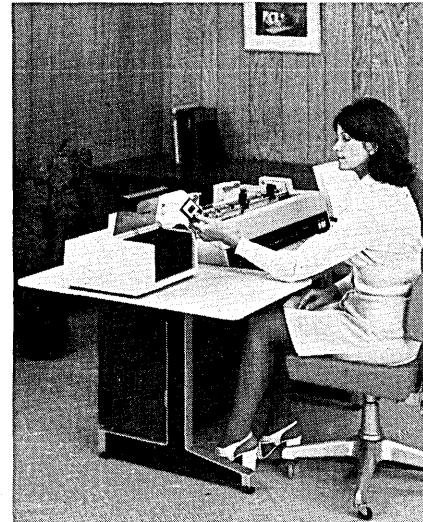
are available, the difference being about \$400 added to the \$2,917 price of the 80-column unit. GENERAL ELECTRIC DATA COMMUNICATION PRODUCTS DEPT., Waynesboro, Va.
FOR DATA CIRCLE 223 ON READER CARD

Accounting Computer

Accounting computers just might be greater competition to small-scale systems such as IBM's recently announced System/32 than many people think. Everyone knows that the new mini sys-

tems usually start out in life by doing accounting applications anyway, so accounting computer salesman can always counter by saying their machines are more specialized for the task.

One of the more experienced firms in this business has just brought out the latest accounting computer in its 299 series. The system offers expanded memory, cassette i/o, and communications capabilities. Up to 126 program steps and 100 totals can be accom-



modated by the new 299 member, double the original model's limits. In communications networks, the new system can edit, format, and validate data for transmission to a central cpu. Data received from the central site can be formatted and reports prepared by the 299. The cassette can be used for entering data captured on other devices such as point-of-sale terminals, etc. Prices for the 299 series start at \$9,300 or \$310/month; slightly higher for the new expanded totals capability. NCR, Dayton, Ohio.

FOR DATA CIRCLE 229 ON READER CARD

System/3 Terminals

Users of IBM's System/3 now have the ability to use any asynchronous RS-232 device on the system by installing the Model 1 isc Terminal Adapter. Devices that might be attached to the S/3 include paper tape units, cassette drives, line printing systems, alphanumeric terminals, crt units, etc. Design features of the Model 1 include variable i/o speed selection of from 10-240 cps and the ability to be used in conjunction with RPG II, FORTRAN, and assembler languages. Parity is checked on all input, and parity generation on output is a standard feature. The hardware configuration required is a System/3 model 10 disc system, including the 5471 adapter and Remote RPO No. 841279. The unit rents for \$600/year

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and sells for \$1,985. DIGITAL SYSTEMS CORP., Frederick, Md.

FOR DATA CIRCLE 225 ON READER CARD

Modems

The Short-Haul series of modems is for applications using line speeds up to 50,000 bps over distances of less than 35 miles. One asynchronous and five synchronous models debut in the series. All models can be operated half- or full-duplex. The first model operates from 0-9600 asynchronously; the next three are for single speeds of 2400, 4800, and 9600 baud; and two are switch-selectable for operation at 2400/4800 and 2400/4800/9600 baud rates. Two additional units operate at 19.2 and 50 kilobaud. Prices start at under \$300 for the asynchronous model, with the 2400/4800/9600 switch-selectable unit priced at \$710. Leasing plans are available. PENRIL CORP., Rockville, Md.

FOR DATA CIRCLE 227 ON READER CARD

Large-scale Chips

Investment casting, a tooling technique now being used in the manufacture of golf clubs, is the basis of this small, new vendor's first product line. In this application of the process, the intended product is wrapped in a long green covering called the investment. At the end of a surprisingly short period of time, the investment evaporates under the harsh light of an SEC, with only the product remaining. In this case the product is a very large, complex, saucer-shaped circuit covered with mos. The organization is 18 pins and a similar number of needles arranged in both p- and n-organic stacks. Pricing is based on the customer's ability to pay says a spokesman for the firm. BCI intends to go public sometime this Spring. BUFFALO CHIPS, INC., Buffalo, N.Y. For information, dial 411.

PDP-8 Remote Front Panel

There seem to be numerous things that can be done with a device like the AFP-8. Plugging into one of the OMNIBUS slots of the DEC PDP-8, the AFP-8 can be used for program loading and debugging, checkout of turnkey systems, diagnosis of system failures at remote sites, etc. The device supports EIA and current loop terminals with clock rates up to 1200 baud. It is priced at \$1K. DIGITAL COMMUNICATIONS ASSOCIATES, INC., Atlanta, Ga.

FOR DATA CIRCLE 228 ON READER CARD

Remote Batch Terminals

Subtle changes to this manufacturer's mini-based application systems, together with some software develop-

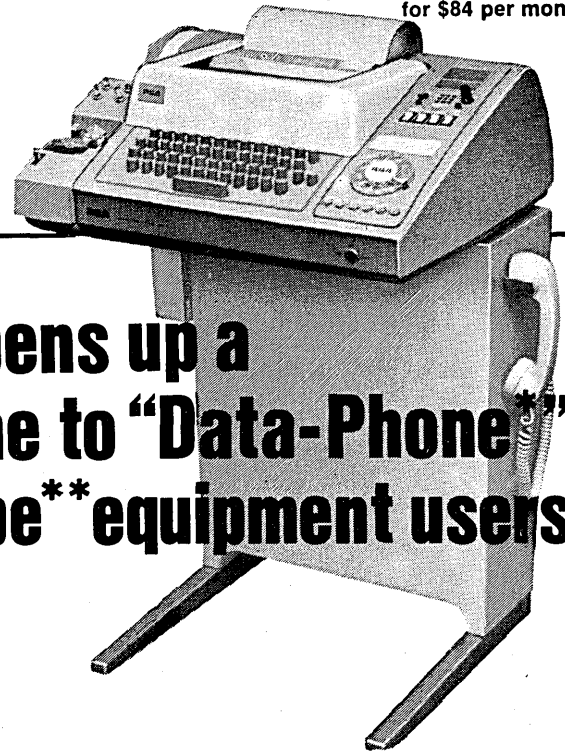
ment, has outfitted them for use as remote batch terminals. Emulation of the more popular remote batch systems is provided, including IBM 360/20 remote HASP work stations, IBM 2780 and 3780 terminals; CDC User 200 units, and Univac's aging 1004.

The three model series starts with the RBT-I for communicating with a remote cpu. Adding a disc based operating system changes the system into an RBT-II and endows it with local batch processing, message spooling, and unattended operation capabilities.

The RBT-III features a real-time operating system to provide concurrent foreground/background processing capabilities. Peripherals are offered to complement the user's choice of line speeds. For 2000-2400 baud users, a 285 cpm reader and 200 lpm printer are recommended. In the range of 4800-9600, there are 400 cpm/300 lpm and 600 cpm/600 lpm combinations available. A minimum RBT-I is priced at \$19,200; a top of the line RBT-III can go for as much as \$48,150. GENERAL AUTOMATION, INC., Anaheim, Calif.

FOR DATA CIRCLE 230 ON READER CARD

Model 33ASR with dial-up set and complete maintenance service for \$84 per month.



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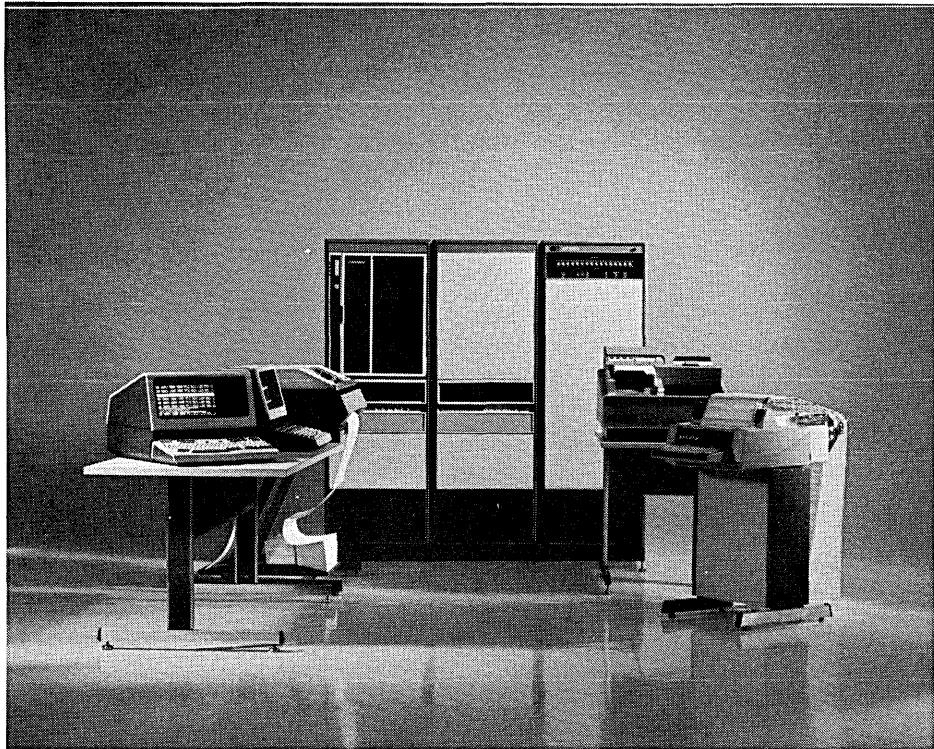
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RCA

CIRCLE 70 ON READER CARD



HP 3000CX

Think. Think again.

Whatever your preconceptions about minicomputer systems, think again. We did. And developed a simple, new architecture and operating system that eliminates the redundancy and wasted memory inherent in traditional minis that echo big-computer design philosophy. The result is cost-saving efficiency.

Because no other mini has been designed for multiprogramming, no other mini can offer the performance of a Mini DataCenter.

Code and data are handled in separate modules. By dividing program elements into those that will change and those that do not, codes can be shared among all users while each maintains his own unique data space. Result. No memory is wasted.

