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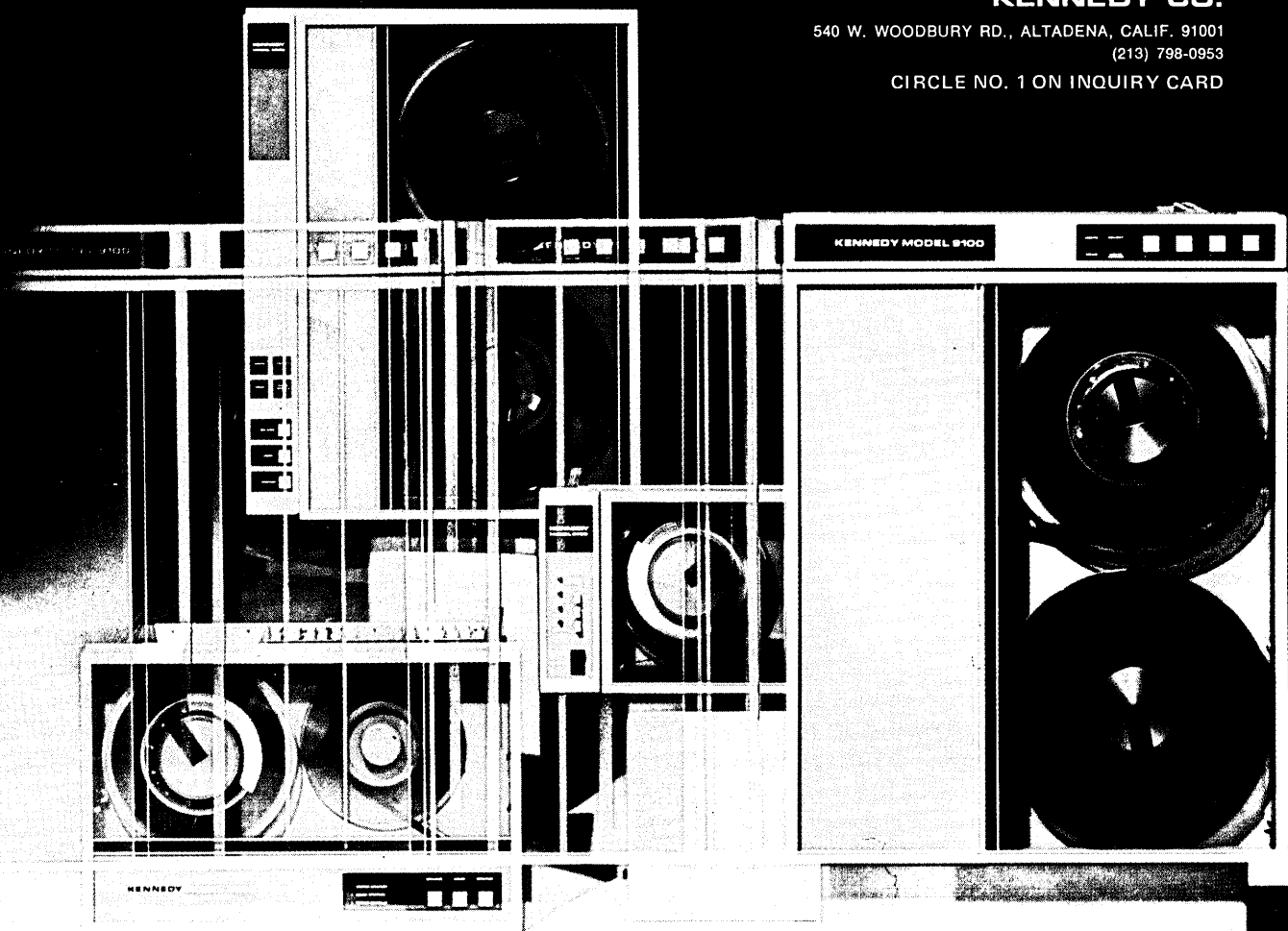
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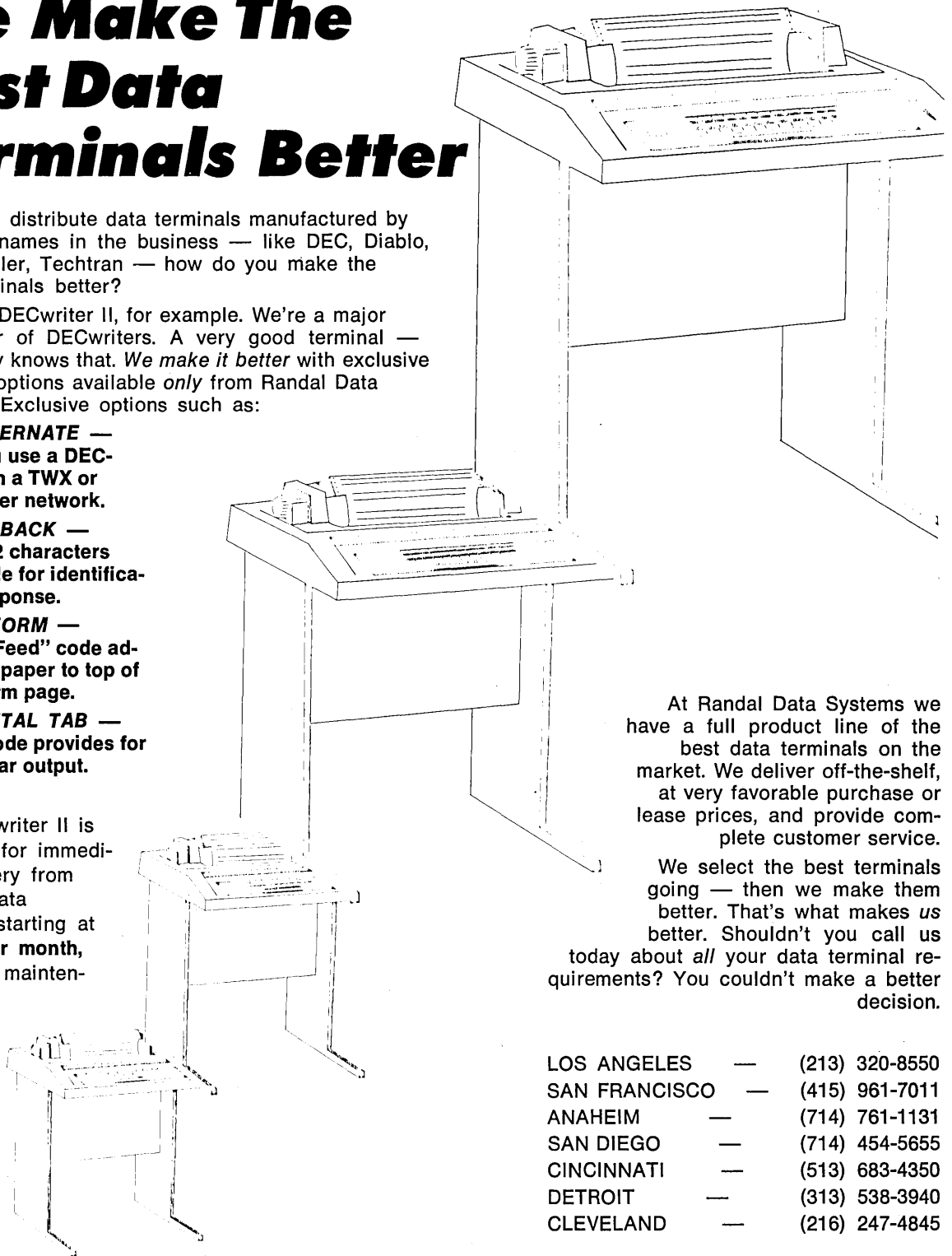
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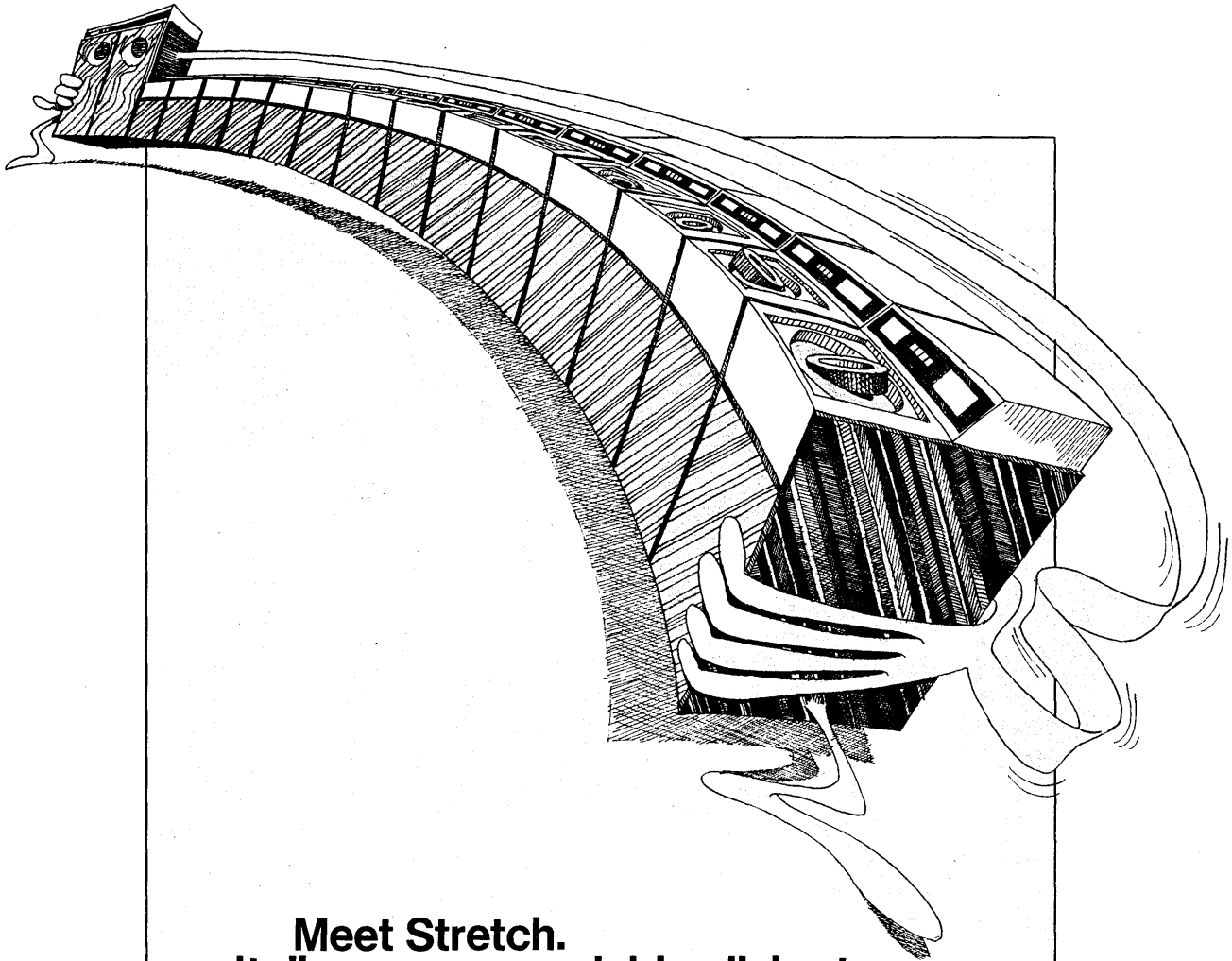
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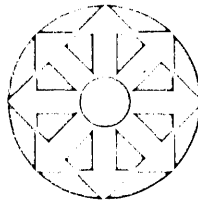
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FEATURES

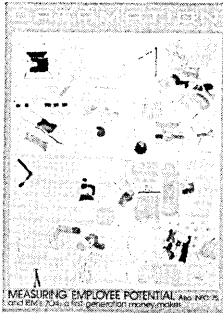
PERSONNEL MANAGEMENT, PART I

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Personnel Management deals heavily with structured communications between people — interviews, presentations, group discussions. Manolo Mompó's "Gente Hablando en la Calle," depicting people talking, gesturing, and interacting, seems particularly appropriate. Courtesy of Ruth S. Schaffner Gallery, Los Angeles.

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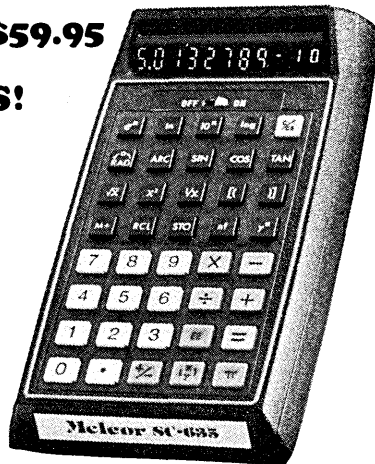
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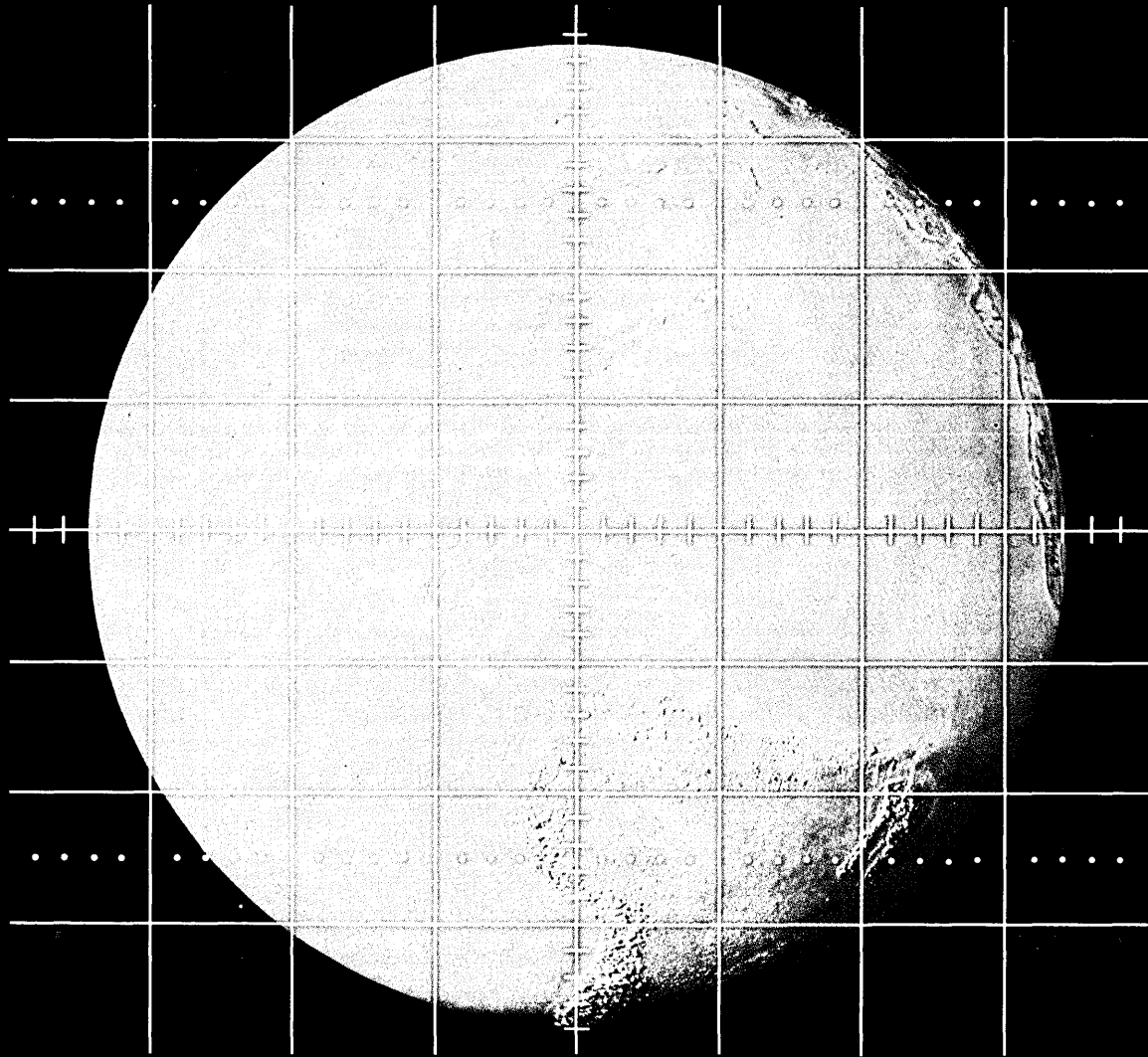
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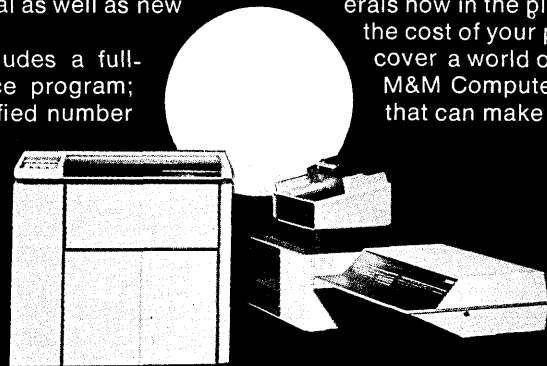
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letters

Talkers vs. doers

Daniel McCracken in his article on the International Conference on Reliable Software (June, p. 93) observes that the attendees did not include very many working-level programmers. Some of us did not attend simply because we doubted that we would learn much of value.

We have found that the bulk of what is written and spoken in regard to programming is obvious (e.g., that the project leaders should actually do programming), oversimplified (e.g., that the approach should be "top-down"), or incorrect (e.g., that the GO TO construction is unnecessary), while the most difficult and challenging problems (e.g., how to cope with hardware malfunction) are seldom discussed at all.

We trust our own expertise more than that of the writers and speakers because it appears to us that we have had experience with a larger and more complex system than they have. We certainly cannot accept the arrogant claim that they are the "scientists" who have discovered indisputable truths that we mere "craftsmen" must obediently accept.

JOHN G. FLETCHER
Group Leader
Computer Systems Division
Lawrence Livermore Laboratory
Livermore, California

Big on small computers

I must say that I found Mr. Marien-thal's article on small business computers (June, p. 62) to be quite refreshing, and I agree wholeheartedly with his suggestion that "we might be seeing a major turn in the industry." I believe that the advent of these small computers is a godsend to the small- to medium-sized business. I certainly wish they had been around when I was installing an IBM 360/20, System/3, or even a 360/40. While they couldn't directly replace that 40, I could have done a lot more, in much less time, and for much less money.

L. C. JOHNSON
Senior Systems Consultant
Associated Management Engineers,
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Chicago, Illinois

Get me to Codasyl on time

Mr. Blasius ("Countering CODASYL Critics," June, p. 169) seems to rule out criticism unless it is "properly timed." Yet one can assume that after each of the many previous CODASYL versions of COBOL, there must have been critical comment that led to its

successor version. I hope that all specific technical points which anyone raises toward the end of making the standard better will be judged on their merits rather than on their timing.

K. P. SEIDEL
Fallbrook, California
Mr. Seidel's Forum, "CODASYL Has Failed COBOL," appeared earlier in these pages (November 1974, p. 168).

Where is he coming from?

In reference to Mr. Temperly's letter (May, p. 10) regarding the .WAS. and .WILL BE. operations, I believe he missed the whole point of the extensibility of the COME FROM statement.

Give 'em ELSE, 'arry!