Virtual memory is provided by a user-determined form of code segmentation. This approach permits a program to be larger than the main memory and avoids the thrashing between disk and memory that often results when segmentation is totally machine determined. The 3000CX automatically eliminates swap out of segments that are in frequent use.

A hardware-implemented variable stack design sharply reduces the amount of memory required to execute programs. No data area is wasted by unused sub-routines. The data stack also provides variable-size arrays, re-entrant code, recursive programming, and an extremely efficient method of parameter passing to sub-routines.

Performance from architecture designed for efficient software.

A 32 bit LSI ROM microprocessor is at the heart of

every Mini DataCenter. This microprocessor implements 182 instructions, has a cycle time of 179 nano-seconds, utilizing overlapped microinstructions to provide both extreme speed and power — as many as 5.27 million operations per second.

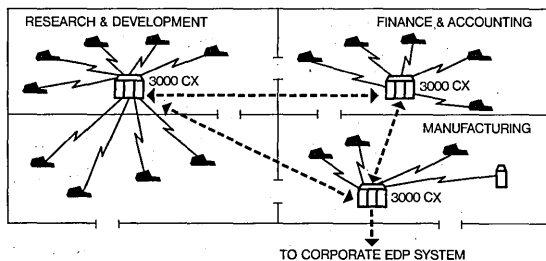
Add to this, interleaved memory modules for faster access, CPU and I/O processor designed for greater throughput and bus-oriented architecture for modularity.

Program size is kept small because of the very efficient code generation resulting from a strong instruction set, specifically designed to implement high-level languages. The subroutine call process is unusually fast because the microcode — not the user — shoulders the burden of determining whether code segments are in disk or memory. Program design is simplified because many features of the instruction set are reflected in the syntax of the programming languages.

The result is difficult to accept at first: a system that provides a range of operating features on a par with large-scale data systems.

At a fraction of the cost, it extends the capabilities of a major data system outward to users who want the features and convenience of a large system, but whose problems don't require the full brute force capabilities of a costly major system. In the corporate environment, it permits EDP management to shift time-consuming lower-priority management demands out of the central system's work flow with measurable savings in time and cost. Able to communicate with other HP computers and with major IBM systems, while performing other batch and

Mini DataCenters



interactive tasks, a 3000CX Mini DataCenter can form the basis of powerful distributed systems that enhance the reach, versatility and value of the corporate-level effort.

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Don't look for the competition. There isn't any.**

In fact, at any price, you'll find few systems that offer a single operating system for concurrent execution of batch, real-time and time-share with a common file system for all.

Few systems let you work simultaneously in any mode from multiple interactive terminals concurrently. Or let you do it in RPG, COBOL, FORTRAN, BASIC and SPL at the same time; even mixing languages in the same program. Or permit terminal accessed input-output spooling.

Few systems implement virtual memory and code-sharing programming in hardware.

Few systems offer decimal arithmetic and extended precision floating point as time saving microprocessor features. Or come with a built-in

debug and trace to cut program check-out time in half.

Few systems offer you as extensive an array of peripherals and input options available from the manufacturer.

No other system offers a BASIC interpreter plus a full BASIC compiler with execution as much as 10 times faster than those attainable with incremental compilers.

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Updates

Pioneers Get Arrows Dept. There are some real palefaces at Pansophic Systems, Oak Brook, Ill., these days. It seems that one of its customers, the Navajo Indian Tribe of Window Rock, Ariz., is strongly considering swapping its IBM gear for a Burroughs system—meaning that Pansophic will lose out on some rental for its Easytreve file management system.

Not all Indian dp chiefs are unhappy with their systems, however. The Colville (Washington) Indian Tribe originally bought a Data General Nova mini and Fortran compiler to help it scientifically manage its land resources. With the leftover compute time they wanted to automate some of their accounting functions, however, and give high marks to Information Processing Inc., Orlando, Fla., on its BLIS/COBOL system—without reservations.

A grant of \$31,300 has been awarded Dartmouth College, Hanover, N.H., 03755, by the National Science Foundation to support development of a national standard syntax for graphical operations in the BASIC computer language. The aim is to make graphic software in the popular language more transportable. Correspondence is welcomed from people wishing to influence the project or to be kept informed of its progress. The contact is Prof. Arthur Luehrmann.

If anyone asks you how moose hunters are selected in the Canadian Province of Quebec, tell them that a Univac 1106 at the Province's service bureau now has a program for doing that sort of thing and maybe you'll win a prize. Seems that there was so much demand to use the hunting reserves that the whole job of randomly selecting applicants was given to the 1106.

Here are some of the more interesting dp-oriented license plates we've heard about since our last April Fool issue. Seen in the proximity of IBM's Data Processing Division, White Plains, N.Y., was COBOL. DPMA came up several times from around the country.

IBM ONE has been spotted near the giant's L.A. headquarters. John Postley, designer of Informatics MARK IV file management system got those six letters on his license. And Datamation v.p. Ham Styron, an industry figure for more than 20 years, proudly sports ABACUS.

April, 1975

Performance Measurement

Users of VM/370, certainly one of IBM's most sophisticated operating systems, can now measure the activity and efficiency using Product Measurement Facility, PMF. PMF captures and analyzes CMS command usage throughout a VM/370 system, both on the executive and user side. Important statistics accumulated during execution of a CMS command, such as connect time, cpu usage, i/o counts, etc. are supplied to the reporting system in order to produce a series of reports. PMF reports display usage of monitored CMS commands by user as well as by type of command. A third report provides a summary of average system resource utilization for each monitored CMS command.

Data collected by PMF is sequentially logged disc, with the location and size of the storage area completely installation dependent. Monitoring of CMS commands is continuous but the collection of data on the specified disc occurs only when the PMF user id is logged on the system. The package is priced at \$4,800 and takes less than one-half day to install, says the vendor. STANDARD DATA CORP., New York, N.Y.

FOR DATA CIRCLE 232 ON READER CARD

Report Conversion

We've never seen a software product quite like TERMINAL. TERMINAL compresses 132-character length data originally intended for output on an IBM 1403 line printer and changes it so that it can be output on Sycor or tty devices. Installation consists of adding

a call to TERMINAL at the point where the user program writes to the printer. For each print line, TERMINAL compresses the data and inserts the appropriate vertical and horizontal tab control characters. Resultant data strings are concatenated and written to tape in compact 256-byte blocks. The record block size is said to be about optimal for transmission over 1200 or 2400 baud links, and exactly matches the buffer capacity of the Sycor 340 terminal. Unbuffered equipment, such as the tty ASR series would normally receive the records on paper tape. TERMINAL requires approximately 4K of memory and works with any language and operating system. Full instructions and a copy of the source code are supplied for the package price of \$1,200. PARALLEL DATA SYSTEMS, INC., New York, N.Y.

FOR DATA CIRCLE 233 ON READER CARD

RPG to BOMP/DBOMP

An interface between IBM's DOS Bill of Materials Processor (BOMP) and Data Base Organization and Management Processor (DBOMP) and the RPG/RPG-II language processors is now available. The interface is distributed as a set of DOS assembler language macro instructions from which the user assembles an interface routine customized to his needs. The macro instruction technique allows the user to specify only the instructions and buffers required for a particular report. Both single and multiple files can be communicated with through the interface. Maintenance is included in the one-time license charge of \$650.

software spotlight

O/S Security

This firm, together with Exxon, has developed a software security system called NCODE/DCODE. The system was developed under IBM's OS/MVT 21.6 and can be used in any o/s environment, including MVT, MFT, vs1 and vs2. In Exxon's case, the system was used with IMS, TSO and batch programs.

In use, the NCODE/DCODE modules take a specified key from the user and encode entire data sets from the key. Timing tests on Exxon's 370/165

showed times of .68 seconds of cpu time to encode 1,000 80-character records from a 5-digit key, and .83 seconds for a 10-digit key. While no security system is unbreakable, the claim of 10^{255} unique combinations would seem to be adequate for most applications. A 30-day free trial is offered, with the modules renting for \$60/month after acceptance. The rental is on a per-installation basis. PALM BEACH COMPUTER CONSULTANTS, Tequesta, Fla.

FOR DATA CIRCLE 231 ON READER CARD

software & services

COMPUTER LINGUISTICS INC., Albany, N.Y.

FOR DATA CIRCLE 234 ON READER CARD

Manufacturing System

IBM has always had a higher than average number of manufacturing support systems to offer customers, and this emphasis shows no signs of abating. Even System/3 users can now get an Initial Production and Information Control System (IPICS) suitable for small and medium sized manufacturing concerns. It's designed for System/3 model 10s and features four modules: engineering and production data control; product costing; inventory accounting; and requirements planning. The four modules incorporate 12,000 new lines of code that supplement two established program products, the Bill of Material Processor (BOMP) and Inventory and Requirements Planning (IRP).

The engineering and production data control module establishes and

maintains basic production data—bills of material, standard routing or process sheets, etc. The product costing module provides quick assessment of the effects of real or potential cost changes and their effects on production costs and profitability. The inventory accounting module tells managers what is on-hand, on-order, and planned inventory balances. The material requirements planning module determines both quantities and delivery dates for purchased and manufactured subassemblies and components needed to meet a given master production schedule. Monthly charges range from \$100 to \$130 per module. In addition, IPICS users must have the BOMP and IRP programs which rent for \$55 and \$82 respectively. IBM CORP., GENERAL SYSTEMS DIV., Atlanta, Ga.

FOR DATA CIRCLE 235 ON READER CARD

Lockheed S/III Sort

The software that accompanies Lockheed's small business System/III machine tells you that you can't sort by the indexed sequential method, but this enterprising representative for that hardware vendor has found a way around the limitation. All that is required is that the file be sorted in either ascending or descending order—dupli-

cate records are okay. From this point, one can ask for all transactions for customer 123 with the control field being the customer number. The method can be used for any sequential disc file and with any programming language which allows direct access to relative record numbers. Using RPG II, this method only requires 25-35 statements in a subroutine, and could probably be incorporated into an operating system. The package is priced at \$1K. COOK'S, Watertown, S.D.