Ed. note: We've had a "mini-avalanche" of letters on Allan M. Bloom's, "The 'ELSE' Must Go, Too" (May, p. 123). Because of space limitations, we can print only excerpts from a fraction of the letters and from Dr. Bloom's response:

First may I thank Dr. Bloom for his excellent article. It has long been my opinion that the ELSE and nested IF are responsible for making structured programs as unreadable as their GOTO predecessors.

However, I believe he has overlooked one important case that cannot be easily written without the ELSE. The case occurs when the function performed affects the condition tested, and it is necessary either to use the ELSE, or to save and restore the tested item(s). In such cases, the ELSE is often a more straightforward approach.

ERIC PETERSON
Albuquerque, New Mexico

... Dr. Bloom's "functional programming" is not as good as structured programming.

A structured program's nested IF's divide the program into a series of progressively smaller domains. Correspondingly, the programmer's attention is focused, by degrees, on progressively smaller domains. The programmer can operate at the level appropriate to his purposes; in Knuth's words, he "selects a scale" at which to examine the program.

In contrast, a functional program, although easily understood and modified at the individual function level, does not clearly show the relationship between functions. There is too great a gap between the programmer's conception of the program and the program's realization in code. In one great step, the program is taken from the highest level of abstraction to the lowest. The programmer has only one scale with which to view the program: the smallest. The programmer must determine for each function, by evaluating its full Boolean predicate, in which of the

The ultimate logical operation is, of course, .SHOULD HAVE BEEN. In application this would be used as:

(IF (X .SHOULD HAVE BEEN, 5)
WOULD HAVE GONE TO 13

This not only eliminates the need for program self-checking, but also removes the requirements for debugging. It has bothered me for years that mistakes could be detected (i.e., "DO" missing in a DO LOOP), but not corrected—now, using the .SHOULD HAVE BEEN. instruction, this problem can be solved.

NEIL SUTTER
Phoenix, Arizona

program's domains he finds himself. He is not led to a domain in digestible steps; he does not have IF filtering working for him.

As Dr. Bloom points out, debugging and maintenance are the most costly of the code/debug/execute/maintain steps. The greater of these is maintenance, and the perspicuity of structured programming, where the logic "leaps out at you," makes it the best choice available today.

JAMES R. DONALDSON
Control Data Corporation
Minneapolis, Minnesota

... The afterthought which Dr. Bloom states on machine inefficiency must be considered further. In his example, the same IF statement would be tested numerous times. The rationale for allowing this inefficiency is that the execution and initial coding stages of program development are the least costly. This rationale does not hold under two very important situations. First, structured code has shifted much of the cost from the debugging and maintenance processes to the initial development stage of the process. Second, programs which are constantly or very frequently in the machine mix will only compound the number of times these excessive statements are executed. Therefore, machine efficiency is a very important consideration after all in program design.

RICHARD E. STERRY
Systems Analyst
Michigan Bell
Southfield, Michigan

... What is the difference between functional programming and Decision Logic Tables? We have had DLT preprocessors for a good while. Why program it out in longhand?

JAMES L. TUCKER
U. S. Army Management
Engineering Training Agency
Rock Island, Illinois

Dr. Bloom responds: I had hoped to start a discussion with my article, and it appears that I have. The letters were quite stimulating overall, and gave me

letters

as much food for thought as the writers apparently received.

The letters appear to fall into three major areas of interest: functional independence, functional hierarchy, and efficiency. Many writers brought up the question of functionally interdependent or "coupled" modules. One popular criticism was that the code segment

```
IF I = 1
  THEN
    I = 2
  ELSE
    I = 3
ENDIF
```

could not be handled ELSElessly by simple negation, as

```
IF I = 1
  THEN
    I = 2
  ELSE
    I = 3
ENDIF
```

The two IF groups are quite highly coupled, with one module changing both a control and a data variable used by the other. I can think of three ways to address this point without recourse to an ELSE. . . . My recommended solution, however, is as follows:

```
BEGIN CASE
  CASE (I = 1)
    I = 2
  CASE (I not = 1)
    I = 3
END CASE
```

The CASE control structure is a logical extension of the IF-THEN, with each condition of interest explicitly stated prior to performing its associated function.

On the other hand, as Mr. Peterson points out, a limited scope IF-THEN-ELSE is "often a more straightforward approach." In a truly binary condition, the simple, brief, visually closed IF-THEN-ELSE construct is certainly no threat to program clarity. Simply because a program can be written without a GOTO or ELSE shouldn't really imply a dogmatic avoidance of both constructs.

Mr. Donaldson emphasizes a point I should have mentioned—the value of functional hierarchy in dividing a program into a "series of progressively smaller domains," with "IF filtering working for" the programmer, allows him/her to "select a scale" at which to examine the program.

In the "functional" code, the desired "progressively smaller domains" are present—in functionally hierarchical modules. This implies a "nest," true, but of the desired variety. I stated the desirability of having the conditions for execution of a function immediately preceding that function. (The hierarchy is defined by function, not by control.) I did not intend to apply the principle to every executable statement to yield a completely in-line program of one hierarchical level—the lowest. I can quite understand Mr. Donaldson's concern if I gave that impression. The IF is working for the programmer in "scale selection," but not by "filtering" as I defined it. The IF-THEN logic does not leave a function of equal hierarchical rank out on a limb (a BRANCH?) to simplify cod-

ing process control statements. . . .

As to the third point, efficiency, properly applied, is a systems concept. As long as the components of a system have any effect on each other, there is no way that "optimizing" the components individually will result in an optimum system. The system itself must be optimized, traditionally converting each component to a dollar representation within a series of constraints (physical limitations, management directives, etc.).

On the average, initial coding and execution are historically the least costly elements of a data processing system. There are, of course, exceptions to this rule-of-thumb—Mr. Sterry's frequently-executed programs may (or may not) be the dominant cost components. To be dogmatically for either program microefficiency or program readability/maintainability is equally indefensible. To "lean" generally toward the latter, however, has some historical/statistical validity. . . .

Finally, Mr. Tucker's comment on DLT processors is a good one. . . . If, indeed, one has a well-structured decision table in which sequence has no effect, a DLT processor would be a rather easier way to solve the problem. Sequence does count, however, and problem solutions often require more flexibility than a DLT processor can provide. *

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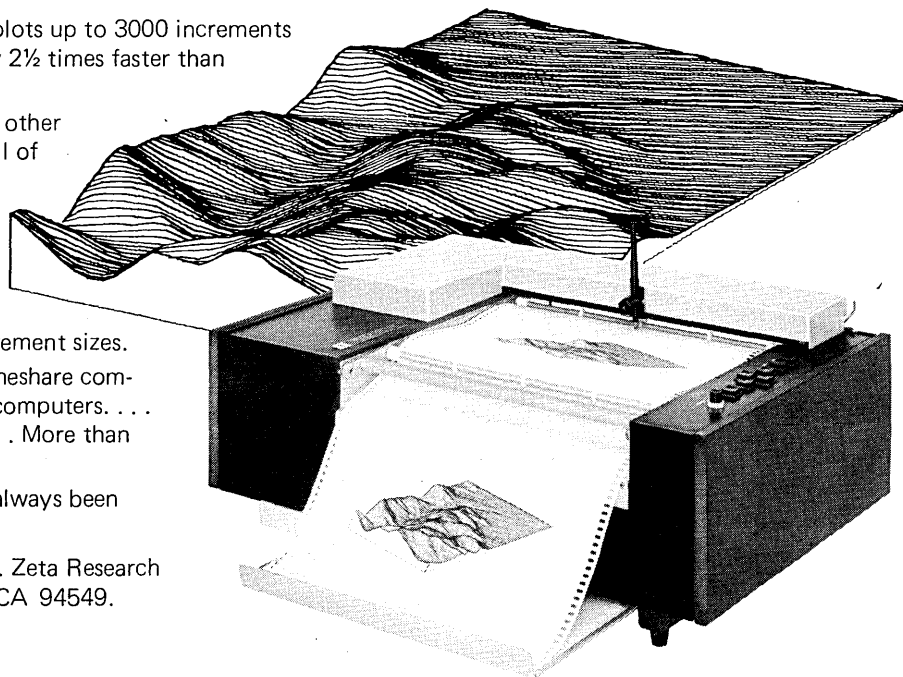
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Ten Months In Japan

One year ago this month, All Nippon Airways took delivery of the first Lockheed Model 290 flight data analysis system. With it they got Ann W. Sargent, a Lockheed information systems analyst, loaned to ANA for six months to refine and implement the systems' software and to train airlines personnel to modify and extend it.

Actually Sargent got to Tokyo one week before the system did and she ended up staying there ten months instead of six.

The 290 system, designed to produce a variety of reports from data collected by magnetic tape flight recorders aboard ANA's 12 L-1011s, is based on a Digital Equipment Corp. PDP-11/45 with 96K of core. In all, Sargent created 54 programs for the system.

"There were all sorts of little crises at first," she said. The system uses a Varian Stratos 30 printer/plotter which was supposed to be software compatible with an 11/45. It was but not with RSX, a DEC real-time software package which was handling an engine condition monitor portion of the system so it had to be modified.

Among other things, the system will check tapes from the flight recorders for limit exceedences in things like pitch and angle. "In experience we learned things like, if a certain transducer is out, there would be apparent limit exceedences continuously. We modified the software to take care of things like these."

Sargent said the hardest thing she had to do in Tokyo was teaching a two week course in the system's FORTRAN. She taught two hours a day to students whose computer know-how ranged from that of programmers who knew FORTRAN and only needed to learn the differences of this system to none at all. "English ability varied from moderate to non-existent." She made extensive use of a blackboard and written materials because "many who couldn't understand spoken English could read it."

But, "When I'd ask if they understood, they just sat there . . . no response." So, "I violated Japanese custom and asked them to do some work on the board." In Japan, she explained, one is not supposed to risk embarrassing a person in public but it was the "only way I could find out if they were

learning anything. As it turned out, they were."

All of Sargent's contributions to ANA were not in programming. "Lockheed didn't care what I did as long as I kept ANA happy." Part of keeping ANA happy was to afford groups of its employees an opportunity for daily practice in English conversation. This over coffee for her (ANA had purchased a coffeepot just prior to her arrival) and green tea for the others.

There are very few women employed by ANA, Sargent noted. Those that are, are young, unmarried, and, she guessed, in rather low clerical positions. They spoke little or no English and Sargent's Japanese is limited to what could get her around in a taxi or while shopping. "The only thing I



ANN SARGENT, Lockheed Aircraft Service Co., Inc. information systems analyst, initiates a plot program for All Nippon Airways' Fusao Sho.

ever saw them do was clean the green tea pots but I'm sure they did other things too."

Shortly before she left Japan, Sargent said, a law was passed prohibiting firms from forcing women to retire at age 30. "But in practice," she said, "most Japanese women do retire by 30 if they haven't married by then."

Sargent enjoyed her stay in Japan and would go back "in a minute" if she had the chance. She commuted about an hour each way, each day from her comfortable one bedroom apartment to ANA via subway, electric train and monorail AND 225 steps. This was okay until, last Dec. 29, she fell and broke her foot and was forced to take cabs for awhile. "I spent the New Year's holidays in the hospital."

Sargent, 44, didn't start out to become a systems analyst. She holds a B.S. in language arts ("that translates journalism") from California Polytechnic Institute in Pomona and currently is working on her M.B.A. at Cal Poly. "I have six classes to go." She began working for Lockheed in 1961 as a technical writer. Subsequently she took some IBM courses to learn how to use an IBM time-sharing system to solve engineering problems. Then came some Univ. of California extension courses in business systems and a course in assembly language for the Lockheed Mac computer.

Sargent is the mother of two grown children and is married to an electronics engineer.

Now back at Lockheed she is working on another flight data analysis system, similar to ANA's but slightly smaller. This one is for Saudia Air Lines of Saudi Arabia. When it's shipped she won't go with it. "They take a dim view of women in Saudi Arabia," she said.

The World is His Marketplace

Software is a business of education and hand holding. When you're the proprietor of a growing U.K. software company, that could mean having to spend nearly half of your time flying around the world to keep in touch with prospects and distributors. It's a life that seemingly would require one to be young, unmarried, highly ambitious and with a love for long hours and the art of salesmanship. A man with all of these qualifications is David Gomes da Costa, the 31-year-old managing director of Management Systems and Programming Ltd. of London.

Gomes da Costa talked of his 85-person company and its products early this summer in an interview in Los Angeles—on his way to Seattle, Dallas, Chicago and Toronto. It's a contract programming and systems software

package firm that he founded in December 1966 with \$700 and which now does about \$1.4 million a year. In 1970 when it was doing \$300,000 a year in contract programming, the company offered its first products—test tools for IBM operating systems and sold 40 within two years. It has sold 130 copies in 16 nations of an upgraded version, called Module Testing System, which was developed a year later, and it has made 18 sales of a third product, a project management and control system introduced a year ago. It's newest offering is a data dictionary package called Datamanager.

It has two more system software products on the way, soon will offer applications packages and is about to enter the facilities management business. But it counts on Datamanager for

people

a significant portion of its growth. Gomes da Costa says he's identified 2,000 to 3,000 prospects worldwide for data dictionary software and would be happy with 15% of that action in the next three years. It's a freestanding system, he says, that complements but doesn't have to lock into any other software package or data base management system. He says installations with traditional files, data bases or a mixture of the two can use the data dictionary to automate the location of files and programs in a data base. The company this summer was lining up

distributors for the new product.

It was developed under ideal conditions, Gomes da Costa says, with money from the U.K. government and regular input from prospective customers. Dp managers from these prospects met every other month with his staff to discuss and offer suggestions during the two and a half years of its development. An interest free loan from the government covered nearly half of the \$600,000 development costs. The government will be repaid out of royalties under an assistance plan administered by the U.K.'s National Computing Center. Although grateful for the help, Gomes da Costa says the U.K. should provide more incentives for computer organizations

who market outside that country (about 35% of his profits are generated overseas, he says). "For example, why should I be paying income taxes while I'm out of the country generating business that will come back in taxable revenues?" In the past eight and a half years, he's travelled to 18 nations and this year will bring that figure to 22 with trips to Russia, Iran, Brazil and South Africa.

A math major dropout from the Univ. of London, Gomes da Costa held only one job before forming his company. That was with the Gillette Co. in the U.K. where he advanced in 18 months from a programmer trainee to chief programmer.

"That was before I grew my beard."

From DP Manager ...to President

Six years ago Jerome Geckle was data processing manager of Petersen, Howell and Heather, a management services firm headquartered in Baltimore. Today he's president of the company. To what does Geckle give credit for his upward mobility? "I've always believed that machines are insignificant," he said. "The problems that we hope to be able to solve with the technology that is available are business problems, or human problems, or government problems, or whatever, but they're really not machine problems. Anyone that tends to take the approach that as soon as business learns to use machines, the machines will be successful in solving all problems, is kind of looking at things through the wrong end of the gun."

Geckle said his company has put hardware and technology in the background, admitting that "it's a great, wonderful, useful tool," but keeping in mind "the only way that the tool is going to turn a screw or open a bolt or anything else is to have somebody decide that that's what we ought to do." According to Geckle, "The real ability to utilize all the computer hardware that exists or ever will exist depends on people and the ability of people to assimilate what the problems are and then apply the technology to solve those problems—and that's really what we've done here."

Petersen, Howell and Heather employs approximately 900 people, 100 of which are in its data processing department, and "this year we'll make net after taxes about \$6 million," Geckle said. The company's headquarters offices in Baltimore uses a Honeywell 6060 and its branch offices throughout the U.S., in Montreal and overseas use "a number of different pieces of equipment," some of which is IBM, Geckle noted. The dp department keeps track of items connected with the services offered by the company. For example, the company helps relocate families of large corporations from one city to another. It also provides transportation to individuals who are on the road for company business. The computers keep track of the company's activities, such as the status of cars, motel and hotel rooms, travel etc.

"All the information is recorded and then massaged in a variety of ways so we can recommend to clients what type of car should be operated under particular sets of circumstances, for example, and when these vehicles might be replaced, and in the interim, they are constantly telling us what it costs to do these things," Geckle said.

Most of the output from the company's computers is communicated directly to its clients. "It actually becomes a product," Geckle pointed out. "If you want to compare us to a typical company, our computer in many ways is part of

our manufacturing facility. We manufacture information—it's the lifeblood of our company."

Geckle's first experience in the data processing field was in 1948 with IBM where he went to school and learned how to wire the 405. "That was a free school, and, as typically in those days, it was a one room schoolhouse," Geckle said. "IBM could teach all the machines it had to offer in one room with one teacher." After school he went to work for International Harvester "where I could put what I had just digested to work." Four years later he accepted a position



JEROME W. GECKLE
"machines are insignificant"

with Lever Bros. where he worked until 1955, when he joined the data processing department of Petersen, Howell and Heather. In 1969 Geckle became director of the company's Planning and Development Department. Soon thereafter he was named executive vice president of operations. He was made president of the company in August 1974.

For those dp managers who want to become president of their companies, Geckle offers this advice: "Study the business and spend the majority of your time trying to solve problems in the business world, rather than trying to educate the business world in data processing. Recognize that your ability in accountancy is only a tool, and not an end all." To grasp beyond the point of being involved in the technical sense in any area of a business "you have to concentrate on the business and not your technical expertise," he advised.