FOR DATA CIRCLE 236 ON READER CARD

Disc Capacity

Here's a little program that can be used by the programmer or analyst to calculate disc capacities. It's valid for IBM 2311, 2314/2319, 3330, and 3340 packs. Tell DISCAL the number of disc tracks, and it'll calculate records. Tell it how many records there are, and it'll come up with the number of tracks required. The module generates multiple solutions for a requested range of blocking factors from which the best solution can be selected. The package can also be used to calculate track requirements when converting from one type of storage media to another. The package is priced at \$125. UNIVERSAL COMPUTER SERVICES, Philadelphia, Pa.

FOR DATA CIRCLE 238 ON READER CARD

More CICS Enhancements . . .

IBM's Customer Information Control System (CICS) continues to be enhanced by users customizing to their own uses, and here are two additional modules offered for it.

The first module is called AUDIT/5. It is designed to provide a complete picture of the overall terminal system. Management reports are produced summarized by terminal, depicting cost breakdown by transaction type, program usage, I/O utilization, and elapsed time on the system. Other statistics that can be gathered include communications line utilization, program logic paths, etc. and special hourly utilization reports can be generated. This information is also a handy way to bill users for their usage. The package requires less than 5K of memory and is priced at \$4K.

FOR DATA CIRCLE 239 ON READER CARD

CICS STOP consists of two programs, PROTSE and PROTPGM. PROTSE is a service program that activates and deactivates STOP for the system and for particular programs. In addition, this routine defines options, such as a TRACE for particular programs.

PROTPGM assumes control when an

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The only thing our sales people would do is supply facts about The Data Analyzer. And if your computer were fed all the facts about The Data Analyzer and all the facts about other retrieval systems, it

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| Graphs and Statistics | ✓ | | | ✓ | |
| Complete data analysis (subscribing etc.) | ✓ | | | | |
| Executive command language | ✓ | | | | |
| Exits to "own-coded" routines | ✓ | ✓ | ✓ | ✓ | ✓ |
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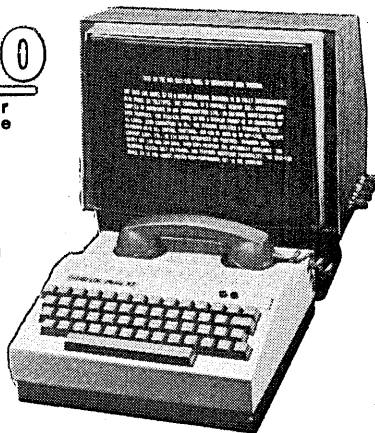
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CIRCLE 85 ON READER CARD

Model 204

Database Management
 Software System

If you are considering a database management system, you should know about Model 204.

Model 204 is a proven database management software system offering multi-key access with rapid response, flexibility in data organization and safeguards for the privacy and integrity of data. A full complement of options is available, including on-line and batch update, a simple yet powerful user language, an interface to programming languages and a utility for file conversion.

Model 204 provides a practical solution to the problems of managing large databases. You will find Model 204 a superior product.

Computer Corporation of America specializes in the design, development and implementation of advanced information retrieval and database management systems.

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CIRCLE 94 ON READER CARD

software & services

application program is given control by cics. The module follows the subject program as it executes and, before each instruction of the subject program is executed, checks whether it would damage the cics system or other applications. Approximately 5K of memory is required. This module is also priced at \$4K. SOFTWARE MODULE MARKETING, Sacramento, Calif.

FOR DATA CIRCLE 240 ON READER CARD

S/3 Data Base

The advantages (and perils) of data base processing have now been brought to the IBM System/3. The TOTAL package is functionally compatible with the very successful TOTAL packages sold for IBM 360 and 370, Honeywell, Univac, CDC, and NCR equipment over the years, written in assembler for the S/3.

TOTAL incorporates data independence at the field level and provides for an unlimited number of files and relationships between files. The data base can be accessed through RPG II, COBOL, or FORTRAN programs. The package can be used with the IBM communications control program CCP for on-line environments.

A minimum System/3 model 10 configuration required for TOTAL comprises 32K of memory and one 5444-A2 disc storage drive. The package is priced at \$9,750 and is also available on a monthly rental basis. Included in the price is full documentation, education and system support. CINCOM SYSTEMS, Cincinnati, Ohio.

FOR DATA CIRCLE 241 ON READER CARD

Sort

A completely new sorting technique is claimed by the developers of Piranha Sort. Dumping relatively small modules of the sort into data streams results in a very fast sort, it's claimed, though some records survive the 12K bytes of the package. Mainly, the package is aimed at applications that can get by with a less than perfect sort that is needed very quickly.

No schooling is required for the use of Piranha sort; the modules automatically take up places in the data stream (usually under ledgers) waiting for records to prey on. Once activated, it is next to impossible to stop the sort short of pulling the plug on the machine. UNUSUAL BUSINESS SOFTWARE, INC., Faulei, Austria. For information, dial 411. □

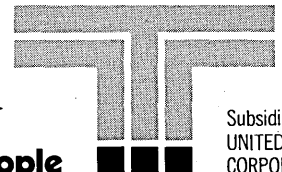
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'75 NCC PREVIEW

A PROGRAM OF HIGH RELEVANCE

As preparations for the 1975 National Computer Conference, May 19-22, reach the final stage, one thing is clear: This will be the most comprehensive and relevant data processing conference ever held on the West Coast. Attendance will be vital for computer professionals and users who need to keep pace with their fast-moving disciplines and business requirements.

An imposing lineup of more than 400 industry leaders and experts will probe a wide range of program areas with emphasis on problems and solutions as they impact current technical, economic, and social issues. As detailed in the '75 NCC Program Booklet, some 90 sessions will bring you up-to-date on major topics in three key areas . . . Data Processing Methods and Applications, Science and Technology, and Interaction with Society.

For the visitor seeking cost-effective solutions to data processing problems, thousands of products and services displayed by more than 250 exhibiting organizations will permit one-time, on-the-spot evaluation and comparison. The Anaheim Convention Center will contain the world's largest display of data processing equipment, permitting the user to obtain immediate, practical information from industry representatives.

The conference opens May 19 with NCC Keynote Prof. Jay Forrester of MIT discussing computer modeling of social

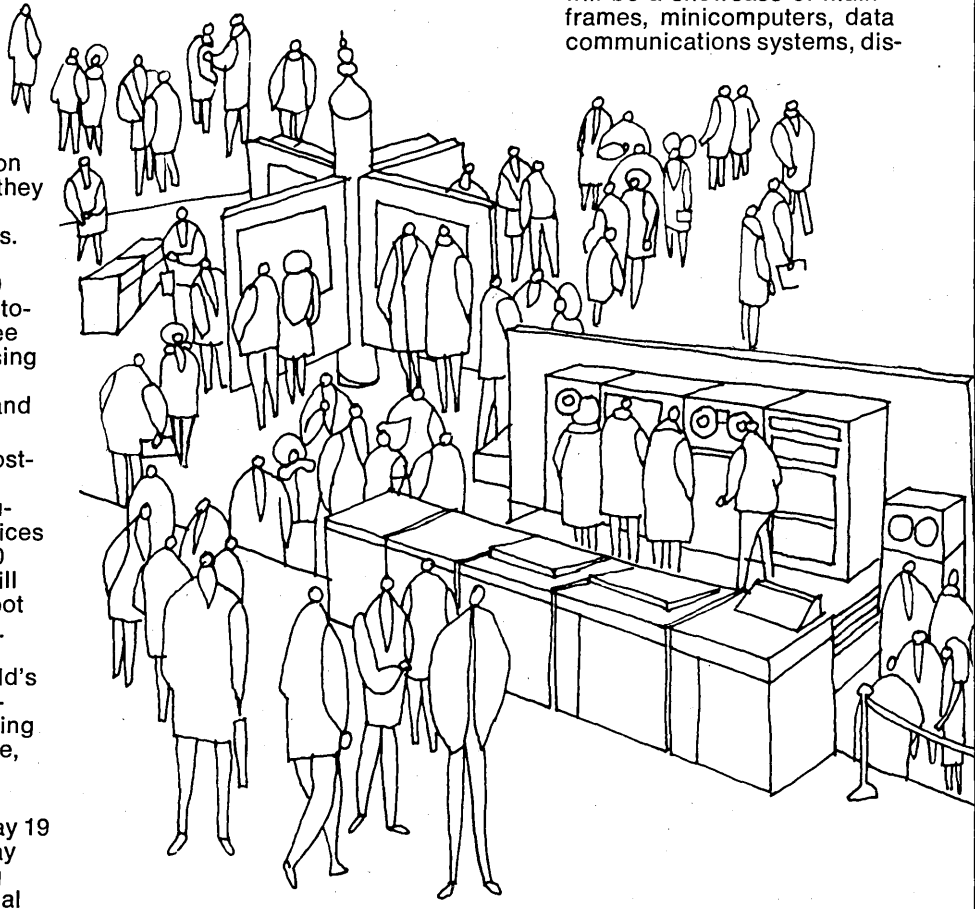
systems and making special reference to forces underlying current inflationary trends. This note of relevance will persist throughout the four-day conference, making '75 NCC the place to be for data processing specialists, computer scientists, users, corporate managers, administrators, and educators. Its significance is underscored by a Department of Commerce decision to designate this year's NCC as a

major event for promotion of exports.

The exhibits, sessions, featured speakers, and special events . . . all are available with special discounts and benefits to those registering in advance. Anyone preregistering for the full conference prior to May 1 will receive the gold NCC *Everything Card* covering all four days of exhibits and program events plus an advance copy of the NCC Program Booklet, the '75 NCC Proceedings, and Conference Luncheon discounts. The *Everything Card* represents a \$15 saving over full registration at Anaheim.