Geckle is an honorary lifetime DPMA member and a past international vice president. He's also a CDP and spent three years on the CDP Advisory Committee. *

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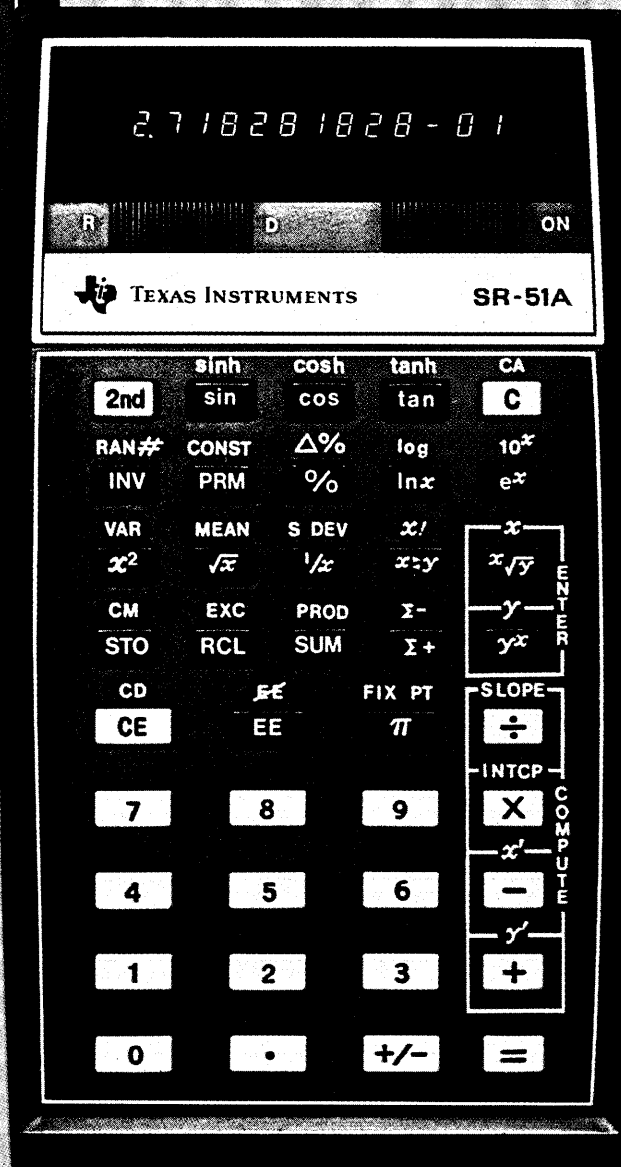
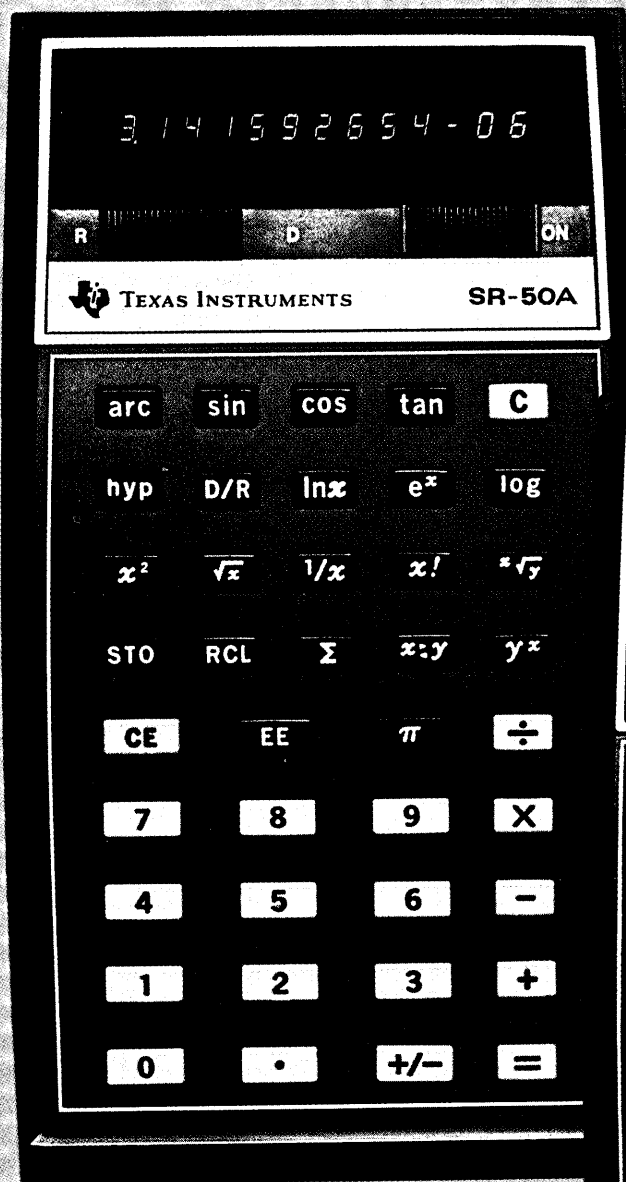
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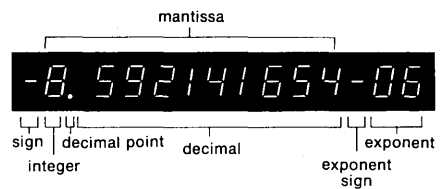
FUNCTION	SR-51A	SR-50A
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Hyperbolic (sinh, cosh, tanh, INV)	yes	yes
Degree-radian conversion	yes	yes
Deg/rad mode selection switch	yes	yes
Decimal degrees to deg. min. sec.	yes	no
Polar-rectangular conversion	yes	no
y^x	yes	yes
e^x	yes	yes
10^x	yes	no
x^2	yes	yes
\sqrt{x}	yes	yes
\sqrt{y}	yes	yes
$1/x$	yes	yes
$x!$	yes	yes
Exchange x with y	yes	yes
Exchange x with memory	yes	no
% and Δ %	yes	no
Mean, variance and standard deviation	yes	no
Linear regression	yes	no
Trend line analysis	yes	no
Slope and intercept	yes	no
Store and sum to memory	yes	yes
Recall from memory	yes	yes
Product to memory	yes	no
Random number generator	yes	no
Automatic permutation	yes	no
Preprogrammed conversions	20	1
Digits accuracy	13	13
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fluid ounces	liters
gallons	liters
ounces	grams
pounds	kilograms
short ton	metric ton
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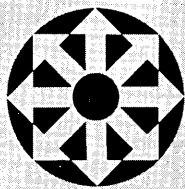
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LOOK AHEAD

BILLION DOLLAR QUESTIONS...

The froth in the wake of Xerox' announcement that it will quit the mainframe computer business is three big questions, and none of them is why Xerox did it. It was a logical business decision -- to get rid of an earnings drain in bad times. A former Xerox Data Systems executive summed up the feelings of many. "As a Xerox shareholder, I'm delighted. As an ex-XDSer, I'm saddened." Agreeing in milder terms was prominent Xerox stockholder, Max Palevsky, founder of Scientific Data Systems which became XDS when Xerox acquired it in 1969. "In the long run, given their (Xerox) managerial problems, it probably was a wise move."

The Puzzlers: Why now, and with such apparent suddenness, with XDS' orders up, new product announcements coming thick and fast, and with an increased level of advertising (Xerox' ad agency had to make hasty substitutions for brand new computer ads it had prepared for September trade journals)? Why did Xerox acquire SDS, for nearly a billion dollars, in the first place, a move chairman C. Peter McColough has flatly admitted was a mistake. Palevsky agreed in an initial reaction to news of the Xerox move, which reached him in the Hawaiian Islands. Now in the motion picture business, he was seeking location sites for a new film of Ernest Hemingway's posthumously published Islands in the Stream. Choosing his words carefully, Palevsky commented: "Considering the amount of money it cost the company (Xerox), I can't help but say it was a mistake."

And the third question: What, if any effect will the Xerox move have on the Justice Dept.'s antitrust suit against IBM? Palevsky believes it will impact the suit. "Here's another company (like GE and RCA), enormously successful and with enormous resources, that couldn't compete in a market 70-80% dominated by a single vendor." Earlier, in testimony at the trial, Palevsky said he was unable to raise venture capital on Wall Street for SDS, because Wall Street thought it impossible to compete with IBM.

...MAY MOVE A GLACIER

The Xerox debacle can't help but intensify the pressure on the Justice Dept. to step up its efforts in the IBM case, which has been moving with glacial speed. The case has been recessed for most of the summer with proceedings tentatively scheduled to resume Sept. 22. Strangely, the Justice Dept. has been resisting Congressional attempts to give it more funds to beef up its meager antitrust efforts, so with that attitude it's difficult to imagine the government getting very serious about the case. Some pressure has been building in California, where a Memorex attorney told a federal court judge presiding over a group of private antitrust cases against IBM that "the Department of Justice bottled that case up for six years. There's no hope in the government."

UNDER THE FROTH

In the rest of the wake of the Xerox announcement tumble those individuals most directly affected, the XDS users and XDS employees. They seemed equally stunned in the first days following the black Monday news in July. Most users were informed by phone by their local reps. "Why," said one, "in this last year we've had the best support ever. Everything's looked better including delivery, up-time, software development, new hardware offerings." Xerox users feel they have special cause for concern -- different from that of users abandoned by RCA and GE. "We picked Xerox equipment because it fit our concept," one said. "If we were to go to other equipment it would mean starting all over again with a totally new concept." The Xerox Users Group scheduled an early August meeting during which it will formulate a position paper outlining user requirements which it will present to Xerox and which it hopes Xerox will make available to any potential buyer.

As for employees, they seemed stunned but not bowed or bitter. In a short spot in a local tv newscast, introduced by a beaming anchor man with the label "pink slips from a blue chip," one young lady interviewee said, "it was like a bomb dropped on us at the last minute." She was smiling as she said it.

LOOK AHEAD

UCC'S HELP FOR DATRAN -- STOPPED AT \$40 MILLION

"The long and the short of it is that I'm not going to sell anything more to finance Datran," says Donald G. Thomson, president of University Computing Co., the Wily Corp. computer services and software subsidiary. Thomson, the 45 year old former ITT management whiz, took over the subsidiary in 1972 when it was \$4.2 million in the red and put it nearly \$7 million into the black last year. It's aiming at a \$7.5 million profit this year, despite the sale of two operations -- Keystone Computer Associates, a Philadelphia contract programming company, and the UCC Energy Group, the latter a highly profitable operation. Together with the sale in 1974 of its aerospace services division to LTV Aerospace Corp., UCC has netted \$40 million for the parent to help keep its fledgling Datran digital switch transmission subsidiary alive.

Thomson has trimmed his hectic 14 hour-a-day schedule as UCC's boss to a more leisurely five hours and soon will involve himself in the management of the parent. And Swiss financier Walter Haefner was in Dallas July 26 to pow wow with Wily officers over the financial needs of Datran, which he's loaned several million dollars, but which now needs another \$10 million to operate through the year. Haefner is considered the likely source of that money (July, p. 92).

GSA SAVES THE ARMY

If anyone ever questioned General Services Administration's ability to save money in computer procurement, he need look no further than the Army's controversial Project Alpha logistics program. The GSA, we figure, was able to fill orders for IBM 65s for about one-third the price the Army had been paying for the equipment by purchasing directly from IBM. The Army was paying \$2.7 million each for the 65s it bought from IBM while the GSA procured three 65 mainframes from Continental Information Systems, Greyhound, and Intel at substantially lower prices. The comparison isn't exactly apples with apples. The \$2.7 million figure the Army was paying included core, peripherals, and some service while the \$500-\$600K the GSA paid the independent bidders was for mainframes alone. Ironically, Comcisco of Chicago, the leasing firm that had protested the original 65 procurements, won none of the business.

MAYBE IT'S UNSINKABLE

General Automation, which appeared to be sinking badly just a few months ago, now shows every sign of getting ready to steam ahead again--much more quickly than had been thought possible. The Bank of America was preparing to receive the first 440 in late July and GA was hoping to announce three n-channel MOS machines -- the 110, 220, and 330 -- in the fall to replace its ill-fated SOS machines. A bigger, more sophisticated mini tentatively called the 660 currently is scheduled for February announcement. The MSI machine would compete with DEC's PDP-11/70. On the low end, GA is working on an Intel based microcomputer that would probably replace the 1260.

PRIVACY AND THE INSURANCE INDUSTRY

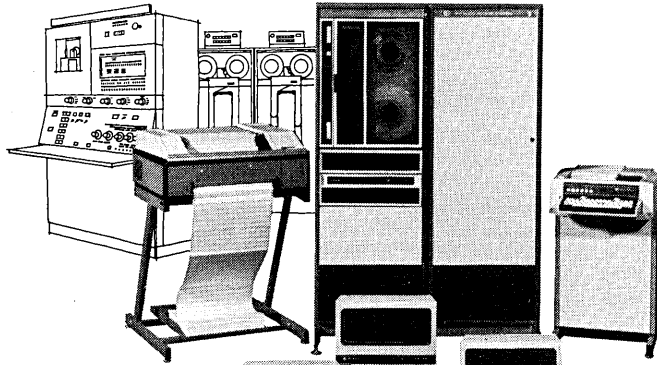
Insurance could be the first industry to be studied by the now complete Privacy Protection Study Commission created by the Privacy Act of 1974. William O. Bailey, executive vice president of Aetna Life and Casualty Co. and a presidential appointee to the seven man commission, suggested his industry for study because its involvement with the privacy issue "runs the gamut. We're employers, users of personal information, and statistical gathering agencies, and we have heavy interface with government agencies." Bailey was named to the commission in June along with David F. Linowes of Laventhol, Krekstein, Horwath and Horwath, and Willis H. Ware of the Rand Corp. Linowes has been named chairman and Ware, vice chairman. The commission has had two meetings and has scheduled a third after Labor Day.

THE 1403 PRINTER STILL IN WIDE DEMAND

More than a decade after its introduction, IBM's venerable train printer, the 1403, brings close to top dollar on the used computer market--about \$30,000 or some \$8,000 below the original IBM asking price. One company to take note of the 1403's

(Continued on page 82)

Introducing the Hewlett-Packard 2000 ACCESS.



**The unique
multi-terminal
RJE system
that increases
the capability of
IBM and CDC
computers.**

**32 on-line
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- UT200 RJE to CDC
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- Information retrieval
- Concurrent program development
- Local processing

**Plus multiple
on-line
peripherals.**

- Up to 7 line printers (200-1250 LPM)
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- IBM and CDC-compatible magnetic tape drives
- 5 to 120 Megabytes of on-line disc storage.

Available now:

Hewlett-Packard's 2000 Access System is the low-cost way to enhance the capabilities of your IBM 360/370 or CDC computer. For complete information call your nearby HP field engineer. Or write.

**HP minicomputers.
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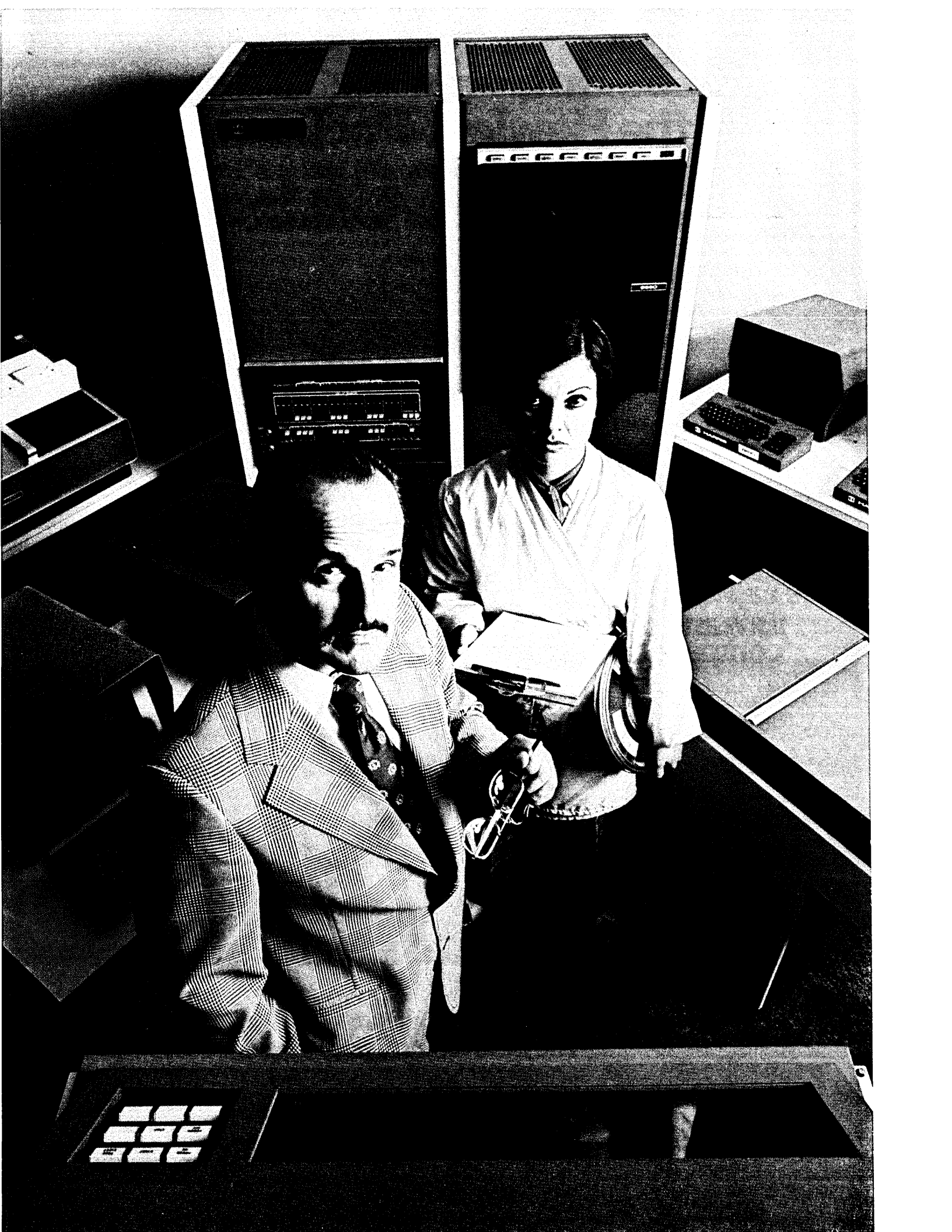
Sales and service from 172 offices in 65 countries.
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August, 1975

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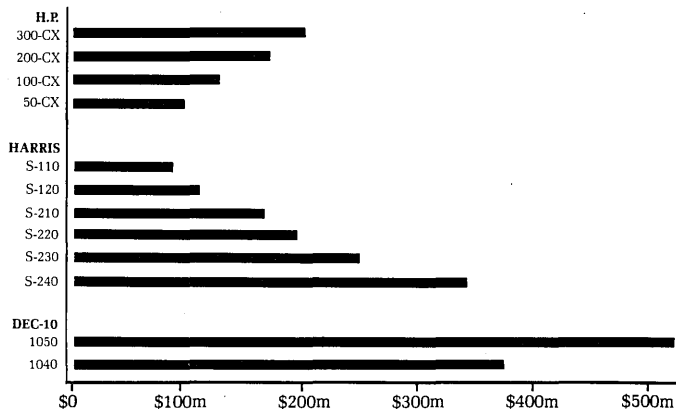
19



Now HARRIS Virtual Memory Systems give you a choice

If you are looking at computer systems today, you're looking for economical initial cost, the best price/performance you can get, and room for your growth tomorrow. That's exactly what the new HARRIS family of computer systems delivers. We've packaged some of the most powerful computer hardware and some of the hardest working software into six systems that give you low cost, high performance computer processing. Each delivers transactional and batch processing capabilities that surpass what HP 3000 and DECsystem 10 offer at higher costs.

Let's compare apples to apples:



The above graph represents equally configured systems comparisons based upon currently available published information.

SIX SYSTEMS: Virtual memory all the way.

We've named our systems, S110, S120, S210, S220, S230 and S240. They're expandable systems, upward compatible, each with our powerful field-proven virtual memory operating system, VULCAN. And they all talk FORTRAN IV, COBOL, RPGII, and EXTENDED BASIC. Remote Job Entry to large host processors is available.

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Another unique approach to our systems packaging concerns you. We package our systems for how you need to communicate with them. That's a universal need from application to application, from industry to industry. How do you want to talk to your system? Real time? Interactively? Multi-batch? In any combination and concurrently? Tell us how and we'll show you the package you want.

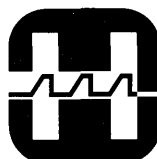
SUPPORT

Single source responsibility—another big benefit of packaged systems. We train your people, we service the system, and we maintain it. We built the operating system and we know how to keep it working for you.

Each of the new HARRIS Virtual Memory systems is a complete package. From dependable hardware to field-proven software to responsive support.

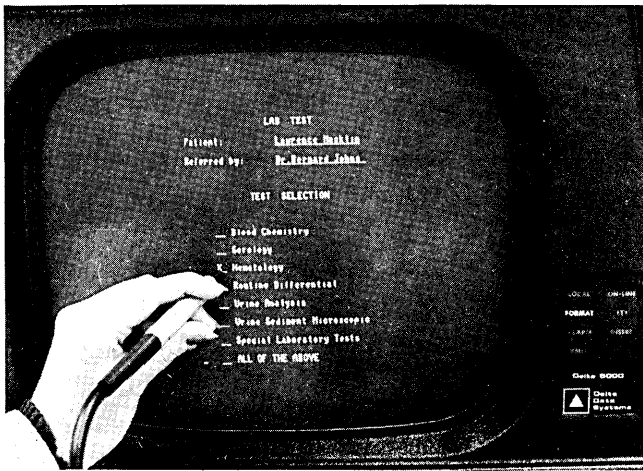
Now you have a choice. Let HARRIS show you how easy it is to make the right one. Write Harris Computer Systems, 1200 Gateway Drive, Fort Lauderdale, Florida 33309.