A SPECTRUM OF PRODUCTS AND SERVICES

Virtually every type of data processing technology, product, and service will be represented in displays and demonstrations in the 230,000 square feet of exhibit space in the Anaheim Convention Center. Visitors will have easy access to the most comprehensive computer show ever held in a major West Coast urban center. More than a thousand technical, marketing, and management representatives will be on hand to answer questions and supply technical and commercial data. NCC will be a showcase of mainframes, minicomputers, data communications systems, dis-



plays, terminals, memory systems, software systems, test equipment, time-sharing services, components and accessories, and much more. Many will be displayed for the first time.

NCC brings the whole world of data processing into a single arena where visitors will have their one opportunity in 1975 to make "hands-on" evaluations of essentially *all* the industry's offerings, benefit from the experiences of other users, and find cost-effective solutions. This looms as an even greater imperative in view of today's higher costs and softening economy.

NCC exhibits will be open Monday, May 19, from 11 a.m. to 7 p.m., and Tuesday through Thursday, May 20-22, from 10 a.m. to 6 p.m.

NCC PROGRAM: CHALLENGES AND SOLUTIONS

Rapid advances in computer technology and interaction of these developments with users and society in general will be analyzed in the '75 NCC program sessions. The program will cover such relevant topics as the interaction of computer hardware and software, storage technology, microprocessors, data base management, cost-effective software, interactive graphics, computer

science applications, and computer-communications networks. Other program areas will focus on development of user requirements, banking, health care, international issues, management and computers, future prospects for data processing, and education and training.

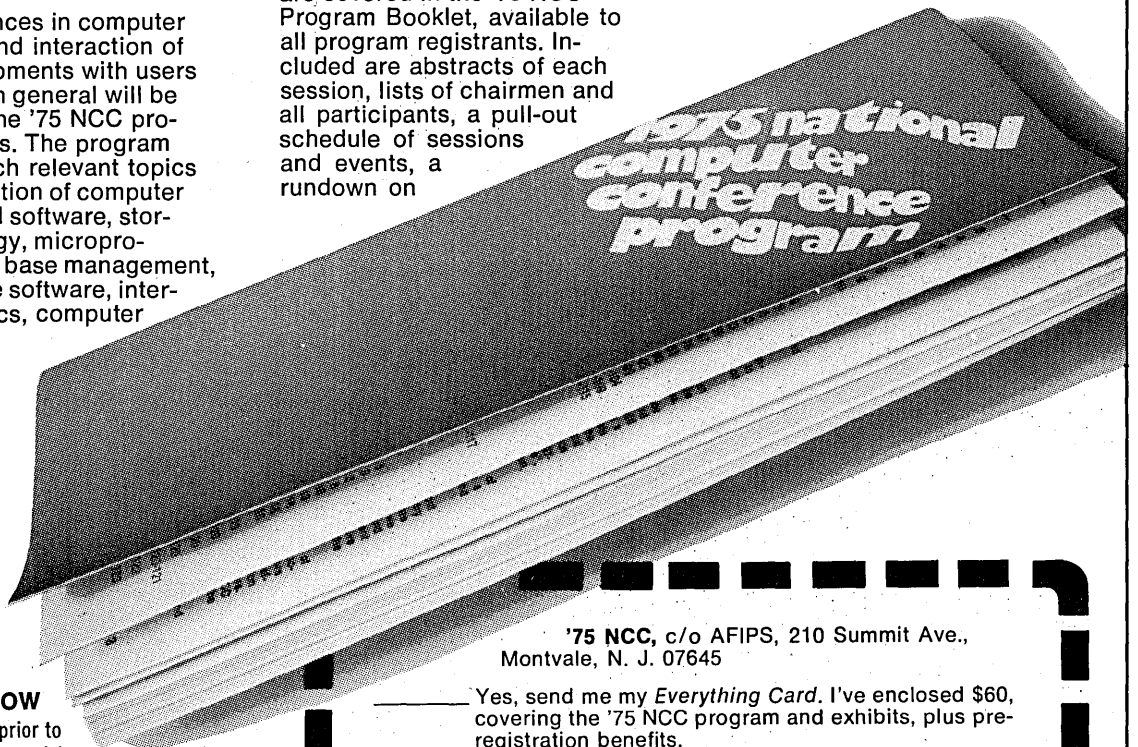
A number of sessions will provide in-depth analyses of topics of special interest to users and management . . . such as federally supported EDP programs, the legal aspects of computer management, energy and the environment, and library systems. And in the vital area of how computers impact on society, discussion will focus on such controversial issues as confidentiality and recent antitrust and regulatory developments.

Detailed information on the sessions and many other aspects of the conference are covered in the '75 NCC Program Booklet, available to all program registrants. Included are abstracts of each session, lists of chairmen and all participants, a pull-out schedule of sessions and events, a rundown on

special activities, and general NCC information.

ROUNDING OUT THE PROGRAM

Rounding out the program for the '75 NCC is a series of special sessions and events. A Pioneer Day program on Wednesday, May 21, will honor the team that was associated with Dr. John von Neumann at the Institute for Advanced Study, Princeton, N. J. Other events will include a special presentation of SHARE's SILT Report describing projected demands on the data processing industry for 1980-1985, the annual Conference and Industry Luncheons, featured speakers, a high school computer science fair, a film theater, a special NCC Night at Disneyland, and various receptions.



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Mail this coupon prior to May 1, 1975 to preregister for the full '75 NCC and to obtain advance information on the NCC Program. With preregistration for the complete four-day program of exhibits and sessions, you will receive your gold **Everything Card**, representing a \$15 saving over full-conference registration at Anaheim. Other benefits include advance information on a special NCC travel package providing savings of up to 30 percent, conference luncheon discounts, advance housing arrangements, and the '75 NCC Proceedings.

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(Continued from page 33)

booklet which includes diagrams and photos, data on available peripherals, and detailed information on language and software features offered with the systems. Designated 3000cx Mini DataCenters, the systems have a common operating system that features spooling, virtual memory, and a communications subsystem to line systems in the series to each other and to larger computers. HEWLETT PACKARD, Palo Alto, Calif.

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Small Computer System

An illustrated brochure covers this vendor's new 2903, a computer system designed for small and medium-sized users. It describes such features as direct data entry, visual display unit facility, operator's console, and fixed/exchangeable disc store. It also describes the new 2903 customer center established to provide new users aid in all aspects of implementation. INTERNATIONAL COMPUTERS (USA) LTD., New York, N.Y.

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Free Art Poster

Computer rooms are stark and sterile, someone at Memorex thought, so the company commissioned a series of art posters to dress things up. This one, called "Lucid Dimensions," was se-



lected for display by the Society of Illustrators. It comes suitable for framing, and—for a pleasant change—has no sales message. It's a limited run,

too. MEMOREX CORP., Santa Clara, Calif.

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COM-ics

Memorex must have turned its public relations department loose. In addition to the free art poster series, they have produced a comic book format coloring book extolling the virtues of the Model 1603 Computer Output Microfilmer. The comic book also has serious stuff, like the list of worldwide offices. MEMOREX CORP., Santa Ana, Calif.

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International Communications

Whether to use the public international communications networks or to install a private international system of your own, is a decision which this vendor's brochure may help you reach. Pertinent questions are raised, the answers to which can help in making the right choice. TRT TELECOMMUNICATIONS CORP., Washington, D.C.

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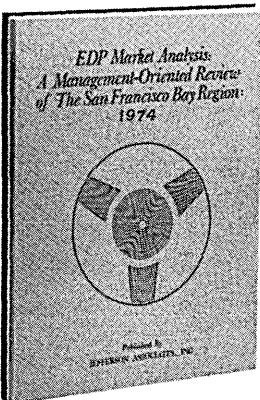
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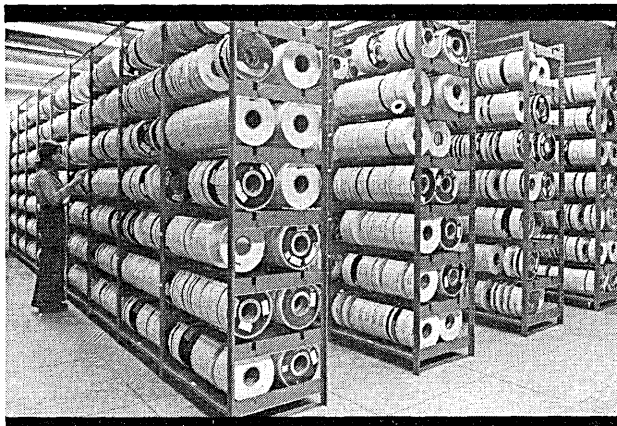
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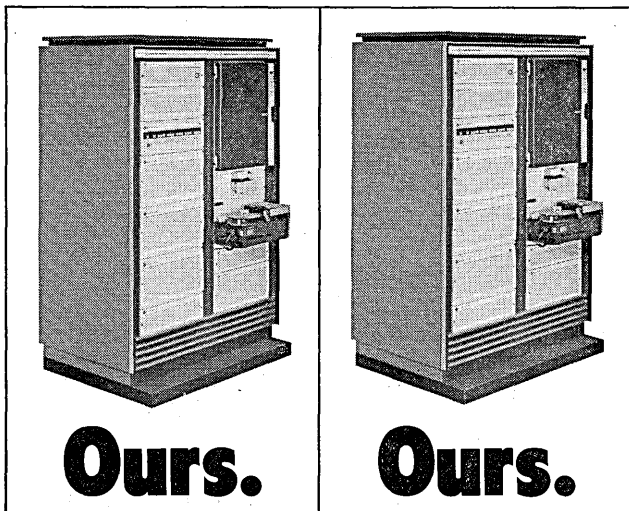
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The CPU's instruction set is a significant expansion of previous V-70 computers. New instructions operate on 8 general purpose registers and handle 8-, 16-

and 32-bit operands. Plus, up to 512K bytes of 330 nanosecond memory which is directly accessible via 1024 mapping and protection registers. And I/O transfers at up to 3 million 32-bit words per second are possible through dual memory buses.

The V-75 widens the competitive gap even further with the Writable Control Store package. New firmware modules include byte and stack manipulation and accelerated FORTRAN functions.