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COMMUNICATIONS AND
INFORMATION HANDLING

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DELTA TERMINALS AND LIGHT PENS MAKE YOUR SELECTION EASIER

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These and many other unique and useful features in DELTA 5000 video display terminals work to save time, money and effort, add convenience, minimize error possibilities and eliminate unnecessary computer time.

We want to make one more point about simplifying your selection. Our new light pen takes the time and tedium out of selecting required information on the display screen. The light pen is easy to use, accurate, and it can save considerable time. All DELTA 5000 terminals are available with a light pen as an option.

Now that we've told you how easy it is to simplify your terminal selection, we'd like to show you with a demonstration at your convenience. Contact us today to set one up, or for literature or applications assistance.



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CIRCLE 79 ON READER CARD

calendar

SEPTEMBER

ABA Payments System Policy Conference, Sept. 7-9, San Francisco. Limited to 500 top banking executives, this meeting sponsored by the American Bankers Assn. will concentrate on the theme, "EFTS—An Emerging Reality." Program participants include members of government, the banking industry, and other financial institutions. Fee: \$200, members; \$300, nonmembers. Contact: Frank P. Curran, ABA, 1120 Connecticut Ave., N.W., Washington, D.C. 20036.

Western Electronic Show and Convention (WESCON), Sept. 16-19, San Francisco. An estimated 28,000 persons will attend this conference sponsored by chapters of IEEE and Electronic Representatives Assn. More than 300 companies will have displays of components and microelectronics, computers and communications, and production, packaging and instrumentation equipment. The \$5 registration fee covers attendance at all program sessions and exhibits. Contact: William C. Weber, WESCON, 3600 Wilshire Blvd., Los Angeles, Calif. 90010, (213) 381-2871.

Int'l. Symposium on Computer Assisted Cartography, Sept. 21-25, Washington, D.C. Purpose of this meeting, sponsored by the American Congress on Surveying and Mapping in cooperation with the U.S. Bureau of the Census, is to exchange information on application problems, software and hardware in computerized cartography. Fee is \$60. Contact: Dorothy Bomberger, U.S. Bureau of the Census, Washington, D.C. 20233, (301) 763-7094.

European Computing Conference on Communications & Networks, and on Interactive Systems & CAD, Sept. 23-25, London. These concurrent conferences are sponsored by ONLINE, Brunel Univ., Uxbridge, Middlesex, England. Discussions of the immediate future of data communications, and a review of interactive computer methods in relation to communications and networks will highlight the meetings. Fee: approx. \$250 and \$200 for each conference, respectively. Conference fee for delegates wishing to attend sessions at both meetings is approx. \$300.

Telecommunications Assn. Conference, Sept. 23-26, San Diego. Exhibits of telecommunications products and services by more than 70 companies and workshops and panels on advanced data communications, special carriers, and trends and regulations, among others, will be geared to the TCA '75 theme, "Telecommunications—Beacon to Bits." Fee: \$25, members; \$50, nonmembers, prior to Sept. 9. Contact: TCA 1975 Conference, 424 South Pima Ave., West Covina, Calif. 91790, (213) 332-6611.

OCTOBER

5th Annual Conference, Assn. of Computer Programmers and Analysts, Oct. 1-3, Itasca, Ill. "Awareness: Past, Present and Future" is the theme, to be highlighted with seminars, workshops and vendor demonstrations on structured programming, chief programmer teams, computer output microfilm, minicomputers, privacy, certification, and licensing. Fee: \$90, members; \$100, nonmembers, advance; add \$10 after Aug. 31. Registration for single sessions available. Contact: Martin A. Morris, Jr., 13th floor, 1 N. Dearborn, Chicago, Ill. 60670, (312) 732-4696.

Conference on Applications of Computer Graphics in Engineering, Oct. 1-2, Hampton, Va. The NASA Langley Research Center and Institute for Computer Applications in Science and Engineering sponsor this meeting. No fee. Contact: David D. Loendorf, M/s 132C, NASA Langley Research Ctr., Hampton, Va. 23665, (804) 827-2513. *



When your computer speaks, Bell & Howell's COM understands.

If you've been hesitant about getting into COM because of the alterations it would require, Bell & Howell has some reassuring news for you.

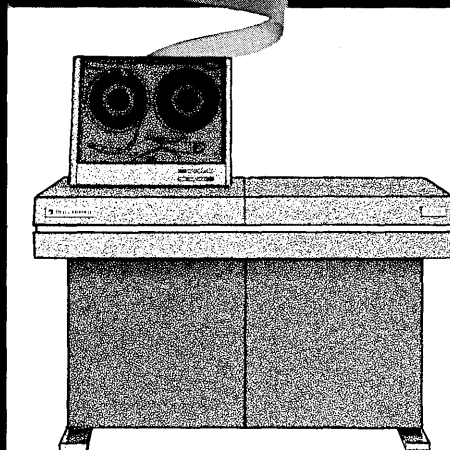
Our COM recorder is compatible with most computers now in use. It speaks virtually any computer language. Job setup is accomplished through the use of a single job control card. So human error is substantially reduced.

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The \$3995 E4010-1: a graphic example of great new prices.

Tektronix presents a new terminal, free options, and a great 4023 lease plan. You'll save up to 22%!

We're calling it our All in the Family Sale, because price savings can be found up and down the Tektronix family of graphic and alphanumeric terminals.

Take our new E4010-1. It's very similar to our standard 11" hard copy-compatible graphic terminal, with the same high quality graphics we're famous for.

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difference: at \$3995*, it's \$700 cheaper than the 4010-1. And at \$3795, our E4010 is a full \$400 cheaper than the 4010.

The easy copier. Copy compatibility comes a whole lot easier with our new 4631 hard copy unit . . . designed to deliver superior performance and easier maintenance, while saving you \$400 to \$900 over any of our previous models.

New standards. We're attaching the usually optional \$350 rulings character set to our 4023 alphanumeric terminal. Now you can quickly format standard forms at no additional cost.

Lease for less. We've also made a \$50 reduction—to \$140—in the monthly lease for the 4023 with

rulings character set. That's a savings of over 22%.

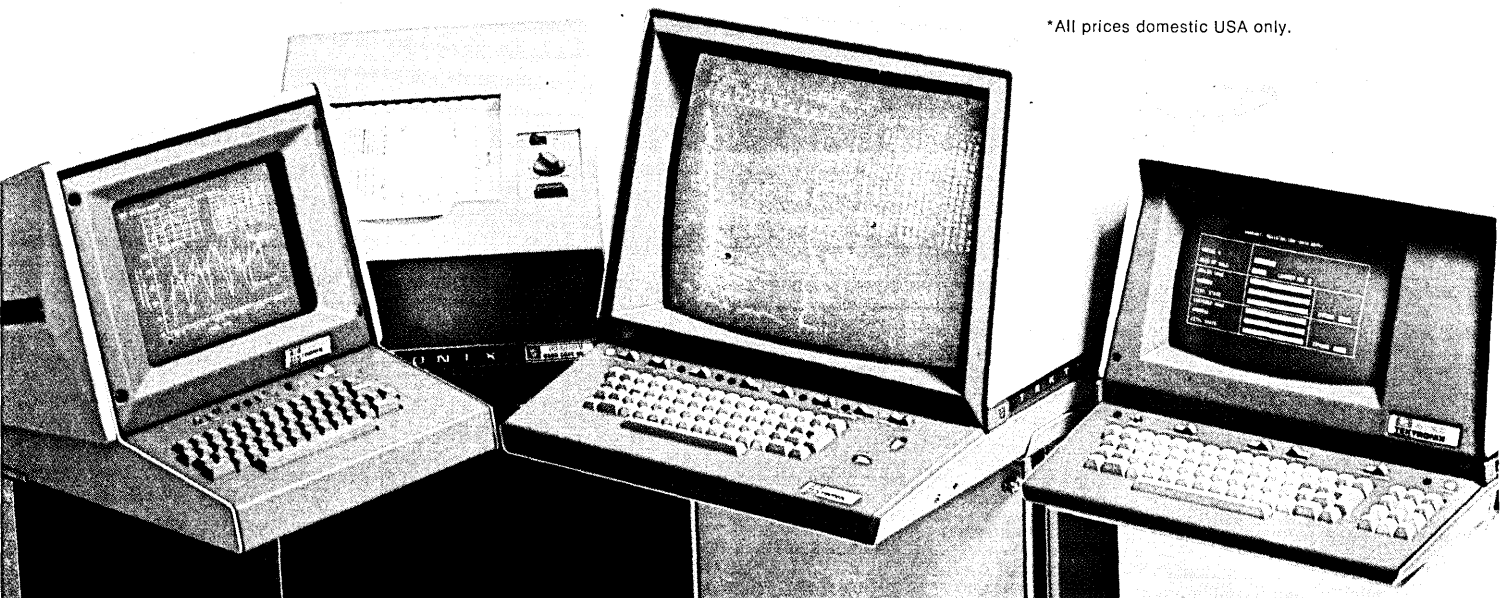
Right now our terminal family can solve your budget problems—and do a lot more problem-solving every day. Talk to your Tektronix Sales Engineer soon. Or write:

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SOURCE DATA provides information on books, courses, references, reports, periodicals, and vendor publications.



Minicomputers in Business

Considering minicomputers? A 24-page report, *Minicomputers in Business Data Processing Applications*, details business dp needs and shows how minicomputers can meet those needs. Application examples and system diagrams are used to discuss minicomputer-based systems in media exchange, disc subsystems emulation, text editing, etc. Advantages of minicomputer systems and future trends are presented. FORMATION, INC., Mt. Laurel, N. J.

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Data Base Systems

What are the benefits and costs associated with DBMS/DMS? How do you select DBMS/DMS software? Can DBMS/DMS be cost justified? Answers to these and other questions are given in a 10-page report, *A Quick Look at DBMS and DMS*. Divided into a management summary and a technical outline, the report discusses data requirements, evaluation, performance analysis, and implementation. CACI, INC., New York, N.Y.

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The Information Connection

To help in understanding the growth of computers, terminals, and remote teleprocessing in industry and government, the CSC report, *The Information Connection*, explores "some of the current thinking as well as . . . some basic concepts of how to make the information connection work." Three articles cover program management (the design and implementation stage of computerization), data base development (from the viewpoint of Infonet, CSC's remote teleprocessing Information Network Div.), and the management of change (in terms of computer-assisted decision making). COMPUTER SCIENCES CORP., Los Angeles, Calif.

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Canadian Dp

An information service, *The EDP Guide*, issued quarterly, provides in-

formation on computer communications in Canada, analyses of the Canadian computer industry, a directory of Canadian suppliers and services, and federal and provincial government policies and practices. It claims to be the only Canadian information service that collects raw data on the Canadian dp industry, analyzes, summarizes, and presents it in one place. Introductory one-year subscription: \$95. THE EDP GUIDE, 987 Clarkson Rd., Mississauga, Ontario L5J 2V8.

Free ADL Publications

A catalog lists offerings of complimentary copies of ADL publications in the areas of management consulting, research, and engineering. All the publications were written by ADL staff members and discuss topics of interest in business and technology. "Beyond 1984: A Technology Forecast," by Frederick G. Withington (originally in DATAMATION, January 1975), "Ten Reasons Why Corporate Marriages Fail," by Allen H. Seed, III, and "Future Telecommunication Interfaces," by John P. Thompson are sample articles offered. ARTHUR D. LITTLE, INC., Cambridge, Mass.

FOR COPY CIRCLE 203 ON READER CARD

Facsimile Equipment Guide

The small, easily operated business facsimile which uses telephone lines to transmit information has, because of technical improvements, become a more flexible and reliable machine at lower cost. The *AUERBACH Guide to Facsimile Equipment* reports on 13 products covering the industry's major facsimile devices. In-depth technical, analytical, and marketing information is given, including a specification chart listing most of the product's lines on the market, and a supplier directory. Price: \$19.95. AUERBACH PUBLISHERS INC., 121 N. Broad St., Philadelphia, Pa. 19107.

Free Datapro Literature

Datapro Research Corp., with over 17,000 subscribers worldwide, has published a 32-page booklet, *21 Answers*, which is a guide to its services—reference works, monthly report supplements, newsletters, and "dial-up inquiry service." Sample report pages on specific dp products, classes of products, vendors, product surveys, users' ratings of products and services, and case histories of product usage are given.

A catalog of 26 new and revised research reports on dp and office products is also available. The reports describe characteristics, prices, specifications, and users' evaluations of hundreds of models of CRT terminals, minicomputers, proprietary software systems, and data communications facilities to word processing systems and office copiers.

The reports are mostly \$10 each, or can be obtained as part of Datapro's information service. Details of trial subscriptions are given. DATAPRO RESEARCH CORP., Delran, N. J.

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Automatic Editing Typewriters

The market for automatic editing typewriters will grow from \$306 million in 1974 to about \$1.25 billion in 1980, according to the report, *Word Processing—Automatic Editing Typewriter Industry*. These typewriters are one of eight categories of the word processing market whose total estimated revenues will reach more than \$4.6 billion in 1975, with IBM and XEROX dominating with 80% of the total. These and other analyses and forecasts of specific products and the whole industry are presented by the report, which is part of the Industry Analysis Service of CSI, or may be purchased separately for \$495. CREATIVE STRATEGIES, INC., San Jose, Calif. 95129.

FOR DATA CIRCLE 205 ON READER CARD

Small Keyboard to Disc Systems

A special evaluation package on small keyboard to disc systems is available. Analyses of Inforex 1303, CMC 3, CMC 5, Consolidated Computer Key Edit 50, and Mohawk 1200 are included. Price: \$12. MANAGEMENT INFORMATION CORP., 140 Barclay Center, Cherry Hill, N. J. 08034.



The Cost of Privacy

by Robert C. Goldstein
Honeywell Information Systems
40 Guest St., Brighton, Mass.
02135, (1975)
150 pp. \$10 (Specify Order No. DD99)

This book is the doctoral thesis of the author at the Harvard Business School. It presents a methodology to estimate the cost to data bank operators of present and future privacy legislation. It is the first attempt at an analytic approach to a significant problem, and is a very valuable contribution. The early part summarizes the history of personal privacy—in the context of computer-based record systems—and

source data

the legislative treatment of it.

The author has created a simulation model that contains terms for the various provisions that *might* appear in privacy legislation. Since his work was completed before the Federal Privacy Act of 1974 was passed, the results presented clearly pertain to no extant law. Costs are determined in terms of manpower, data storage, processing time, data transmission, and capital. The model characterizes a data system in terms of 29 attributes. For representative examples of six types, the model is used to estimate cost by each possible legislative provision and the total cost to each system.

For organizations faced with having to assess the impact of privacy legislation, this work is an important methodology. For his test cases, the author, of necessity, had to obtain estimates of various model parameters by a questionnaire and interview technique. A particular organization could, of course, supply its own cost parameters for the model and obtain correspondingly more accurate results; furthermore, the model can clearly be adapted to actual legislation. The author properly cautions that the language of legislation is sometimes vague, and that the model represents his interpretation thereof.

The author and his book are each to be commended for a significant contribution to a troublesome problem. It is to be hoped that organizations will exploit his approach and thereby provide important cost guidance to future legislative efforts.

Recently some of the material for this book has appeared in another publication. It would be better for the dp person to read the complete treatment and explain it to his management along with his own local cost parameters.

—Willis H. Ware

Dr. Ware, a senior computer scientist at the Rand Corp., is one of the three White House appointees to the seven member Privacy Protection Study Commission established by the Federal Privacy Act of 1974. He also serves as chairman of the AFIPS Special Committee on the Right of Privacy, and is co-recipient of DPMA's 1975 Computer Science Man-of-the-Year Award.

Management of Information Technology

by Elizabeth B. Adams
Petrocelli/Charter, 1975
196 pp. \$10

This collection of 16 short case studies on dp management is presented as "on-the-job training" for the student, offering a "systems approach" to solving real-world problems. However, how to solve problems using the "systems ap-

proach" is never mentioned; the term, in fact, remains undefined. Since the limited material here can hardly reach beyond an academic environment, it is difficult to see it as "on-the-job training."

The text supposedly can supplement any management text and, depending on the level of students, enrich the study of dp management. Underprepared students will have trouble with undefined acronyms and technical jargon, such as SCERT, PERT, exception reports, etc.

The table of contents may lead the reader to believe he has found a unique diversity of interesting subjects not dealt with in other books. Cases directed at inept management, vendor-user relationships, and management resistance are here and covered quite well. However, cases directed at analysis, design, and decision-making models address the subjects poorly; and the often mentioned MIS is inadequately covered.

The chapter on financial implications of dp is one of the better case studies. It involves several subsidiaries of a small corporation with decentralized control, one with its own dp operation and the others purchasing services outside the corporation. The

BOOK BRIEFS . . .

No Place to Hide

by Alan LeMond & Ron Fry
St. Martin's Press, 1975
278 pp. \$8.95

The book jacket asks the question: "Are you being bugged?" The authors, in this "guide to bugs, wire taps, surveillance and other privacy invasions," answer with a resounding "yes," document ways and means used to collect and use information on individuals and organizations, and give advice on how to prevent or thwart such invasions of privacy. With newspapers and radio broadcasts daily uncovering new accounts of unauthorized use of information, and privacy legislation compelling new attention in Congress, this book is timely and informative.

Programming Languages: Design and Implementation

by Terrence W. Pratt
Prentice-Hall Inc., 1975
330 pp. \$13.50

Intended as a textbook for college students—an elementary background knowledge of one high level language and a basic knowledge of machine organization is presumed—this volume seems well organized and thorough in its approach. The two central concerns of the book are computer programming language design and the interplay between language design and implementation. Problems and examples are abundantly used; Part I builds a framework for analyzing languages re-

chapter's presentation however could be strengthened, for example, by expanding and itemizing present costs and projected savings of each subsidiary. The student could thus be introduced to aspects of a dp budget as well as cost considerations for time-sharing and service bureaus.

Most of the cases are built around mismanagement and organizational problems. The most disturbing thing about all the case studies however is that not enough facts are given to allow a decent evaluation of the problems. Nevertheless, the continual preview and review of 17 different organizational charts is one of the book's more attractive aspects.

This book could become an excellent instructional or supplemental book in a revised edition if (1) the bumpy writing style is smoothed out and the text reads less like a progress report; (2) more facts are given in case studies for completeness; and (3) acronyms and buzzwords are either explained or discarded.

—Douglas A. Colbert

Mr. Colbert is the author of "Computers and Management for Business" and "Data Processing Concepts." With more than 15 years in the field, he now serves the City of San Francisco as a senior systems analyst.

ardless of which one is used or encountered, and Part II is devoted to specific analysis of seven languages: FORTRAN, ALGOL 60, COBOL, PL/1, LISP, I.5, SNOBOL 4 and APL.

FORTRAN to PL/1 Dictionary, PL/1 to FORTRAN Dictionary

by Gary DeWard Brown
Wiley & Sons, 1975
204 pp. \$10.95

Numerous examples dot this concise book that explains FORTRAN and PL/1 in terms of each other, much the way a foreign language is taught, and is intended for use as a reference work and a refresher. Each programming language is summarized in the first half; the second part of the book describes features of the languages in detail, side by side down the page. Exercises are presented at the end of each chapter.

Systems Analysis and Design

by Leon Yousef
Reston Publ. Co., Reston, Va., 1975
228 pp. \$10.95

This text presents basic concepts, with the emphasis on applications, for university and college business students in various specialties. Divided into three parts (the first two deal with fundamentals and descriptions of information flow and systems design), the book presupposes some previous dp knowledge. The last third of the book

(Continued on page 102)



ONLY ALL OF THE ABOVE CAN OFFER ALL OF THE BELOW:

General Automation's new family of low-cost, expandable remote batch terminals offer more capabilities than any competitive systems produced by any terminal or minicomputer manufacturer anywhere.

Here's what we mean by *capabilities*:

Talk to any computer.

Our software emulator packages make our terminals multi-lingual. They can talk to IBM 360/370 HASP or 2780 work stations. They'll also emulate a Control Data User Terminal. Or a UNIVAC 1004 system.

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General Automation didn't get into the communications business yesterday. We are already the major supplier of minicomputer systems for front end processors, distributed data systems, Telex message switching systems and PABX control systems for the world's largest international communications companies. We're also the number one solver of tough communications problems in more than a dozen different industries.

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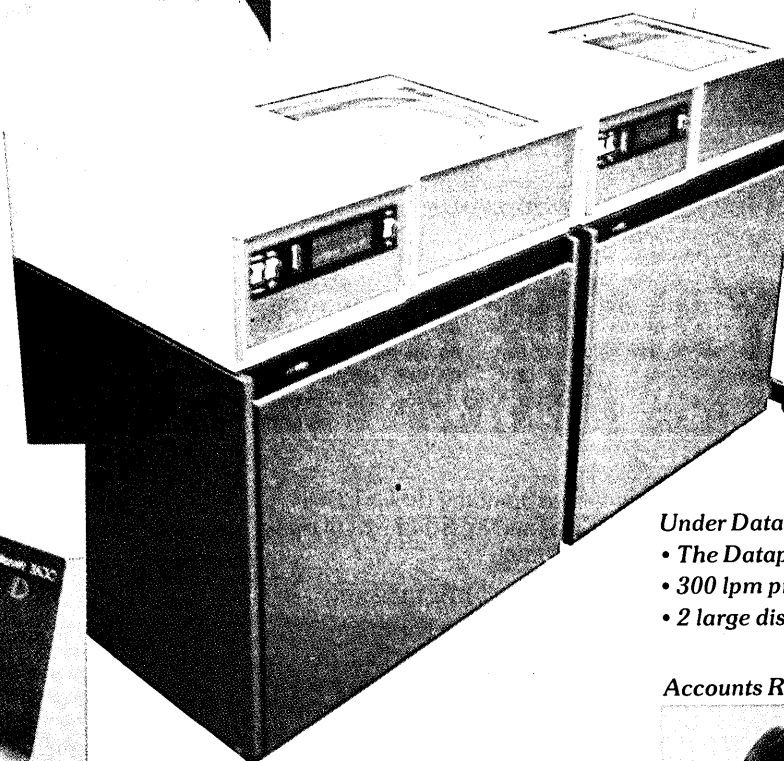
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Under Datashare control

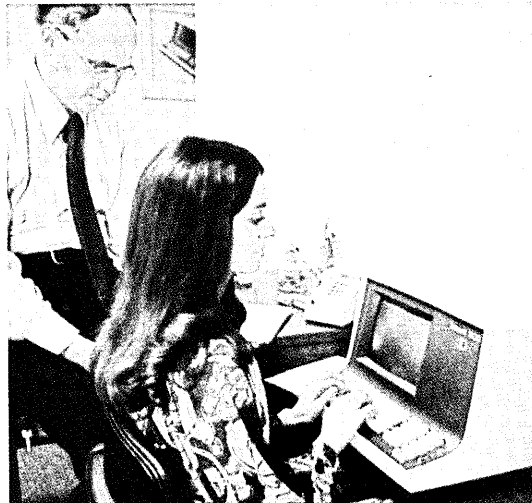
- The Datapoint 5500
- 300 lpm printer
- 2 large disk units



Inventory Control

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data processing needs: Datapoint's New, Expanded Datashare System

- **Datapoint 5500 Central Processor/Mass Storage Disk Units**
- **Datapoint 3600 Remote Terminal/Hardcopy Terminal Printers**
- **Datashare III**

The new Datashare system, from Datapoint, builds on the success of the initial Datashare based on the Datapoint 2200 processor. The concept remains the same — a compact central computer with associated peripherals providing the people who need it most compute power at remote work stations for a variety of business data entry and processing needs — but capacity for work throughput and diversity of applications have expanded greatly with the new version. For businesses whose workload has outgrown both available equipment and available budget, Datashare represents a real breakthrough. Nowhere else can you get such a total business data processing capability at such a modest cost. Let's take a closer look at these new elements and what they can do for you.

The Datapoint 5500 — a compact but powerful business processor that incorporates the very latest integrated circuit technology. Physically the same size as the Datapoint 2200 and 1100, the 5500 offers 64K high-speed internal memory and an advanced processor architecture with a wide variety of printers, tape units and disk systems (see list). It can supply up to 16 work stations simultaneously with compute power. In one typewriter-sized unit the 5500 provides the basis for an independent "computer utility" operation (even while it serves optionally

as a highly efficient data communications link to a central computer complex.) Fully compatible with software created for the Datapoint 1100 and 2200 systems.

The Datapoint 3600 — a low-cost video terminal with upper case/lower case capability, a unit designed for efficient satellite use with a Datashare configuration. (Datashare also works efficiently with other Datapoint units such as the 1100 and 2200 and all TTY-compatible terminals.) The optional 120 CPS belt printer serves as a hard copy outlet for work stations where printer information is desirable.

Datashare III — the enhanced master control system that extends Datashare capability to 16 remote stations, allows users at these stations access to the expanded number of peripheral units that may be associated with the 5500. Version III offers greatly improved file creation and handling capability, including advanced file protection/security and virtual memory techniques.

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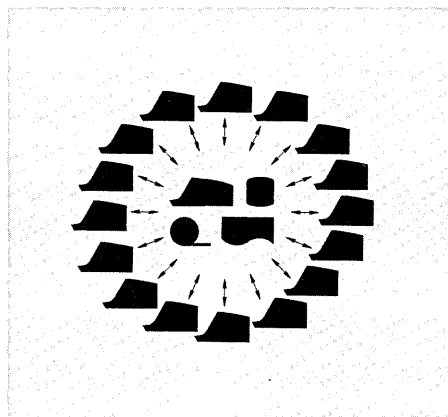
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Editor's Readout

John L. Kirkley, Editor

Dealing with the "What Ifs" of IBM Antitrust

People who rely on conventional wisdom often find themselves bankrupt, duped, or deluded.

That's why we felt a current piece of computer industry mythology—the idea that edp users are apathetic regarding the IBM antitrust trial—needed our investigation. Daily fire fights, crashing out reports . . . these are the preoccupations of the dp manager, not the lethargic legal battle being waged at Foley Square.

Angeline Pantages, DATAMATION's international editor and East Coast bureau manager, talked to a number of individual users and user organizations. Her report on their reactions—or lack of them—appears on page 74 of this issue.

Superficially, the conventional wisdom seems to be right. The dp manager is a busy person with not much time left over to even gain an understanding of the complex issues involved, much less take a stand. And, with the exception of DPMA, the user groups, including Share and Guide, have made no commitment to help their members with analysis, information, or any other aids toward clarifying the implications of this important case. (User groups, and membership organizations like AFIPS, are notoriously leery of gut-level controversies like this. Better to stay with issues like privacy—they're topical and chances are they won't bite.)

But perhaps users and user groups alike have a more fundamental problem, a problem caused by the complex dynamics of this case. Now six and a half years old, the trial is set against a constantly shifting background of organizational and product maneuvering on the part of IBM and a fluid industry that is still struggling to achieve some level of maturity. To fully understand the issues involved and to predict with some accuracy the consequences of the trial, an individual or organization must combine the characteristics of a trial lawyer, economist, industry historian, and soothsayer. That's a tall order.

But this is precisely what the dp manager must become. The stakes are too high: the outcome of this historic trial could cause major upheavals in our industry, substantially affect the type of technology available to the user, and even shape the nature of the edp job market. Contingency planning based on an understanding of the "what ifs" is absolutely necessary.

What "what ifs?" Well, here are some samples:

—What if IBM's market share is limited to 55%.

—What if IBM is broken into five or six equally balanced companies—mini-IBMs.

—What if IBM agrees to divide itself into a common carrier satellite company with a communications division, a small computer and office products company, a data processing company and an oem peripherals company, all grouped under an IBM holding company.

—What if IBM is divided functionally (separate divisions for marketing, manufacturing, software, leasing, maintenance, etc.).

—What if IBM is accepted as a natural monopoly and a Federal Computing Commission is created to regulate the giant, or perhaps the entire industry.

—What if IBM, like Kodak, is required to notify its competitors of standard specifications well in advance of product announcement.

—What if the entire computer industry is transmuted into a *laissez faire* environment.

We think that Share and Guide and other user organizations should examine the possible outcomes and implications of the trial and let their members know how their careers and corporations may be affected. And AFIPS, whose membership includes DPMA, the IEEE Computer Society, and ACM, should break its silence. AFIPS may not be able to lobby because of its nonprofit status, but it can provide much-needed information and clarification to its members and interested parties in both industry and government.

Conventional wisdom also says that a consent decree, if it happens, will occur before the end of this year. According to the provisions of the Tunney bill, persons wishing to protest the settlement will only have 60 days to react before the settlement becomes final. The time for preparation is now. *

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August, 1975

Reader commentary appearing over the past months in our regular feature "IBM and the Structure of the Industry" has been packaged into a single reprint. Some yet-to-be published submissions are also included along with a chronology of major events in the antitrust trial. Free copies are available by writing to DATAMATION, 1801 South La Cienega Blvd., Los Angeles, CA 90035. *

Evaluating Prospective Employees

by Carl L. Hall

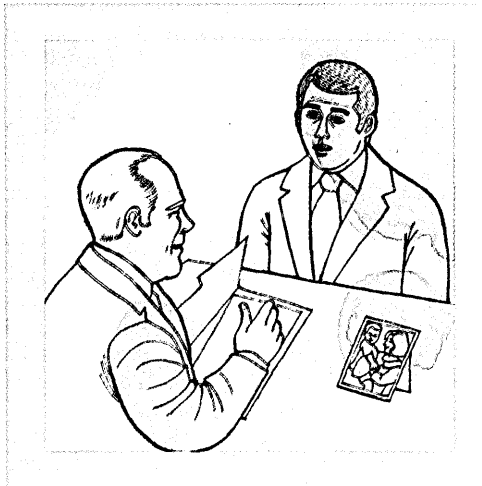
The procedure is intense, but it draws out more information than unstructured interviews.

Finding and keeping good dp personnel is getting harder to do. Personnel offices seldom understand the requirements of the dp department, and know even less about the technology involved. It is the dp manager who has the thorough background and knowledge to evaluate the job candidate.

The personal interview is the most accurate method of choosing good people. However most managers can still improve their interviewing techniques in order to elicit relevant information from prospective candidates, and help those candidates reveal their best qualifications for the job.

My background has included the principal responsibility for recruiting and hiring dp personnel at all levels, including project managers, system analysts, programmers, operators, key-punchers, maintenance engineers, etc.

There are several steps to the interview process that I follow. The first two actually occur before the interview. They are (1) to determine the particular job requirements, and (2) to set up an evaluation chart to compare these job requirements with the abilities of the particular candidate. The third step is to conduct the actual interview with the specific needs and objectives clear in the interviewer's mind.



The fourth step, of course, is the evaluation.

For the first step of defining exactly what the job requirements are, one should particularize the technical knowledge, aptitude, personality traits, stability, etc., needed for the job. These requirements should be weighted to show their relative importance in performing the particular task. It is also very important to evaluate the transferability and possible equivalence of these requirements. For instance, can experience in operating the NCR 101 offset a lack of experience in operating

the System/3?

The evaluation chart

The second step in the interview process is to set up a chart which will facilitate the comparison of the job requirements with the actual qualifications of the particular job candidate (see Table 1). Such a chart provides a rough score of how the interviewee matches the predetermined requirements for the job. These requirements are listed in the vertical column on the left side of the chart, and a sample of dp positions are listed at the top. A weighted "score factor" is shown in the columns under the position titles.

Each score factor represents the achievement level a person must have to meet the requirements of the job. The score factor is weighted on a scale of one through five, so that the value also represents its relative importance.

The "minimum total points required" is an estimate of the minimum a candidate must have before a sufficient match has been achieved. (This is not a total of the various point requirements, but somewhat less, to allow for the less than perfect but nevertheless satisfactory candidate.)

The successful applicant will fulfill two requisites. First, his point total will meet the minimum for the position,

Attributes	Rating Required for the Position							
	Computer Operator	Programmer Trainee	Programmer	Senior Programmer	Systems Analyst	Senior Systems Analyst	Systems Programmer	Senior Systems Programmer
Specific experience with a system like ours	1	1	1	1	1	1	2	2
General experience with computers	2	2	3	4	2	2	4	5
General business experience	1	1	2	3	4	5	2	2
Some college education	1	3	3	3	3	3	3	3
College degree	1	1	1	1	1	1	3	3
Logic ability	4	5	5	5	4	4	5	5
Cybernetic ability	1	3	3	4	5	5	4	5
Maturity	1	1	2	3	4	5	3	4
Reaction reflex	3	3	4	5	5	5	5	5
Patience	2	2	3	4	5	5	3	3
Constructive imagination	1	2	2	3	4	5	4	5
Minimum total points required:	15	20	25	32	34	37	33	37

Table 1. By assigning weighting factors for personal attributes, the manager doing the hiring can outline the skills required for each dp position. The low numbers represent attributes which are not too important to those particular jobs, the 5's represent

critical skills. Since prospective employees are not expected to earn every point available in every category, the minimum total points required for each job are lower than the sums of the numbers in the columns.

indicating that he has, in general, sufficient abilities in most areas, and that his deficiencies are balanced by his strengths. Second, if the position requires a factor of five for a particular category, the candidate will not score less than four in that category. Similarly, if a factor of four is needed in a category, the candidate will not score less than three. Items with lower point values need not be treated as stringently.

Evaluation factors

Specific experience. This factor measures the individual's specific experience with any particular language, system, hardware, etc. In most cases, this factor is of little importance because of the overriding value of other factors that make a person able to perform in data processing. The real value of experience is measured by the person's ability to profit by it. Managers who think they should hire only COBOL programmers who have used DOS/VS because that is what they themselves use, can be compared to someone who hires only chauffeurs who have driven Cadillacs for at least a year, regardless of the availability of other drivers who may have better safety and skill records.

Experience with some computer system. While experience with a particular computer system is not important, some experience with some computer system is generally required for all positions.

General business experience. In the business dp field, this factor increases in importance as the responsibility level rises. Some feel experience in a specific business is also important, which may be true, especially for systems analysts. (If so, one should make that a factor on the chart.) Most have found that a good, broad business background brings something to a company that a single long experience cannot, in terms of imagination, potential, and just plain good ideas obtained elsewhere.

Some college education. This factor includes successful completion of at least one semester of college work. Some college work may indicate the candidate's innate abilities, but can never be considered preparedness for performance. (In scoring, persons with degrees are given the number of points for "some college education" in addition to points for the degree.)

College degree. This factor is rather controversial of late. My experience, and that of others, seems to indicate that a computer science degree actually has a negative correlation with a person's preparedness for dp work.

Therefore, except for the more technical aspects, this factor receives a low score on importance.

Logic ability. This is a measure of the person's ability to think clearly, without confusion and without accepting nonrelevant information.

Cybernetic ability. The term "cybernetics" usually refers to the study of the interaction of the parts of a system, specifically at the juncture between man and machine. A person's cybernetic ability is the ability to consider a system as a whole, while at the same time placing each part into its appropriate frame of reference—especially the macro parts called computers and people. Lack of this ability on the part of systems design personnel has, in my estimation, caused more system failures than any other single factor.

Maturity. "Maturity" is generally required in direct proportion to the extent that quick decisions and failure to admit mistakes can impact the organization. Difficult to define accurately, it is definitely not measured by one's age.

Reaction reflex. The reaction reflex describes how a person reacts when faced with the unexpected and unknown. Some may feel the need to "cover up," react with anger, or jump to conclusions; others may take the time to think the problem through and attempt a reasonable solution.

Patience. Patience is important. In the dp profession, many are required to produce prodigious amounts of work in a short time. Short cuts are often taken which later loom like switchbacks in the mountains—no room to turn around, no way to make further progress without much lost time. Thus the ability to work the problem out and lay all the proper foundations is highly important, especially in systems analysis.

Constructive imagination. Many people have imagination, but it may be so unconnected to reality that it is of little value. The ideal would be to have fertile ideas combined with an ability to sort out what is of value to the employer.

Factor testing

Some of the factors comprising the requirements for a particular dp position can be tested during the interview. Such tests are really no more than a further probing of the job candidate's abilities that most interviewers normally engage in. However, the questioning can be more pointed and focussed when the interviewer prepares for it, so that when the interviewer hones in on the candidate, the results are really a sort of test of that particular attribute required for the job.

Here are some tests I have found useful:

Experience test. Ask the candidate to describe the systems worked on, the programs written, and the relationship of the programs to the rest of the system. A rote recitation of the intricacies of the system proves nothing except that the applicant has a good memory. Forgetting details also proves nothing except that he may have more important things on his mind, or more likely, is nervous.

As you question him about the programs and systems, probe for understanding of the reasoning underlying the various parts. Are there any improvements he would make? What are the strengths and weaknesses of the system? What mistakes were made, and what would he have done to improve the situation if he could? The answers, and more important, the reasoning behind the answers provide positive indication of the value of his experience.

To find out whether his experience will be of value to you, postulate some problem in your business, and ask for a top-of-the-head solution.

The key to the value of experience lies in the ability of the individual to assimilate principles so that when faced with similar problems in different settings, he can apply his previous experience.

Logic test. Among logical thinkers are two major categories, the "straightliners" and the "spiralers." Generally the straightline thinkers move easily from one conclusion or fact to the

(Continued at bottom of page 36)

A Sample Interview

The groundwork has been laid, you have worked out your requirements, prepared your chart, and have an appointment to see the prospect. What now? How is it possible in just one meeting to find out if this person matches your requirements, or even harder, how does this person compare with the many more you hope to interview? (Hopefully, at least two from the

dp department will interview the prospect and compare reactions afterward. This step is skipped with great peril!)

Let's assume the candidate has three years experience in programming, all at one place. He states he wrote the programs and performed minor systems work in the areas of accounting and management reporting. He has used DOS/VS, writing in COBOL. He is a col-

A Sample Interview

lege graduate with a major in management and a minor in accounting. In college he studied BAL and COBOL programming. He also states that he has just begun to write programs to be used on-line for a new data entry system.

At the point where this excerpt begins, the candidate has been put at ease, the parties concerned are now more or less acquainted, and the time is ripe to begin the testing. In abbreviated form, the questioning might go something like this:

The experience test

Interviewer: Joe, tell me a little bit about this accounting system that you've worked on. Your paper here says that you wrote programs for the general accounting system. Did you write the ledger programs?

Candidate: Yes. I had to design the system which transfers information from the tapes which contained the payments into the general ledger.