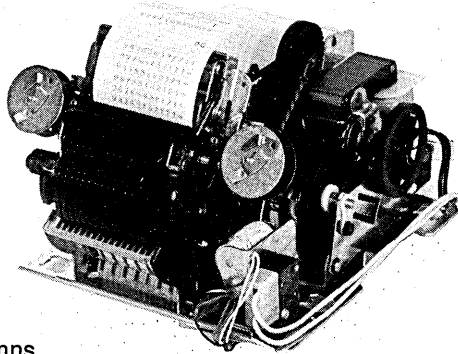
The new, fast FORTRAN included in the V-75 package is comparable to large machine compilers. With double precision integer data, compiler overlays, seven dimensional arrays, and direct access I/O.

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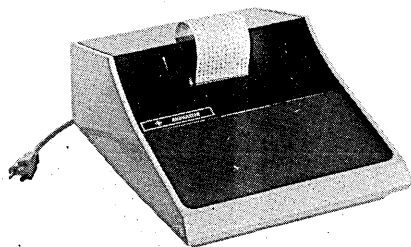


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treatment systems (influent), water pollution (effluent), and the instrumentation used to make up the systems are described in a 36-page brochure. THE FOXBORO CO., Foxboro, Mass.
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Conversion Methodology

This vendor, which specializes in the development of tools and procedures for converting computer systems from one environment to another, describes its transformation methodology and capabilities in a four-page brochure. BRANDON APPLIED SYSTEMS, INC., San Francisco, Calif.
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Computer Accessories

This catalog of control tape accessories lists performance data, specifications, and current prices on a line of splicers, winders and rewinders, editing punches, tape, reels, containers and miscellaneous equipment and supplies. COMPUTER ACCESSORIES CORP., Huntington, N.Y.
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Services for Banks

This vendor, a computer services firm, is offering a brochure describing its automated customer services for banks. The services include payroll processing, accounts receivable and accounts payable, and general ledger and financial reporting services. AUTOMATIC DATA PROCESSING, Clifton, N.J.
FOR COPY CIRCLE 216 ON READER CARD

Power Pangs?

"Does Your Computer Have Power Pangs?" is the title of a bulletin which proposes uninterruptible power systems as the answer. The bulletin includes a return on investment study and diagrams and explanations of how a UPS can protect computers. CYBEREX INC., Mentor, Ohio.
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Print/Plot Software

JPR software, a general purpose program for Status off-line print/plot systems, is described in an eight-page brochure. JPR consists of six major callable subroutines which are explained in the literature. Also discussed are several optional subroutines which are available to provide enhanced capabilities such as apparent three-dimensional plotting and variable dot density for creating up to 16 different gray tones. VARIAN DATA MACHINES, Palo Alto, Calif.
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iomec disc drives

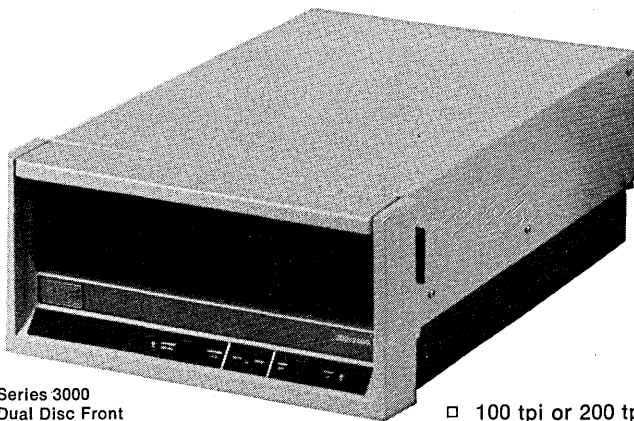
benchmarks in cost of ownership

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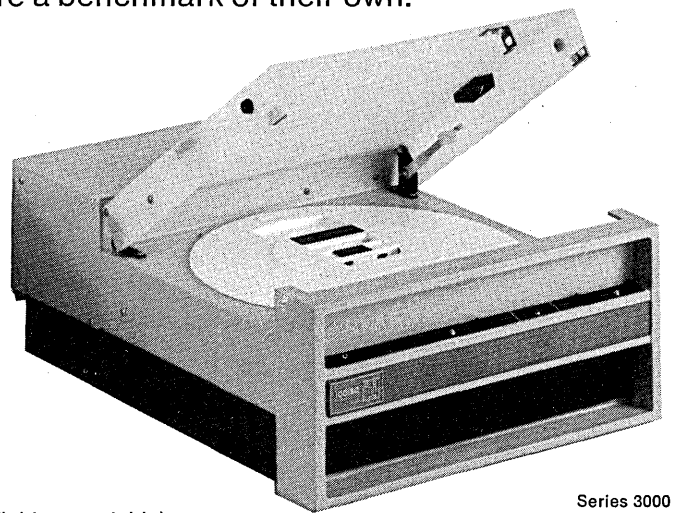
Series 3000 drives eliminate low reliability and high maintainability areas that contribute to excessive cost of ownership. Areas like heat generation, thermal mass, tricky head alignments, and lack of parts commonality.

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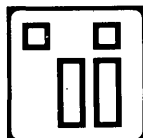
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Data Communications Guide

This basic guide to data communications was designed to give computer users a comprehension of the basic factors associated with data communications technology in 20 pages. SE LABS (EMI) LTD., Feltham, Middlesex, England.

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courses

Management Information Systems

Arthur D. Little, Inc., is running an MIS seminar series comprising four-day seminars in these topics: data base systems, data communications, dp operations management, effective written communications, executive computer systems concepts, how to understand and get more out of your operating system, materials management information systems, minicomputers, on-line data base oriented systems, programming productivity, project man-

agement, and systems analysis and design. These seminars are scheduled from April through June in Cleveland, Washington, D.C., New York, Chicago, Atlanta, and Boston. Fees are \$545 per seminar and include all workbooks and course materials. NEW YORK MANAGEMENT CENTER, 360 Lexington Ave., New York, N.Y. 10017.

ADAPSO Seminars

Two-day ADAPSO seminars on sales/marketing, operations, and accounting are scheduled for various times during the year in Los Angeles, New York, New Orleans, and St. Louis. Fees are \$85 if with a member firm, \$110 otherwise. ASSOCIATION OF DATA PROCESSING SERVICE ORGANIZATIONS, Montvale, N.J.

FOR DATA CIRCLE 218 ON READER CARD

Control Data Courses

Washington, San Francisco, New York and Chicago turn out to be popular places to hold roadshows or seminars. They are the sites selected for most presentations of the Control Data Institute for Advanced Technology, too. CD's "spring semester" curriculum includes: applied programming technology, design of on-line systems, minicomputers, business applications

of minis, and cdp operations—advanced practices, among others. The seminars usually run two or three days and are priced at \$300 to \$400. INSTITUTE FOR ADVANCED TECHNOLOGY, Control Data Corp., 6003 Executive Blvd., Rockville, Md. 20852.

periodicals

Software Engineering

The IEEE Computer Society's new quarterly, *Transactions on Software Engineering*, will appear in April. Areas included are programming methodology, software reliability, system performance evaluation, software development management, and software development tools. The journal, according to its editor Prof. Raymond T. Yeh of the Univ. of Texas at Austin, "will cover that middle ground . . . between the initial step of basic research and the final steps of manufacture and use of computer software." One year subscription: \$4 for IEEE members, \$24 for others. IEEE COMPUTER SOCIETY Publication Office, 5855 Naples Plaza, Suite 301, Long Beach, Calif. 90803. □

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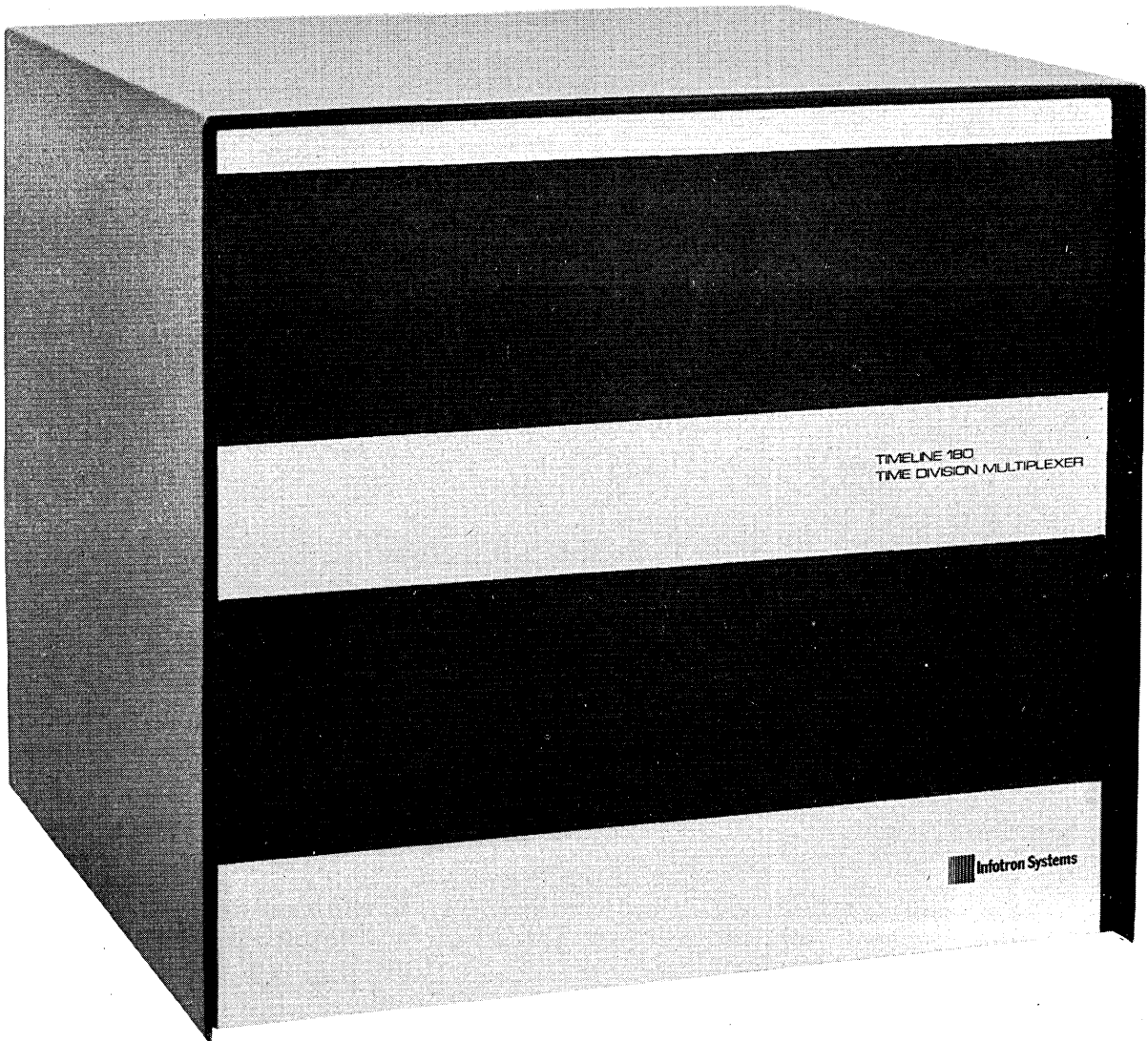
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letters

(Continued from page 10)

was quoted. This issue incorrectly indicated that I was affiliated with the Univ. of Maryland. I am employed by the Naval Research Laboratory in Washington, D.C.

HONEY S. ELOVITZ
Communications Sciences Division
Naval Research Laboratory
Washington, D.C.

Comparing APLs and ALGOLs
This letter is an attempt to clarify some of the confusion demonstrated by Lawrence Cooke, Jr. in his article "Programming Time Vs. Running Time" (Dec., p. 56).

1. Interpretive languages are not necessarily high-level languages, and vice versa. Cooke associates the short development time of high-level languages with the slow execution speed of interpretive languages. This happens to work for the languages he investigated (and a good many others) but as a general rule it's nonsense. How would Mr. Cooke deal with an interpretive ALGOL or an APL compiler?

2. The use of two widely ranging variables—programmer skill and programming language—in a single experiment makes it extremely difficult if not impossible to determine the extent of each variable's contribution to the results. The variation in development time could in fact be explained almost entirely by differences in programmer skills, rather than by differences in programming language as Mr. Cooke believes.

While I don't necessarily disagree with Mr. Cooke's conclusions, they certainly don't follow as logical consequences of his "experiment."

JAY S. SULLIVAN
Agoura, California

Mr. Cooke [who is with Midlantic National Bank, not Atlantic as reported in his article] replies: Very high level languages simplify the program description process, while interpreters hasten the program construction process. While one need not necessarily imply the other, the interpreters in the experiment had very high level properties which accelerated development time.

It would have been interesting to measure an APL compiler, but none was available for the experiment. Rather than associate a slower execution speed with interpreters, I merely reported what it was. I would have been even more excited if interpreters

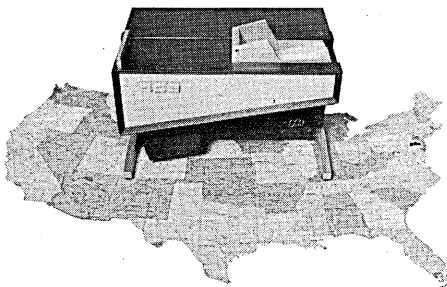
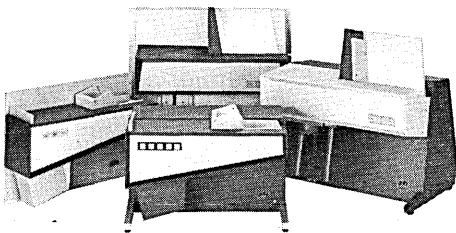
were faster executing than compilers, for that would have eliminated the tradeoff to make a clear and indisputable case for interpretive, very high level languages. However, reality appears otherwise, so that if one wants faster development, he must sacrifice machine efficiency, and vice versa.

Mr. Sullivan's second point is more telling. It is extremely difficult to filter out individual differences, as I acknowledged in the article. Nonetheless, there is more evidence to support the relationship than coincidence would bring about, which the reader may determine from looking at the first table. Gerald Weinberg's article "Psychology of Improved Programmer Performance," (DATAMATION, Nov. 1972, p. 82) broke the ground in showing the range of performance in a programming project. My purpose was to hang dollar costs on these differences. So it is in the second table, on costs, which determines which part of the tradeoff to select.

My results suggest that efforts to accelerate program development, which may cause some loss in machine efficiency, will produce output at lower cost for most applications. Only the most frequently executed programs should be written exclusively for efficiency.

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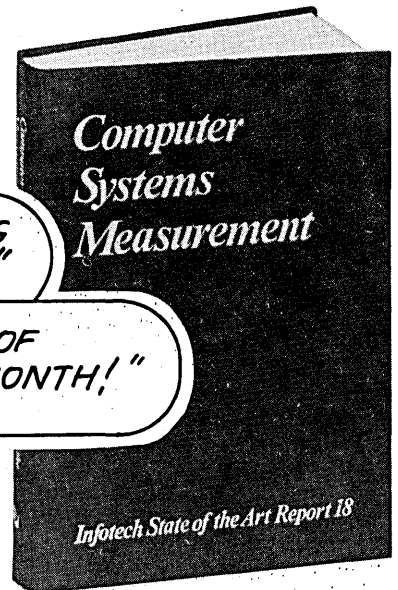
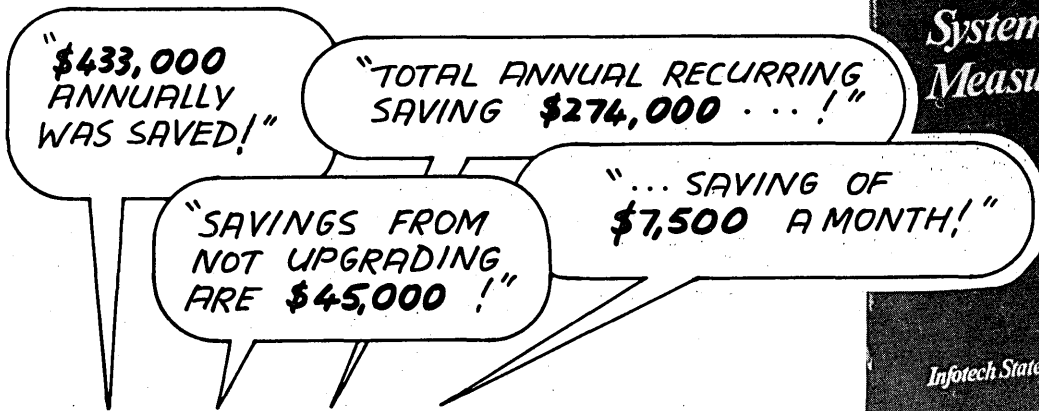


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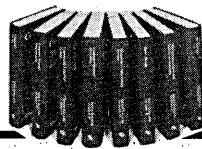
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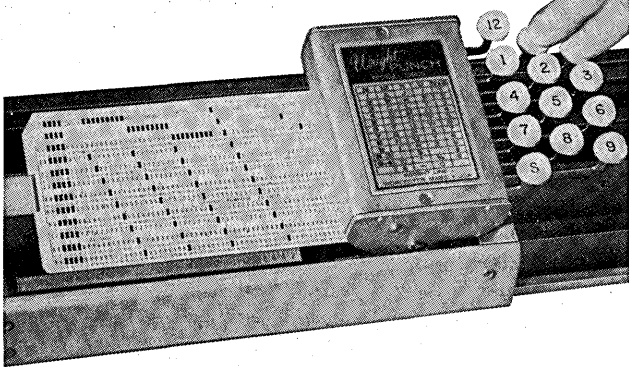
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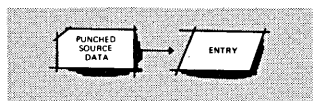
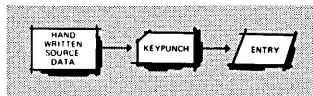
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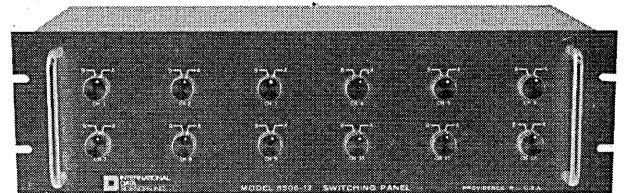
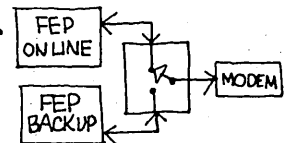
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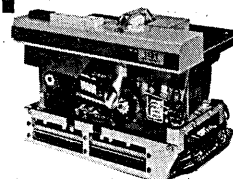