I: How many programs were there?

C: There were three.

I: Tell me about those programs.

C: Well, one searched the transaction tape daily and transferred transactions into a monthly tape. The second one built the master general ledger tape. A third program actually printed out these transactions for the accounting people to use.

I: And how did the accounting people use these printouts that you produced?

C: I don't know. They just went to accounting.

At this point, it seems that his experience with the accounting system is not of much value. Let's find out why.

I: Well, how did you find out what to put on those forms? How did you know where to print what information?

C: The systems man designed the form, and gave me a layout of the form so that I could print it the way he wanted it.

I: Will you tell me a little bit of what information was on that report?

C: There was a ledger number, and there were debits and credits.

I: Okay. What sort of information were these debits and credits?

C: I don't know. They were just debits and credits.

I: You say in college you had an accounting minor and you studied management.

C: Yes. I know what a debit is and a credit is, but I don't know how the accounting people used it. There were such things as, you know, payments on account and general disbursements, and things like that, and there was a journal number on there, too. I guess

they balanced the journal against the ledgers to make sure that all the transactions were on it.

I: What would you do if you had to design that form? How would you go about it? You say you didn't understand it because the systems man did it, but how would you have done it?

His total experience didn't seem to be of much value, but this question will better determine what value his experience is to us.

C: Well. I would have gone up to accounting and sat down with them, and our systems man didn't always do it that way. He wouldn't tell us what was going on very much. But I would've found out what they were doing already because I think this form didn't really do what they wanted.

I: And then would you have made any changes, do you think from your experience in just writing this.

C: Yes. I would've put a journal number on every transaction and I would have had a detailed list available with a breakdown by ledger by day so that we would have balanced this thing daily instead of waiting until the end of the month. Yeah. And I probably would've included the operation of putting the daily transactions into the monthly ledgers with the programs which handled the transactions in the first place instead of having separate programs.

He obviously needed to be awakened. He has potential and has demonstrated that he learns even from a bad experience. The first Experience Test did not show enough, so we'll lead into a second.

A second experience test

I: Good. Now would you tell me a little bit about this management reporting that you had.

C: Yes. Every month we made a report which went to the sales managers. It was broken down by salesman's account numbers. Each of our salesmen has a separate account number which tells the manager what he sold, and what he sold was also broken down by the type of item it was, and the amount of profit the company had made; this is a standardized number.

I: Well again, you seem to know more about that than you did about the accounting anyway. Did you design the system or what happened?

C: The systems man gave me a layout and I didn't really understand it too much, so I snuck over to the sales manager and I talked to him a little bit and asked him about it, so we got a few of the things in. We couldn't

get everything we wanted in this thing because the systems man hadn't put it in the master file, but we were able to get what we could out of it, and so each sales manager gets a report that fits him.

I: Uh-huh. If you had to design a new management system, what would you do?

C: Well. I would first get to know my company better. My problem here was that this was the second system I had done. I did the accounting first, so I knew the company a little better, but I would've learned more about my company's products and organization, and I probably would have included some organization information on this thing. *A little maturity showing, also good use of experience.*

I: Now, getting back to programming, did you have any trouble learning to program when you first got out of college.

C: Oh, yes. I found that programming in real life was completely different from what we did in college. It's a good thing I knew accounting though, because those accounting guys would have really got me if I hadn't studied accounting.

I: What do you mean by that?

C: Because I had this degree in accounting, they listened to me. The systems man, you see, has a degree in computer science and he didn't really understand accounting at all. He had everything set toward the machine.

Cybernetic empathy

I: What do you mean, set toward the machine?

C: Well, he had a beautiful machine system. The machine ran very beautifully and the tapes moved fast and the discs were used heavily and he was able to do the whole job in just a short amount of computer time. The only problem was that nobody could read the reports when they were done.

I: Huh? What do you mean nobody could read the reports!

C: Well, there were no headings on them hardly, and when there were, they were in cryptic language—so when he wasn't looking I changed some of them to English.

"Maturity" test

I: Ohhh! Well, how did you get away with this in your company? Didn't they get a bit upset?

C: No. I didn't rub it in their faces, I just quietly made the changes. In fact, in some cases I went to some of the guys who wanted the changes—especially this fellow in the management, (the sales manager there)—he just simply went and asked for what I told him he should ask for because I told him the computer could do it. They'd been telling him, you know, that it

couldn't.

He has successfully handled the "maturity" test, now to see if the logic test shakes him up.

A logic test

I: Changing the subject now, I want to present you with a bit of a problem, and don't be afraid if you haven't seen this problem before. It's just to try to find out a little bit what you're made out of. I know that in our previous discussions you talked about merging tapes and all that sort of thing, and I know that in school you studied writing merges. Now, most of these (I notice) you've had to read in a master file and a single transaction file and match it up by some key and produce some results. Now, I'm going to ask

to set up a block for printing and so forth.

The blackboard exercise

The candidate goes to the blackboard, begins to draw and completes the assignment. It becomes obvious that he has never been asked to write a three-way merge with processing and printing all going at once. He is flustered at times, and asks questions. The interviewer gives him encouraging help but does not tell him how to do it.

When the assignment is done, there are several flaws in it. The interviewer gently questions him about the flaws by the technique of asking, "What happens if—." The candidate in turn answers these questions, looks somewhat dismayed, but goes back and

got a chance for a job. You try to encourage him without giving him false hopes because you haven't made your mind up at this point, really.

A cybernetic test

The interview continues:

I: Now we have had a problem here in the past. I hope we've got it solved now, but I would like to see how you would have solved it.

First, let me explain that in our basic system all our orders come into the computer. We really should be on-line, and we are looking for programmers to help us get on-line with this system.

All our orders come into a data entry group and they edit these orders and mark them with account numbers and make sure that the account numbers are on properly and the order is properly filled out, and that sort of thing.

And then the orders are entered into the computer by cards. The computer checks credit and checks the item number against the item master and picks up the prices, and all that sort of usual stuff. Then it produces orders and eventually transfers the data into the general ledgers, produces sales reports and invoices, statements, etc.

We have several different types of entry which have to be made, but because of the diversified and independent nature of our businesses, we can't even get our item numbers to follow a consistent system between the different departments, so it gets pretty complex.

We have programmed pretty fairly, but our order entry people find it so complex that they make a lot of errors. They tend to put the account number where the item number should be and vice-versa. They used to have a system where the item number was six digits, and now it's seven and so on.

Now we think we've solved the problem, but I would like to hear how you would solve it.

C: Well now, I would think that you'd have to have some kind of error checking on the computer that would check the cards to make sure that they were properly entered. You may want to have someone read all those documents before you keypunch them, because if you get them in the computer it can become expensive if they go in wrong.

I: Yes, but people are expensive, too. If they're just checking and proving it isn't always all that good, you know.

C: Yeah, people do make a lot of mistakes. Well, it depends upon how many errors they make, you know. Then you'd want to have an edit in your computer that would stop it—stop the stuff from getting into it, I would think. You could put a check digit on some of the stuff, and you could. . . . Well hey, you know what



you to go to the blackboard there and draw a block diagram where you have three tapes come in.

Okay? Ready to go? Go to the blackboard and draw a block showing the three tapes. One tape has the master file and two transactions and you're going to read these in, match them together and you're going to create another output tape. As each transaction is read and processed you're going to print a list off the printer, just a simple list with the stuff broken down across. Now, I don't want you to get into details on how you are going to make the printer work, but I want you

questions the interviewer.

After much erasing and use of chalk, the candidate has generated a really fine three way merge in general block style.

He did well on the logic test, showing maturity and that elusive resourcefulness also. His "reaction reflex" is good.

There is now some discussion of a little bit of the personal thoughts and philosophies of the candidate. You knew all this before, but you discuss his hobbies a little bit and take five to ten minutes to calm him down and help him to get his breath back after the problem of wondering if he's still

A Sample Interview

you really need is a crt that would edit the stuff as they entered it, and then the people would be reading these documents, and they would enter these things as they thought about them, and the computer could be programmed to come back and tell them.

He can relate men and machines.

I: That's what we thought about, and that's what we're going to try to do, but I'd like to know how you'd solve this problem on the cards.

C: Oh! Okay. Well, let's see—of course you'd want to keypunch them as soon as you could, and you'd want to have them run through the computer as soon as possible, and you'd want to have the errors go back to the people who made them.

Hey, that's the answer. If the people could see right away what errors they made, then they would probably begin to do it right. And, of course, you want to try to bring consistency wherever you could, because you know if you're going to have different things, it's kind of a mess. You'd want to have forms. You'd want to make all the preprinted forms you could and use the old terms if you can and then translate them into new terms. And you'd want to have the computer—Oh! Yeah sure, if you've got a discount code . . . Oh! yes, you have discount codes and you have certain types of customers who get discounts. You can have the computer check that sort of thing.

Programming would be kind of rough. In fact, the edit program might be the most difficult one. If you're going random though (like you told me), that would help, because you see random—in my limited experience, most of mine has been sequential—but

random seems to be so much easier because you don't have to worry about merging tapes like this problem I just had to do. . . .

He agrees with you. Because his current supervisor is not providing healthy training, this is a surprisingly good reply.

The interviewer breaks in, but tries not to show the candidate he is satisfied with things at this point. The candidate has done well so far, but it is probably worthwhile to give him one more non-blackboard exercise in thinking through the design of another system as a test of his constructive imagination. At this stage in the testing, the interviewer would be verifying what he thinks he knows about the candidate.

Evaluation

I would score this individual as follows:

Specific experience	0
General experience	2
General business experience	2
Some college education	3
College degree	1
Logic ability	4
Cybernetic ability	3
Maturity	4
Reaction reflex	5
Patience	5
Constructive imagination	4
Total	33

The candidate is obviously weak on good experience, but he has made very good use of what experience he's had. He is qualified to be a senior programmer, but because of his talents we might try to hire him as a systems analyst trainee. *

for additional facts but, when denied, will continue to work without excuses. When the disappointment of failure is presented, he will admit his mistakes and accept the test as a learning experience. Remember this can be a great psychological blow since the person feels the job is on the line. He is in no position to realize that getting the right answer is not as important as how he went about it, and his reaction to stress.

Cybernetic test. Place before the candidate a written specification, not of a system or a program, but of a function known to be computerizable in part, but which will also require people to interface. The output should be some function report and the input should come directly from people.

The candidate will work with the interaction of the hardware system and the people system; he must take into consideration both the human and the machine. It is less important that the candidate come up with a particular answer than for him to take proper consideration and make a reasonable attempt to have the machines serve the people. The key to success here is that "people characteristics" are considered and accounted for, yet some sort of reasonableness is maintained for the computer system.

Conclusion

The ideas presented in this article have worked successfully for the author. More or different classifications could be added with appropriate tests in order to match the individual requirements at each shop. Mistakes in hiring personnel are the most costly of all. Hopefully those who read this article will be stimulated to evaluate their techniques and make improvements where necessary. *

EVALUATING

next, making direct progress toward the goal.

The spiral thinkers move around the target, getting closer all the time, and always getting there. They are usually best at developing intricate plots for large novels!

Both types of logical processes are followed by all of us at one time or another, but for dp work, it is the straightline thinker who gets the work done quickly, well, and leaves his work in the kind of condition that others can follow.

To determine which logical process the candidate follows, if any, present him with a verbal description of a system but leave some glaring holes. It is best to use diagrams if possible. Also present the applicant with a problem which has recently been solved, or is

yet to be solved. The important thing is not whether he solves the problem at this point, but the approach he takes.

Caution—this test is sometimes negated by "sleepers," those who work quietly and say little. They are sometimes the most desirable people. The interviewer must use deft questioning to get them to reveal their method. Of course, the purely intuitive person who cannot recite his steps when asked might become a problem employee unless trained to elucidate his logic.

"Maturity" test. Pick an area where the candidate has very little experience, and postulate some problem which is basically simple, yet tricky. If the answer comes too easily, try again.

Most of the time the mature person will start with the facts and begin directly to work on the problem. He may ask



Mr. Hall has hired approximately 200 people at various dp levels since 1963, for ITT, Union Carbide, and other companies, with only five failures due to either inability to do the job or personality disorders undetected at the interview. He has also been a systems analyst, a project manager, and manager of systems and computer services in a medium size shop (about 40 people).

Assessing Managerial Potential

by Eugene J. Skoff

The technique is tough, but even the "losers" get something valuable from it.

One of the most critical and persistent concerns of top dp management is identifying, selecting, and developing or promoting qualified staff to fill vacancies as analysts, project leaders, supervisors, or other managers. Too often, too late, and at great tangible and intangible costs, it is discovered that an otherwise qualified technical superstar develops "people problems" when thrust into a position of authority over others, or when dealing with people outside the context of his immediate responsibility.

When senior dp management is confronted with identifying human interaction skills or leadership potential, what options are available beyond educated guesses? There are the traditional approaches such as psychological tests, past performance records, experience, seniority, or combinations of these, but all these approaches have a poor batting average.

The inefficiency of the traditional approaches is nowhere more emphatically illustrated than in the mounting court activity resulting from the Civil Rights Act of 1964. One of the major revelations of federal involvement and court activity is that the traditional approaches often fall very short on issues of job relevance, objectivity, reliability, and predictability of job performance.

The assessment center

For the past 18 years, the "assessment center" technique has been gaining widespread use and recognition as a very effective tool in finding managerial talent. The technique is a highly controlled, two to three day procedure in which a team of carefully trained assessors (usually company managers) observe and evaluate candidates, typically for supervisory or management roles.

Research has demonstrated the superiority of the assessment center over



more traditional methods. Not only is it superior in predicting leadership success, but also in gaining:

- (1) increased precision in manpower planning;
- (2) greater insight into effective management and supervisory skills;
- (3) improved skill in interviewing, observing, and appraising relevant leadership potential;
- (4) more effective training and development activities (because training programs can be tailored to the supervisor's or manager's development needs);
- (5) more efficient allocation of training and development resources;
- (6) greater insight and motivation for self-development efforts; and
- (7) increased departmental morale (as a result of senior management's genuine interest in the career mobility of its staff).

The assessment center technique originated in World War II when it was used by the Office of Strategic Services for the selection of agents. In 1956, AT&T introduced an adaptation of the technique in the Bell System. The technique has since spread widely to a variety of businesses and indus-

tries. In addition to use in management and supervisory appraisal, selection, and development, it has been used for the evaluation of salespeople, law enforcement officers, school administrators, governmental officers, and a wide variety of others.

Today over 1,000 organizations, large and small, many on the *Fortune* "500" list, use assessment center techniques. The idea is not really new then, but it does seem new to dp. Only one pilot assessment center seems to have used it. The center was operated in a large midwestern dp installation (an installation large enough to have 230 systems analysts and 120 persons in computer operations). Here's how it was done, and the results of doing it.

Establishing the purposes

The purpose of the center, in the pilot operation, was to answer two questions: Which of the Systems Supervisors have the best potential to succeed at the next level position of Systems Manager? What are the specific development or training needs of each supervisor in making them into potential managers?

For clarification, in this shop the Systems Manager is one who is responsible for feasibility studies for new applications and for systems design. Sometimes called a Manager of Systems Analysis, this person assigns and directs personnel, consults with and advises other departments on systems and procedures, and reports to the Manager of Data Processing. A Systems Supervisor assists in planning, organizing and controlling the activities of the section and in assigning personnel to projects. Other installations may call this person a Lead Systems Analyst; he or she may act as systems projects manager, and may also coordinate the activities of the section with other sections and departments.

The assessment center technique

POTENTIAL

also offers possibilities for evaluating candidates for lower level leadership positions such as lead systems programmers, lead applications programmers, or lead computer operators. An equally exciting possibility is the use of the center to evaluate nonsupervisory personnel, for example, to determine whether a systems analyst has the additional necessary human relations skills to become a senior systems analyst.

Determining critical skills

After the purposes of the center were established, the next step was to conduct a thorough job analysis of the target position "Systems Manager." The aim was to determine those *observable* behavioral elements or "dimensions" which are critical to that person's successful performance. The job dimensions were established by reviewing existing job descriptions and by discussions with managers both in the target position and at one or two levels above it. Examples of some of the dimensions identified were: leadership, planning and organization, development of subordinates, stress tolerance, problem analysis, and decisiveness.

Selecting the exercises

The next step was to carefully select a combination of exercises or simulated managerial tasks which would elicit and measure the critical managerial dimensions.

The five exercises used consisted of a background interview, an analysis/oral presentation, a supervisory training committee problem, "characteristics of a good supervisor" problem, and an in-basket problem.

1. *Background Interview:* The background interview, a vital component of any assessment center, is the only time in the process when the focus of attention shifts from the "here and now" to the participant's background. This interview is the primary source of information on such critical job dimensions as motivation, work standards, independence, interest in self-development, career orientation, etc. The interview is conducted only after careful preplanning on the part of the assessor, and can be conducted in 1½ to 2 hours.

2. *Brookville Community Bank Problem* (analysis/oral presentation exercise): This exercise was assigned as homework, and the participants were given two hours for the problem analysis and preparation of their oral presentations. Seven to ten minutes were allowed for the oral presentations and 45 minutes allotted for a following group discussion.

In the exercise, the participants assume the roles of consultants whose services are sought by a bank facing a decision about computerization. The participants are given a large volume of information regarding the bank's business and financial situation and various personnel issues to be considered. The participants must sift through all this data, prepare recommendations, and then present logical arguments to back up the recommendations in an oral presentation.

After all the "consultants" have made their individual oral presentations to the "board members" of the bank (the assessors), all the participants meet as a group to arrive at a consensus recommendation to resolve the bank's computerization problem.

This exercise gives the assessors the opportunity to observe each supervisor's oral presentation skills, communication skills, and problem solving ability, in addition to other critical managerial behaviors such as leadership, stress tolerance, flexibility, persuasiveness, independence, initiative, etc.

3. *Supervisory Training Committee Exercise:* In this exercise, the supervisors assumed the roles of managers who are asked to recommend a subordinate to attend a departmental pre-supervisory training program. Within 45 minutes, the supervisors (acting as a team of managers) must make judgments on the proposals of other team members, and allocate training funds. Each "manager" is assigned a candidate and given extensive personal and work background information. The participant's primary task is to: 1) convince the committee that the candidate should be nominated for training, and 2) aid the committee in making the best final recommendation.

This exercise provides additional opportunities to observe each participant's leadership skills, problem analysis ability, judgment, persuasiveness, flexibility, communication skills, and other critical managerial skills.

4. *Characteristics of a Good Systems Supervisor Exercise:* This was a leaderless group discussion in which the participants were required to identify and list in order of importance the specific behaviors that distinguish a successful Systems Supervisor from an unsuccessful one. The group has to reach a consensus on these behaviors and their relative rank in the list within one hour.

This group discussion provided assessors with insights into each participant's strengths and weaknesses in the understanding and appreciation of the duties and responsibilities of a Systems Supervisor. In addition, each participant's leadership ability, problem analysis ability, judgment, decisiveness,

flexibility, tenacity, and persuasiveness could be judged.

5. *In-basket Exercise:* In this final exercise, the participants, acting as newly appointed managers, were required to make decisions and dispositions on several items that might typically be found in a manager's in-basket. The contents of the in-basket consisted of 28 items such as letters, memoranda, reports, budgets, notes on personnel problems, and other items requiring action. Within 2½ hours, the participant must sift through contents of the in-basket determining priorities and actions, planning meetings, routing letters and memos, etc.