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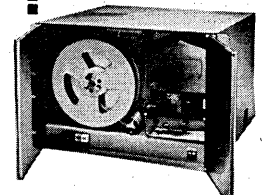
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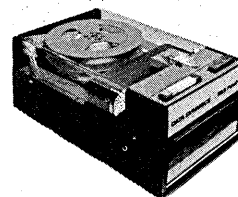
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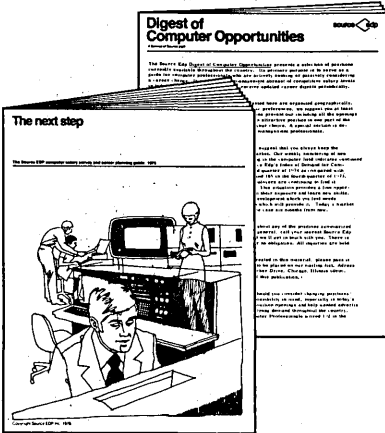
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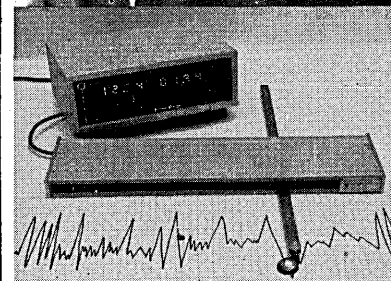
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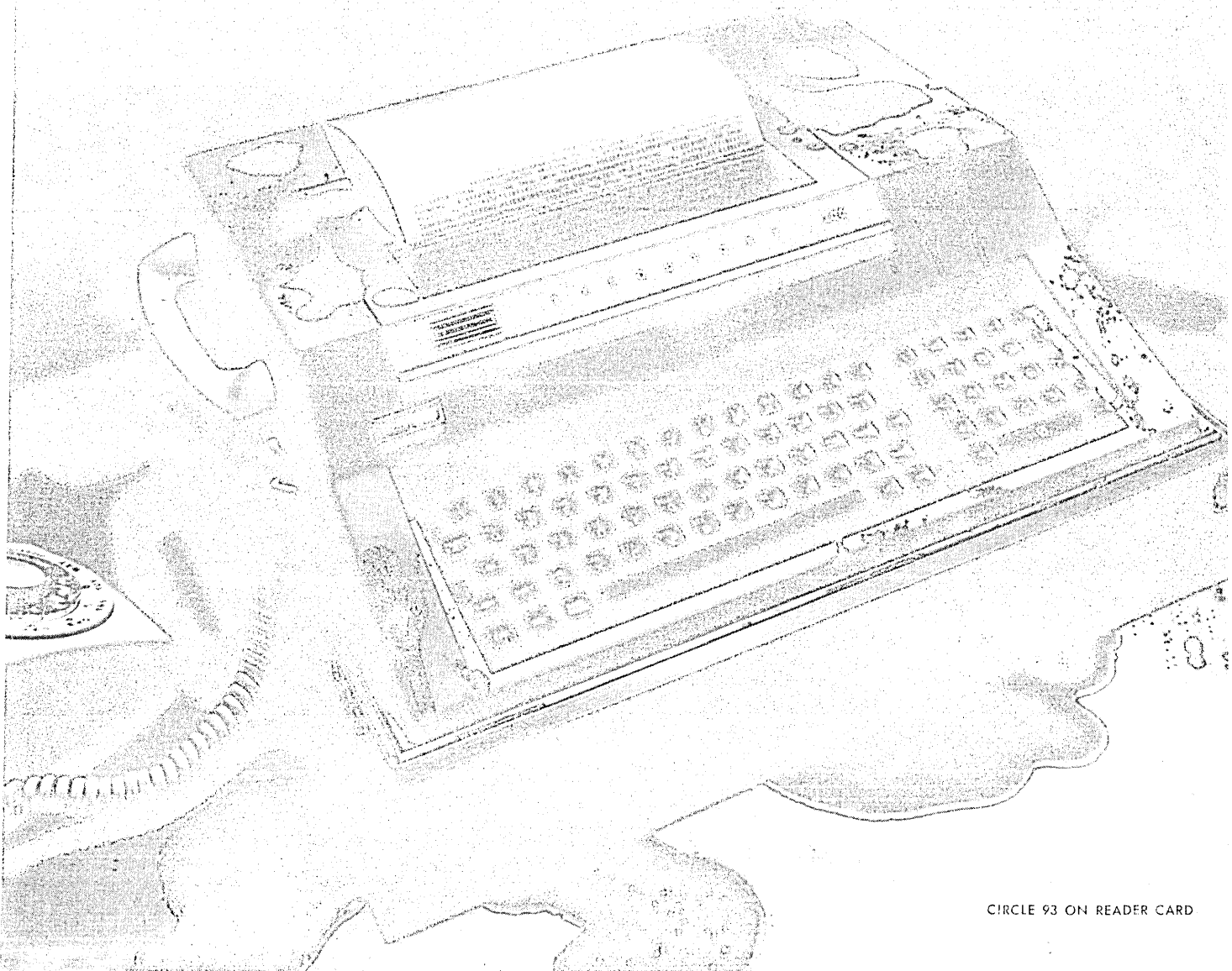
The 300 came through with sitting, if somewhat muddy, colors. Plugged in, it operated beautifully.

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PROGRAMMING: THE PROFESSION THAT ISN'T

A friend, a programmer like myself, related a conversation with a friend of his, a Beverly Hills psychiatrist:

"I'm in the big bucks now!" the psychiatrist bragged. "I've raised my rates from \$25 to \$40 an hour, and not one patient has quit."

"Gee, business must be great if you can get that," my friend noted wistfully as he paid their cocktail tab.

"Business!" exclaimed the good doctor irritably. "I'm not in business—I'm a professional!"

Later my friend complained to me that we had chosen the wrong profession. "Why," he asked, "is being a professional programmer so much less rewarding than being a professional doctor or maybe even a lawyer?"

The answer is we're deluding ourselves if we call programming a profession. The doctor above, unlike programmers and despite his disclaimer, is indeed in business. He is self-employed and he sells his customers a product he produces right in his office: his services. "Professionalism," as defined by the service industries of medicine and law, means each professional businessman can claim his product's ingredients are of the finest quality (government inspected, no less). He and his competitors have agreed not to have price wars, and instead of cutthroat advertising, everyone contributes to professional associations which promote public relations and government lobbying.

Programming can—and should—become a genuine profession, but only if programmers learn how doctors and lawyers handle their businesses. Once programming becomes a profession, computer users and producers will benefit as much as programmers. The proof can be seen in a point-by-point comparison of programming to medicine and law:

1. DIFFICULTY.

High professional standing is normally associated with how difficult a field such as medicine or law is. Professionals in these fields must possess a hard-to-find combination of technical skills, inborn talent, long study, much experience, and the ability to cut through mountains of complexity.

With the current exception of long study, programming requisites include all the above—and then some. Programming is a unique merger of creative art, applied science, and mathematical logic—including a severe practical constraint: the damn thing's got to work!

Where doctors make limited use of machinery, programmers command arrays of complex computers and peripherals. Where doctors learn Latin, programmers are conversant in many living programming languages. Where lawyers sometimes acquire nonlegal knowledge to cross-examine witnesses, applications programmers make a daily habit of wading deeply in science, accounting, math, etc.

2. IMPORTANCE.

Ah, but, say doctors and lawyers, medicine and law are so much more important than other fields—Ben Casey dealt with "Birth, Death, Life, Infinity." They forgot to mention Property, left for lawyers to fiddle with and doctors to accumulate *ad infinitum*, and Love, reserved for doctors who specialize in psychiatry. Medicine and law are universal to society.

Okay. But society has become dependent on a new force surpassing all others in its universal use: the computer. And the computer is powerless without programming.

Programs are trusted to count votes electing lawyers to political office, or to monitor doctors' hospital patients. The assets of all major corporations are balanced in the delicate instructions of programs. And one day, they tell us, we'll have a cashless society with computer programs managing the assets of every human and organization on earth. . . .

No, it's not in difficulty or importance that programmers are different from doctors or lawyers. It's in the rest of the comparison.

3. RESPECT.

It's probably too much to hope that someday "Marcus Welby, Computer Programmer" will be in the top Niensens, but programmers now fall ridiculously short of the respect doctors enjoy. Much of this lack of respect is unfortunately deserved. Employers shudder at the mention of software (due to past programming debacles), and laymen think computers tell programmers how, say, to predict elections (due to programming achievements upstaged by deaf and dumb machines—or is it programmers who are dumb?).

Respect is a key element of the professional. You wouldn't put your life or your home in the hands of someone you don't respect, yet that's just what the plans for a cashless society would do. We programmers must clean our own house; then we must shout how clean our house is. The points below give some cleaning fluid.

4. ETHICS.

Without ethics medicine and law can be monstrously bad. Similarly, programmers are being asked to enter into questionable areas like biological warfare, insurance embezzlement, or computer invasions of privacy. Canons of programming ethics, enforced by a strong professional association, might prevent such abuses of programming and earn the respect of all who are threatened by computer misuse.

5. TRAINING AND CERTIFICATION.

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enter fiercely selective and competitive professional colleges, then pass difficult government licensing tests, capped by closely observed on-the-job training in a specialty.

In contrast, I worked with two new scientific programmers, one who'd been a grocery clerk and the other a garbage collector, just prior to completion of part-time programming courses at trade schools that advertise on daytime tv. (Both men took pay cuts to accept programming positions!) I've no desire to stop people from improving themselves, but this training qualifies programming as a trade similar to plumbing—no, not really, because even plumbers are licensed.

Despite the obvious solution of 100% licensing, I can't advocate making it against the law to code without a license. What the accounting profession has done makes more sense: Certified Public Accountants are the properly trained and licensed professionals, and anyone else calling himself an accountant—let the buyer of his services beware.

Reasonable licensing laws would require professional programmers on all software projects that affect human life, or rights, or that handle large assets, to have college degrees in their specialty. They would also require government-funded projects to use professionals.

Professional training, government certification, and standardized specialization can only make software better, more reliable, and less expensive—yet provide greater rewards for professional programmers.

6. WORKING CONDITIONS.

While a senior lawyer might have a plush office with leather-bound lawbooks and wood paneling, many a senior programmer is crammed into a windowless many-personned office whose only decor is gray shelves overhung with listings. The worst of it is, much programming time is spent thinking, planning, coding, and documenting—all best performed away from such demeaning employer facilities.

Superior working conditions not only reflect one's professional importance, but also, of course, improve one's professional work. One difficulty of being part-scientists is that programmers' efforts to improve programming are directed at theoretical changes like GOTO-less code, ignoring practical changes like better working conditions, even though these are *proven* to increase efficiency and professional standing. So is compensation, as we'll see.

7. COMPENSATION.

There are a variety of ways of being paid for professional services, most of them unknown to programmers:

a. *Salaried Employment.* Programmers are proud to be allotted a weekly salary instead of hourly wages, which they associate with blue-collar workers. Ironically, professional people shun salaries and employment in favor of hourly and other compensation. Although programmers view a salary as security, who has ever heard of a self-employed doctor being laid off at a moment's notice?