After the in-basket was emptied, an assessor interviewed the participant to probe into reasons for actions, and to give the participant an opportunity to explain his rationale for decisions. This interview averaged about an hour.

The in-basket problem provides the assessors an exceptional opportunity to see the participant's critical administrative skills such as planning and organization, management control, use of delegation, judgment, and flexibility.

Training assessors

Five Systems Managers were trained to serve as assessors. Assessor training (and the operation of the center itself) took place on company premises. Unless cost savings are paramount, it is more desirable to conduct assessor training and the assessment of participants offsite, preferably in hotel or motel facilities where job related interruptions can be controlled or eliminated completely. Fortunately in this case, neither training nor assessment quality in the pilot center were diminished by on-site disruptions.

The focus of assessor training was on the assessors: (1) becoming thoroughly familiar with the critical job dimensions, (2) developing interviewing and observation skills, (3) actively participating in each of the selected exercises, (4) writing reports, and (5) learning how to reach final assessment center decisions. All of the training exercises were videotaped to provide immediate feedback, and equally important, to provide assessors with insight into their own personal managerial strengths and development needs. (The training and overall experience of being an assessor is one of the most important and outstanding side benefits of the assessment center procedure.)

Once managers have been trained, they can be called upon again and again to serve as assessors in subsequent centers. Further, it is advisable to train as many assessors as can be accommodated by the facilities available. It is not unusual to train twice as many assessors as are needed because

of the developmental impact of the training process.

After the training of the assessors was completed, the actual operation of the center was begun. Ten systems supervisors volunteered to participate. (The usual ratio of assessors to candidates is one to two. Whatever the ratio, the assignments are scheduled so that assessors see different participants in each exercise, and all assessors see each participant at least once.)

During the assessment, the manager-assessors observed and recorded the behaviors of the supervisors as they performed on the five exercises. All the exercises except the background interview and the in-basket were videotaped. The supervisors were later given an opportunity to view playbacks of their tapes and critique their performances. As in the training of assessors, this videotape feedback provided dramatic insight for the individual participant on his particular strengths and weaknesses.

After the supervisors had completed all the exercises, they returned to their regular work. However, the assessors



and the center administrator worked an additional two days to discuss the performance of each participant and to make their final evaluations and decisions.

Assessor discussions

Over the two day period, each of the supervisors was evaluated separately. Each assessor presented his exercise report on a particular supervisor to the other assessors. After comparing and discussing the observed behavior across all the exercises, the assessors reached a consensus rating on the supervisors' strengths and weaknesses relevant to the job dimensions.

Then, in the final step, the assessors made an overall review of the information presented on each supervisor and came up with a global rating of the supervisor's potential for succeeding in the Systems Manager position. Thus, the assessor discussions yielded a pro-

file of each supervisor's strengths and weaknesses—providing the framework for later developmental action—and at the same time yielded an overall judgment of the supervisor's potential to succeed in a managerial position.

In summary, the actual time span from the planning stages to the assessor discussions was about 17½ days. Of this, 5 days were required for planning the center and developing the critical job dimensions, 5 days for assessor training, 2½ days for the actual conduct of the program, and 2 days for the final assessor discussions. An additional 3 days were required for the center administrator to prepare individual reports on each supervisor, summarizing and reflecting the assessor discussions and findings.

Feedback interview

Each supervisor who participated in the pilot program was given personal feedback on his performance. The center administrator and the supervisor's immediate superior were present at the session. The supervisor was permitted to read and discuss his own report. The supervisor's managerial strengths and development needs were emphasized and tentative development plans were discussed.

After the feedback interview, the supervisors and their immediate superiors met to work out more formal development plans.

Reaction to the pilot program

Immediately after the completion of the pilot center and after the supervisors had all received their feedback interviews, a questionnaire survey was administered to both assessors and participants. The purpose of this survey was to provide top management with an estimate of the receptivity and impact of the pilot program, and to provide essential information for making adjustments in future programs. The questionnaire covered such points as: quality of assessor training, capability of assessor staff and center administration, adequacy of the job dimensions, adequacy of assessment exercises, accuracy of center decisions, adequacy of feedback, center facilities, and opinions regarding the usefulness of assessment center decisions and the assessment concept itself.

The survey data from the manager-assessors revealed some criticism regarding the adequacy of some of the job dimensions definitions, in addition to constructive suggestions on some of the exercises. The assessors were unanimous in the opinion that an off-site rather than a company location should be used for conducting future centers.

Overall however, the survey revealed that the pilot program was quite posi-

tively received by the assessors. Here is a small sample of some of the comments: "Observing the participants provided more insight (regarding managerial potential of supervisors) in a week than years of casual work relations." Higher management should "place a great deal of weight on assessment center results when considering candidates for promotion." The assessment center can "to a great extent objectively measure a candidate's capacity for management."

The survey of the candidates indicated that they too, in general received the pilot program in a positive light. However, some understandably had initial apprehension about attending the program. Others expressed concern about the long term effect their center performance would have on their futures. Some described their assessment experience as "stressful," "irritating," and "tiring," but the experience was at the same time "challenging," "competitive," "stimulating," and "interesting."

The participants also made constructive comments regarding the exercises and improvement of feedback content. They all agreed that "the program was very worthwhile," that "the program measured important qualities in their organization's management to a considerable extent," that they "enjoyed all or most of the exercises," and that "the videotape feedback was highly beneficial."

Positive results

The pilot assessment center program satisfactorily achieved the purposes for which it was designed. First, management was provided with a carefully evaluated pool of managerial talent from which it could later draw to fill Systems Manager positions.

Of the supervisors who participated in the center, 60% were considered by the assessors to have above average potential for moving into the Systems Manager position. Of this 60%, 40% have been promoted to Systems Manager positions, and 20% are eligible when position openings occur. Of the 40% who were rated below average managerial potential, some have transferred to other departments of the division and others have left the company.

Due to the recent promotions of the above average participants, it is too early to determine if the assessors' predictions have been borne out. Whether or not to expand the pilot program into a full blown divisional assessment center program also hinges on a future evaluation of these predictions.

The program further increased the leadership potential of Systems Supervisors by pinpointing their development needs and by providing the opportunity to act on these needs *before*

POTENTIAL

they assumed managerial assignments.

A final possible benefit to the company with an assessment center program is that it may have a competitive edge in attracting and recruiting high caliber talent. The intelligent, talented, and ambitious professional may consciously seek out a company whose selection and appraisal procedures provide a fair and objective opportunity to display his or her leadership talent.

Costs-benefits

Costs of assessment centers are unique to the organization in which they are conducted and largely depend on what is included in arriving at cost figures. Some of the factors are: the objectives of an assessment center program, length of the program, number of candidates to be assessed, organizational level of candidates and assessors, lost time (if any) on the job (some centers are conducted on weekends), cost of exercises and material, travel costs, facilities used (onsite or motel), and use of outside consultant.

Published figures on costs range roughly between \$375-\$500 per candidate.

Although assessment centers are not inexpensive, the benefits to be gained are considerable. In addition to benefits cited above, the superior predictive efficiency of the assessment center techniques over traditional approaches is major. And the centers essentially offer twofold benefits: they fill both organizational appraisal and development needs. Finally, there is the savings of long-term costs, both tangible and intangible, of supervisory or managerial failure. Such costs can far exceed the comparatively modest per capita investment required to conduct an assessment center where failure risks can be substantially reduced.

Assessment centers are not the prerogatives of large companies or corporate giants. Smaller companies have the same managerial appraisal and development needs, and many have effectively applied assessment center techniques in their smaller settings. There are several options available (such as doing some of the exercises at home) that can result in much time and cost savings.

One constraint in a small shop would be the availability of enough assessors or candidates to justify an assessment center. Another important consideration and possible barrier to objectivity of appraisal in the small shops is that assessors may be the immediate superiors of candidates or may otherwise know the candidates. However, these constraints can be over-

come by careful assessor training and strategic assignment of assessors to candidates.

The personal impact

What are some of the problems that attend this technique? One of the major concerns of management is the participant who does poorly in the center, but the "loser" has not, after all, really lost. Probably, for the first time in his career, he has been given the opportunity to "show what he can do;" in return he has received the benefit of an objective and fair appraisal. If he can't cut it as a manager, it is better to find out now rather than build false hopes on a managerial career path that will never be realized—or if it should materialize, would probably lead to failure.

Moreover, weaknesses that are recognized early are very often amenable to formal development, and the motivated loser, by acting on his development needs, can turn out to be a winner. Mollifying the candidate who does poorly in a center can be accomplished by expert planning before the feedback interview and by providing him with alternative technical career paths if possible. Finally, all does not hinge on assessment center outcomes, since the data generated by them should be used to supplement other departmental appraisal procedures.

Another concern of management may be the attitudinal disposition of the participant while he is going through the procedure or after he has completed it. Probably of most concern to management is whether the experience was viewed as harmful, that is, exploitative or possibly degrading. Participants however feel *less* used and *less* humiliated when they have been evaluated on their own merits and on exercises which they can see are directly related to higher performance.

References

Another concern expressed by management is that the assessment procedure tends to produce conformists of little initiative and independence. Research at IBM indicates that participants who did well in their assessment center were more independent and less conforming than those who were not selected for center participation.¹ This is, according to assessment center expert W. C. Byham, "because the assessment center method brings out a broader range of data about the individual than is typical from interviews and other conventional means, decision-making is not restricted to the superficial characteristics often associated with an 'organization man'."²

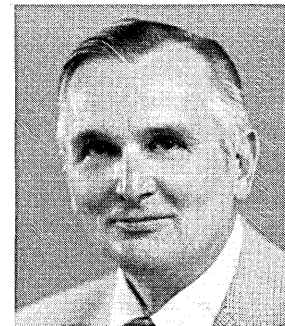
The assessment center technique has been found to be consistently superior to the traditional methods of evaluat-

ing people for promotion—up to three times more valid and predictable than other methods.^{3,4} Moreover, studies show an absence of sex and racial bias, which is not true of traditional methods.^{5,6,7} (For cost references, see numbers 8 and 9. For the use of centers in small firms, see reference 10.) Finally, the method has demonstrated a great deal of acceptability by the Equal Employment Opportunity Commission.

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Conclusion

These and other issues indicate that the assessment center approach may not be the final solution to problems of management appraisal and development. However, there is no doubt about its superiority over traditional approaches. *



Dr. Skoff is an industrial/organizational psychologist in private practice as a management consultant in Chicago. He received his Ph.D. from Loyola Univ. in Chicago and is a member of both the American and Illinois Psychological Associations.

Women Speak Out on DP Careers

Winifred Asprey and Anne Wheeler Laffan

Women in data processing take pride in their work and find satisfaction in their jobs. But is the way to the top closed to them?

How do women view their roles in the computing field? A one-page questionnaire sent to 425 women in the U.S. who hold, or have recently held, professional jobs in the computing field or who use computers extensively as a research tool, received a 77% response. Almost all the respondents had such strong views about their roles that they added thoughtful comments, many at great length. Presented here are the results of the survey and a sampling of the comments.

The questionnaire—and comments

Table 1 (p. 42) shows the questions on the survey to which answers of "yes" or "no" were requested, and the percentage of "yes," "no," and blank responses. Respondents leaving a question blank always gave comments since they thought the question was too complex for a simple yes or no.

Two-thirds of the women responding felt they had equal status with their colleagues in pay, promotions, and overall. Seventy percent felt they had opportunities for advancement to a senior level, but only slightly over half thought there were opportunities for women to hold highly responsible management positions. Interestingly, the "yes" answer to management opportunities came preponderantly from the youngest age group—a sign of the times, or youthful optimism?

Far more informative than these statistical results were the comments, both favorable and unfavorable, on the role of women in the computing field which the last item on the questionnaire invited. The women felt strongly about their roles in the computing



world today, and what can be done about those roles.

Views on their roles included views on management opportunities, salaries, and problems uniquely feminine. In reflecting on what can be done about those roles, the respondents discussed attitudes and viewed the future with hope tempered with stern warnings.

Mirror, mirror on the wall, is my role a fair one after all?

On management opportunities, consensus reigned on some points:

(1) Although women today can attain low and low-middle management positions rather easily, men have a monopoly on the higher management positions, often through a "buddy" system.

(2) A large number of companies have a program on the books to put women into responsible management positions, but only "seeing will cause believing."

(3) The pool of women candidates qualified for the lofty jobs is small or nonexistent because of the generally accepted policy that promotions should come from within the company, and women are, as yet, on the lowest rungs of the management ladder.

A 23 year old graduate candidate for an M.S. in computer science, who also holds a job in a systems development group of the Dept. of Commerce, has had an "eye-opener" in the past several months. "By and large," she says, "women who do attain management positions are aggressive, super-competent and competitive, and scorned by males as 'unfeminine' and 'know-it-all' types."

From a woman who conquered: "It was only after I reached middle management that I saw men acting as though they were threatened by my position being filled by a woman. Now that I am in higher management, I do not, on my level, see anyone acting threatened—only happy to have someone with whom to share the work and responsibility."

Reverse discrimination is a growing concern: "Male backlash occurs because they believe women are being promoted unfairly. In IBM, the men are reacting to the words which management spouts, not the reality. The reality is that fewer than 5% of all managers are women, an especially poor record because IBM has an unusually large number of women capable of holding management positions."

Salaries

"Equal pay for equal work PERIOD!" expresses the desire on salary, a goal definitely closer to realization

WOMEN

today than ever before, though still far from universal.

Percent Response By Age Group

Questions	20-29 Years Old			30-39 Years Old			40 Or Over			Total		
	Yes	No	Blank	Yes	No	Blank	Yes	No	Blank	Yes	No	Blank
Equal Status with Colleagues in:												
Pay?	64%	25%	11%	74%	17%	9%	66%	22%	12%	69%	21%	10%
Promotions?	68%	21%	11%	70%	18%	12%	60%	23%	17%	66%	21%	13%
Overall?	72%	21%	7%	69%	18%	13%	63%	23%	14%	68%	21%	11%
Opportunities To Hold Highly-responsible Positions in:												
Senior Level?	71%	17%	12%	66%	20%	14%	73%	19%	8%	70%	19%	11%
Management?	61%	31%	8%	56%	29%	15%	53%	30%	17%	56%	30%	14%

Table 1. The majority of women in computing, according to responses to these questions, believe they enjoy equal status with men in pay, promotions, and overall. However, only 56% believe opportunities exist for women in management level positions. (Blank refers to respondents who wrote fuller comments to the questions than yes or no allows.)

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CIRCLE 63 ON READER CARD

Witness the following from a recently promoted 37 year old project manager who holds an M.S. in computer science: "If asked about equal pay, the company responds that women are paid in the same range as men. I'm paid at the bottom of the range. Enough said."

A related sentiment comes from an over-40 analyst: "Pay increments seem to be the least amount that can be given to keep the woman from getting too unhappy."

However, almost 75% of the 114 women in the 30-39 age group indicated that their salaries were on a par with male peers. Typically: "I think it's a great field—the work is exciting, the salary opportunities are very good. I have never found women being paid less for the same work as happens so often in other fields."

Salary problems related to family situations generated considerable comment. For example: "Jealousy on the part of some supervisors occurs when they see both a husband and wife working and together earning more than the supervisor." Or: "I've been told: 'You deserve more, but we can't give a wife a larger raise than a husband's.'" Severely condemned were higher salaries offered on the basis that "he has a family to support."

Problems uniquely feminine

Availability of part-time employment or of work on a contract basis was cited as a major attraction of the computing field by women with family responsibilities. "I love my work and especially enjoy my half-time arrangement," said one young computer programmer. "It's the best of both worlds for a woman with children."

An older woman recalled: "For several years while my children were small, I worked for an organization called Computations, Inc., sometimes known as 'The Pregnant Programmers,' all of whose employees had small children and worked at home."

Yet as many women were critical of companies that have a policy of hiring only on a full-time, work-at-the-plant basis. A Ph.D. in theoretical chemistry responded: "Because of special demands by children or the 'head of the household' and his job, some women are forced to retreat to half-time work. Many computing jobs are quite adaptable to half-time, but management often is not."

An outstanding problem peculiarly feminine is the question of travel. A dp analyst for the State of New Mexico complained: "I have been denied attendance at IBM schools, seminars, and conferences out of town because of the additional expense and the 'improprieties' involved when a woman travels

with several men." A programmer analyst at Union Carbide reports: "Business travel for men and women together is frowned upon, and therefore women are rarely allowed to travel."

One large computer firm refused an overseas assignment to a woman even though she was the best qualified for the job, simply because she proposed to take her spouse and children along. Males were expected to take their families along at company expense; females were not.

Mirror, mirror on the wall, can my role be fairest of them all?

Women fault women for irritating attitudes. According to a seasoned professional technical writer over 40 who holds degrees in both English and physics: "Women, in general, do not believe that a woman can be as intelligent as a man." An engineer with Raytheon, M.S. in mathematics and six years of computing experience, has this explanation for the female role: "Sometimes I think women are just too polite. Anxious to be valued as part of the team, a girl will uncomplainingly do all the work necessary to get a job done. She usually ends up doing more than a fair share of the menial stuff herself rather than trying to palm it off on someone else. Often managers interpret this to mean she is content to stay at her level and not advance."

A former analyst for a computer firm, now a candidate for an M.B.A. at Harvard Business School, declares: "A woman must be willing to work as conscientiously as a man, including odd hours, a common requirement in the computer business. Personal problems must be left at home. While I was a project supervisor, I sometimes had to reprimand female team members for being preoccupied with their outside-office affairs. That never was a problem with male team members."

Threat or promise

How do women see male attitudes toward them as coworkers? A senior level person at Sperry-Univac, manager of Marketing Technical Services, observed: "Most men in the field, being gentlemen in the true sense of the word, are more gracious in their dealings with us than with our male colleagues." Women in their thirties most often cite sociological forces: "Younger men (under 35) are not as threatened by competent female colleagues. Perhaps conditioning since childhood was somehow different for both men and women in this age group."

On the critical side comes a comment from a member of the above-40 group who has been working only for the last five years: "There is less regard

for a woman's opinion and a different reaction to anything she says."

Many voiced the complaint that men refused to take a woman's career seriously. A systems designer for a nationally known bank, who has worked in computing for almost two decades and is well known for her contributions to ACM, presents this analysis: "... lack of promotion is due not usually to overt, conscious discrimination on the part of men, but to the rather interesting fact that the *thought* of promoting a woman simply seems *never* to occur to them regardless of how competent she is."

Typical of male attitudes that drew the most scorn: "Managers refer to their female employees as 'their girls.' Men supervisors find their females 'cute little dingbats' and use mannerisms and nicknames to indicate these attitudes."

A computer specialist in field engineering who lived and worked abroad for a dozen years before returning to this country a couple of years ago, cast a uniquely perspective eye on the future of the female in the computer field: "What I have noticed is the way the 'American ideal' concerning women [the meek, sweet helpmate] has permeated even the business world. If you don't fit this mold, people (both men and women) unconsciously try to force you into it. . . . My second observation is this overwhelming need to 'protect' our young women. This is done with only the best of intentions, and the men and women who do this are truly hurt when their protection is rejected as being paternalistic or discriminatory. What is even worse, so many of the women expect equal rights on one hand and this protectiveness on the other."