Not only does salaried employment place an upper limit on earnings, but programmers' salaries are falling behind those of blue-collar workers. San Francisco city truck drivers will be making \$23,730 a year by 1976, yet a personnel executive told me there wasn't a programmer on earth worth \$16,000! Personnel lingo for employees is "bodies" or "captives." Do we really want to be semi-professional captives?

b. *Hourly Rate.* Most legal and psychiatric work is based on an hourly rate. So is some programming, but the rates are one-fourth to one-half the \$50 per hour charged by many self-employed lawyers. The naive programming captive will protest that self-employed hourly pay includes no fringe benefits or provision for dead time. Lawyers know the trick is to have a high enough rate (and sufficient ability to deserve it) to include these items, and the U. S. government is pleased to help with numerous tax benefits for the self-employed (foremost being the tax-deduction of one's car).

c. *Retainer.* A retainer paid yearly by a client guarantees the availability of a law firm for some minimal work. This technique used by self-employed programmers in a professional programming firm (like a law firm, *not* a software house) could provide the security a weekly salary is supposed to but doesn't.

d. *Piecework Rate.* When a doctor charges \$20 for an office visit, this is a piecework fee. A busy, efficient doctor's effective hourly rate can soar with piecework fees (20 patients in an hour is \$400).

Programming is already structured for piecework: a system, a program, a subroutine, or an instruction could earn a fixed fee. The triple advantage of piecework is that the skilled programmer will earn a high hourly rate, the incompetent will eventually see he can earn more in another occupation, and the client will be spared the cost overruns so prevalent in today's software.

e. *Royalty.* Most authors work on a cash advance plus a royalty to be paid for each book sold. This is an obvious way to develop software for which the market is uncertain or whose sales depend on its advantages over competition. The incentive of programmers to achieve practical, marketable results could mean great savings to developers and customers. If IBM had offered a royalty instead of salary, maybe OS would be a hell of a lot less confusing, IBM would have saved \$200,000,000 in presale development, and there would be some wealthy programmers!

f. *Residual.* Actors are paid a fee to appear in a tv commercial, and each time the commercial is aired, they receive yet another, a residual fee. This is a natural for programming, where the payment could depend on the number of times a program is executed or a system is used. Residuals reward useful programs and can be applied to any system, not depending on sales-like royalties.

8. PROFESSIONAL ASSOCIATION.

There are several weak so-called professional associations in the computer field. The strongest, the Association for Computing Machinery, tells where it's at by its title. We need a strong professional *software* association, organized along the lines of the American Medical Association, to work for the respect, working conditions, and compensation of a real profession.

But it is equally important for this association to oversee a vast improvement in programmers by developing standards of ethics, training, coding, specialization, and certification to filter out those who can't make the grade.

The whole point is that an improved programmer, even if more expensive, will provide needed relief to both computer maker and user who have been burdened too long with software that overruns budgets and is itself overrun with bugs.

—George F. Palmer

Mr. Palmer manages his own company, Compugramming Corp., and works as an independent consultant specializing in the design and programming of real-time systems.

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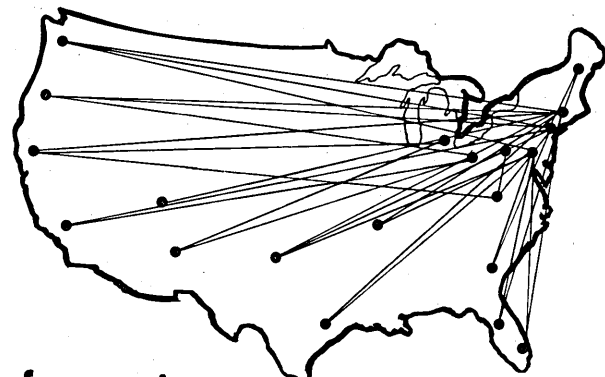
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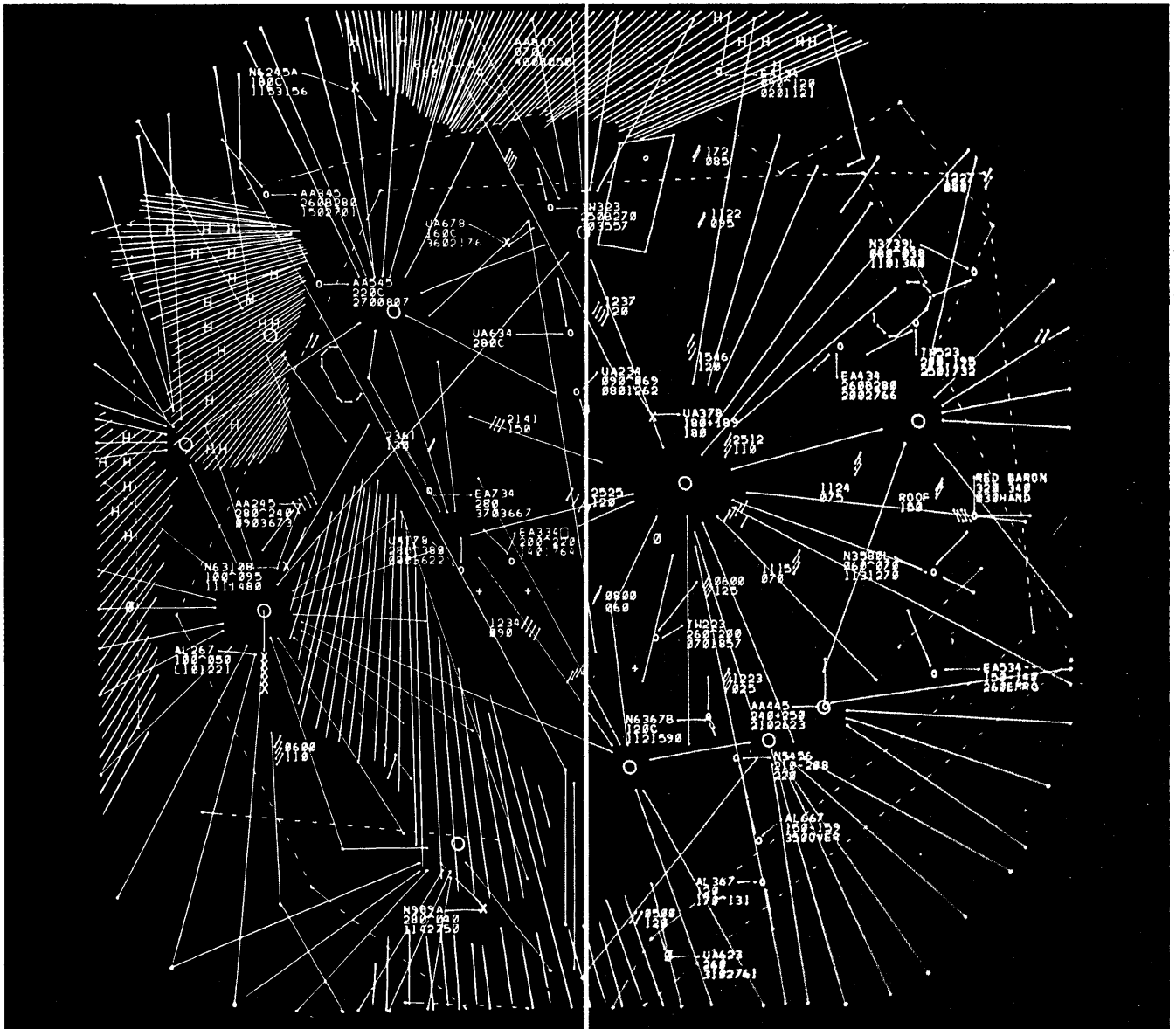
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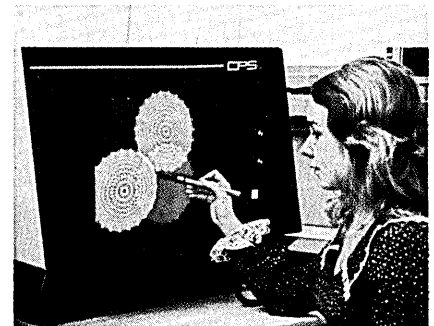
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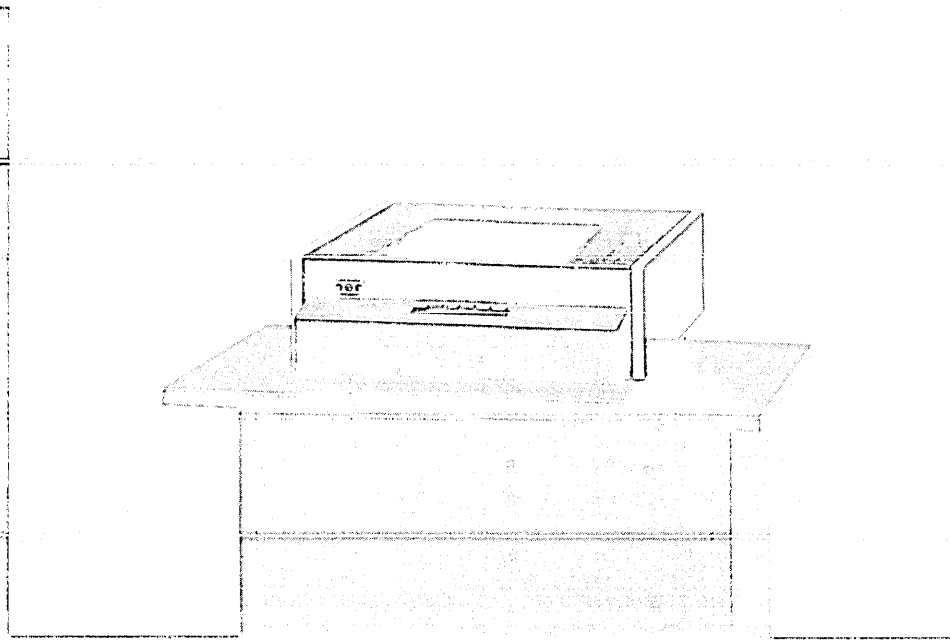
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