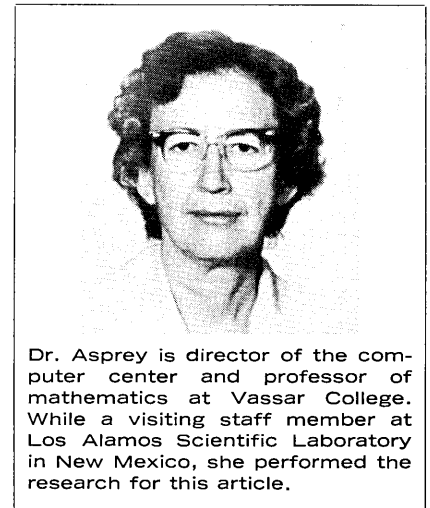
Increased numbers

"How do we solve some of these problems and improve the situation? First, by sheer numbers—critical mass. We must have more well trained and well educated women entering the field. This education process starts as far back as high school. Most people do not enjoy being different from their peer group; therefore, we must obtain the critical mass necessary so that these girls do not feel alone and uncomfortable in their studies for their future profession. Second, we will approach this critical mass faster if these young women have role models they can emulate. . . . We who are already in the field must make ourselves seen and heard so that these young women have the same chances to gain experience and groom themselves (in the professional sense) as our young men. They must see that they can live normal, useful lives as professional women."

Concluding reflections

Women in the computing field view their roles enthusiastically. While the added comments to the questionnaire did include many a tale of unfair prejudices, the very fact so many responded underlines the hope women hold for their roles in the future. Being a relatively new discipline, indeed younger than almost all the participants in this study, the computing field is free of built-in prejudices that abound in other fields. Although critical of still existent shortcomings and aware of a multitude of yet unrealized goals, most of the comments ended with a laudatory sentence: "I enjoy my work and my life, though, and I wouldn't trade with any man."

The computing field attracts, challenges, rewards the most able women. The best summation, reflecting the attitude of so many, comes from Betty F. Maskewitz, Director of the Radiation Shielding Information Center at Oak Ridge: "Computing is a wonderful field for women—an exciting field for anyone regardless of sex or any other stupid qualifier." ❁

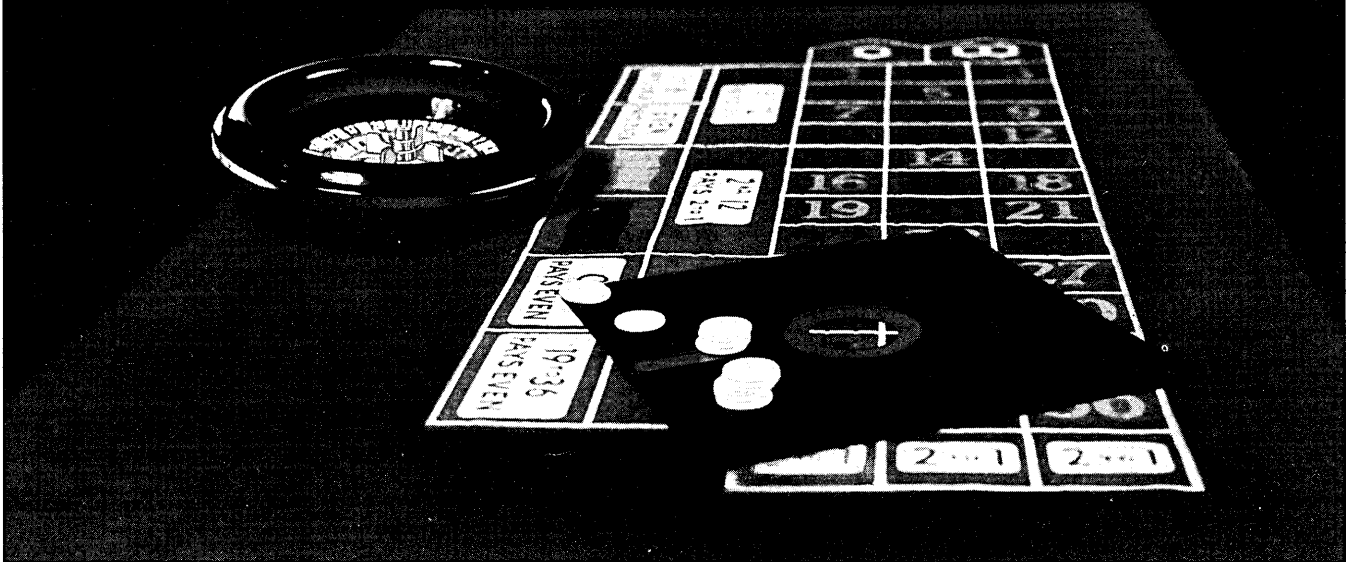


Dr. Asprey is director of the computer center and professor of mathematics at Vassar College. While a visiting staff member at Los Alamos Scientific Laboratory in New Mexico, she performed the research for this article.



Ms. Laffan has six years of dp experience, and her job currently involves documenting software. After graduating from Vassar and raising four children, she returned to computing and obtained an M.S. in computer science at Worcester Polytechnic Institute. "The computing field," she says, "holds great potential for women."

Novelties can be fun but... some games are dangerous.



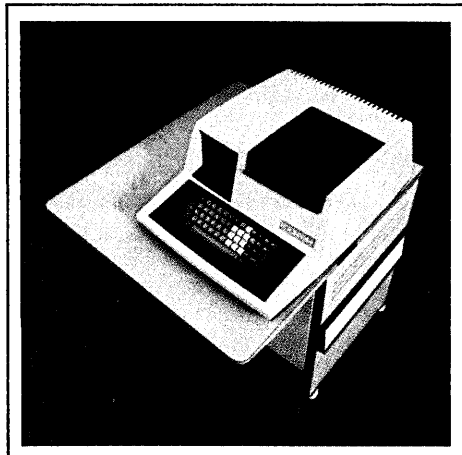
"When you gamble, do it for entertainment, and never with more than you can afford to lose." These words from a well-known Las Vegas gambler make a lot of sense — and not only in Las Vegas. How valuable is the data you must gather and process in order to keep your business running smoothly and efficiently? *Can you really afford to gamble with it?*

Many users who need access to information at data capture time think floppy disc systems are the answer.

BUT WHY BET UNTIL YOU'VE STUDIED ALL POSSIBILITIES?

The unfortunate history of the in-contact heads of a floppy disc in random access applications is all too well known by now. *The technical novelty of the floppy has been just that — a novelty.* This game has not been fair to the user, so Singer set out to even up the odds.

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The IBM 704: 36-Bit Floating-Point Money-Maker

by Richard A. McLaughlin, Associate Editor

It changed the whole industry's conception of what a computer is and how it should be used.

There is no other place where man's special technical genius is as well displayed as in the building and use of computers. In computers the imaginative powers of great minds from Babbage to von Neumann have been channeled through our best engineering and manufacturing skills into eminently practical tools for aiding other minds in the creation of other tools.

Part of the computer's role in the tool-building process is to work in the design and creation of the machines which will replace it. It has handled this role extremely well. As a result, the pace of this cycle of self-obsoleting has been so rapid that the passing of computers is seldom noted and only rarely recorded. Frequently the importance of one machine's contribution is missed entirely. This seems to have happened with the IBM 704.

Although the first 704 was delivered less than 20 years ago, in December of 1955, it is possible that only one model lived to see 1975. That machine was in Tulsa, in a service bureau, and it was turned off for the last time on April first.

The event went almost unnoticed. The people who had built it had long since lost track of it. More, when questioned about what made the 704 different or important, most of its builders and users had forgotten.

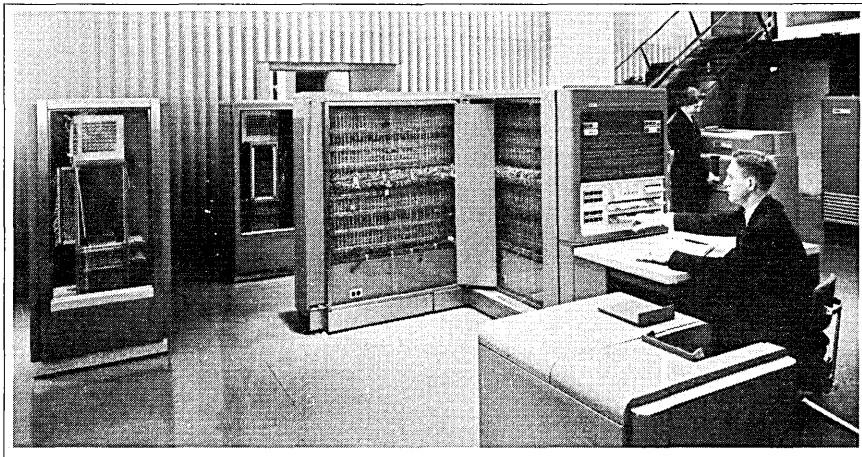
Yet there was much the 704 should be remembered for. It represented a milestone in the architecture of computers, in their application, and in their acceptance. One of the first industry associations was formed around it or in anticipation of it. Many of the systems facilities now taken for granted were developed on it or for it. Many of today's concerns, like standardization and compatibility, were first seriously addressed by its users. Its widespread

sale was concurrent with, and at least partly responsible for, IBM's rise to prominence over Univac. And there was a good deal more that could be claimed for it.

The machine belonged to what we

compared to the 701s that most early users ran them only 40 hours a week and had spare time available. The problems then being attempted were scaled to the size which could be handled by the 701; since that machine

could only run about a half hour between failures, most jobs were small. The 704 processor was about three times as fast as the 701's, and since it could sometimes run for days without blowing a tube, it could do a great deal more work and it was some time before most users loaded it to capacity.



First delivered in 1955, the IBM 704 was the most powerful machine of its time, so powerful that IBM's market forecasting staff thought only about six could be sold.

The first index registers

Because data processing has expanded so rapidly many of today's users have never worked on a computer older than an IBM 360. Those who have worked on second-generation equipment like the IBM 7094 will probably one day call themselves pioneers. It may be difficult for those "pioneers" to imagine what programming was like on a first-generation mainframe.

Scientific programmers working on the IBM 701 and their commercial-application contemporaries working on the 702 lacked some of the most basic hardware and software features. One thing those two early first-generation processors lacked was an index register. Even programming a simple loop was a chore. What whole new worlds must have opened when the 704 provided three registers for indexing and an instruction, TIX, for "transfer and increment index."

One thing the index registers did was to give IBM a clear advantage over Univac. Univac had been running head-on with IBM, actually holding the upper hand at the start. The IBM 701 had met stiff competition from the Univac 1101, 1102, and 1103. The "commercial" 702 had faced the Uni-

now refer to as the first generation of computers. Its processor and other logic circuits were built using vacuum tubes. Transistors had been invented, but wouldn't be used in computers for years. Still, vacuum tube technology had matured by the mid-'50s to a point where logic circuits built using tubes were relatively fast and reliable, and tubes or no tubes the IBM 704 was the most powerful machine of its time.

The first large scale core

The 704 was IBM's first core memory machine. Its predecessor, the 701, had an external drum memory and a small internal memory composed of little crt tubes called Williams tubes, which were highly unreliable. Core had been delivered for the first time by Univac in September of 1953, with the model 1103, but Univac's core was only 1,024 words. The 704 could be ordered with 4K, 8K, or 32K words, giving the machine the right to the claim of being the world's first reliable large scale mainframe.

The 32K core size was such a departure from previous limitations that early users thought it looked infinite. In fact, the machines were so powerful

THE IBM 704

vac I.

Univac had been offering a built-in function for repeating instructions, plus some multifunction instructions like "multiply and accumulate" which gave some additional power to its 1100 series machines, but Univac had no index registers and the index registers were better.

Still the 1100 series machines proved good competition for the 704. According to Dr. Gene Amdahl, who was the designer and project manager for the 704 (and many later machines in IBM's line), the 1103A with its ability to repeat instructions was "as big an advance over their earlier machines as the 704 was over the 701. Univac was really very good competition in those days," he says. "No one else was." (Today Amdahl, as president of Amdahl Inc., is trying to provide some of that competition for IBM.)

The first floating-point

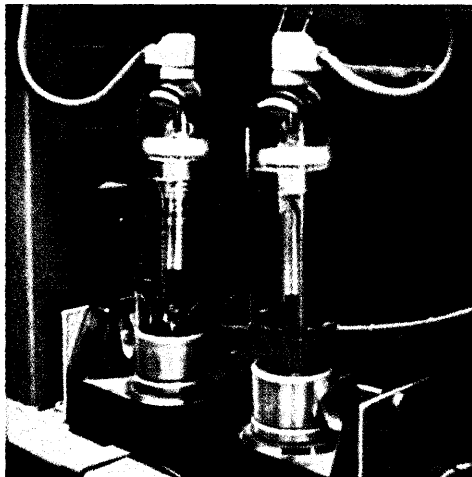
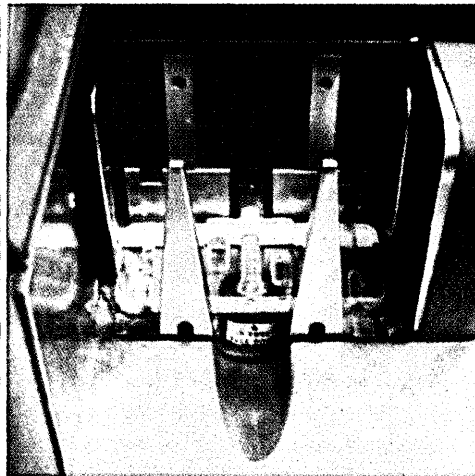
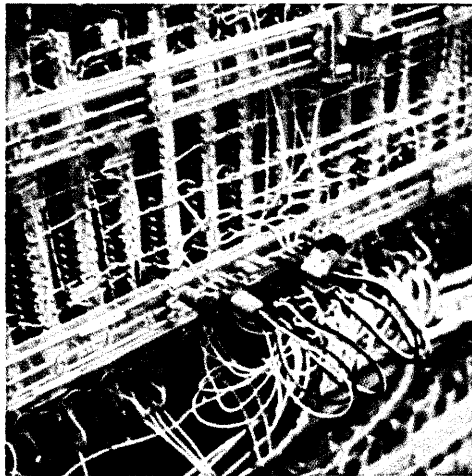
The 704 was the first commercially available machine to offer floating-point arithmetic hardware. Although Amdahl had built an earlier machine at the Univ. of Wisconsin which had floating-point, and although there may have been other handmade machines with the functions, none of IBM's competition offered it.

The first IBM channel

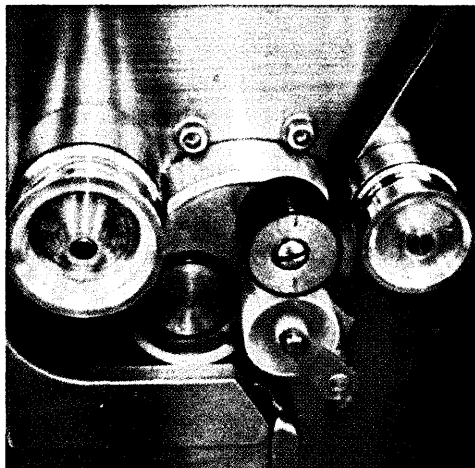
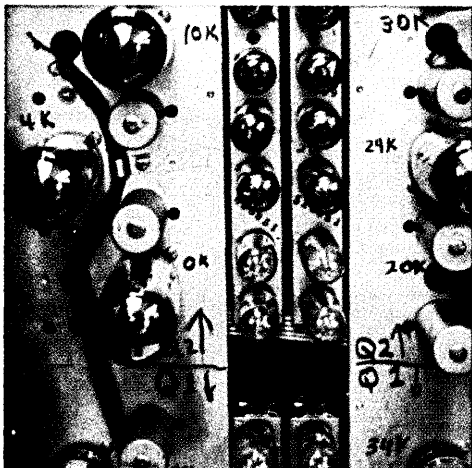
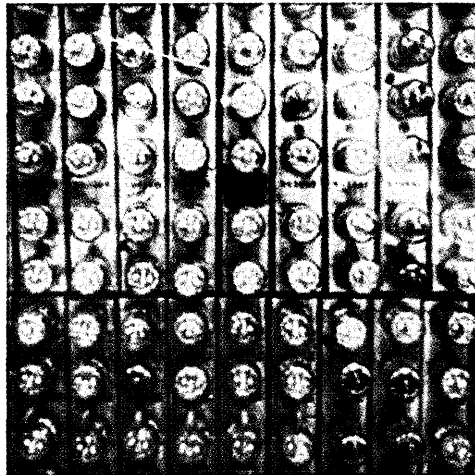
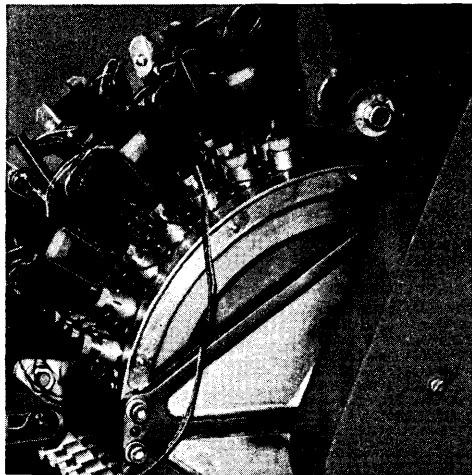
The 704 had one on-line card reader, one punch, and one printer. Though these devices might have been originally visualized as the primary I/O devices, they couldn't run fast enough to keep up with the speed of the processor. Off-line card-to-tape and tape-to-print devices soon came into being so the cpu could be released for computation. This was necessary because the 704 had no channels, nor had any other machine of its time.

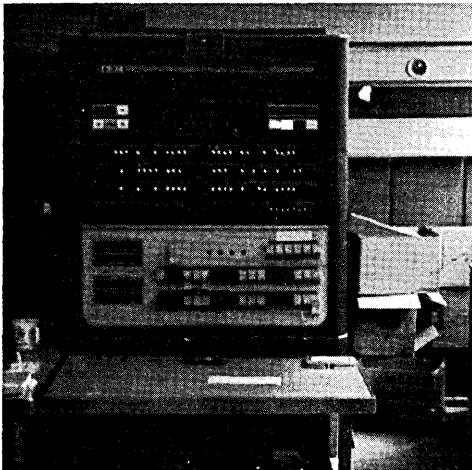
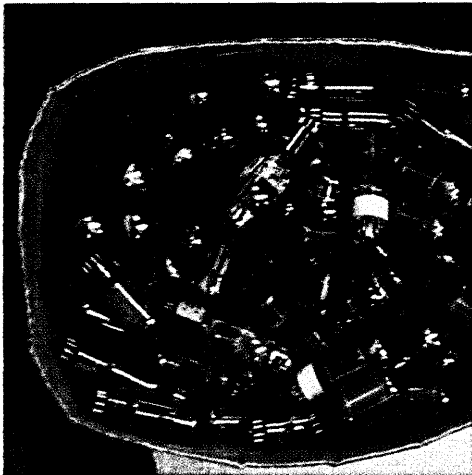
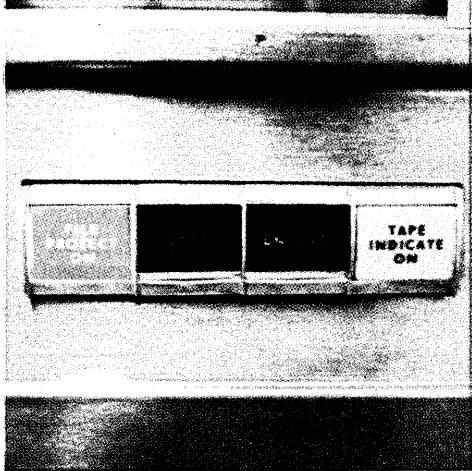
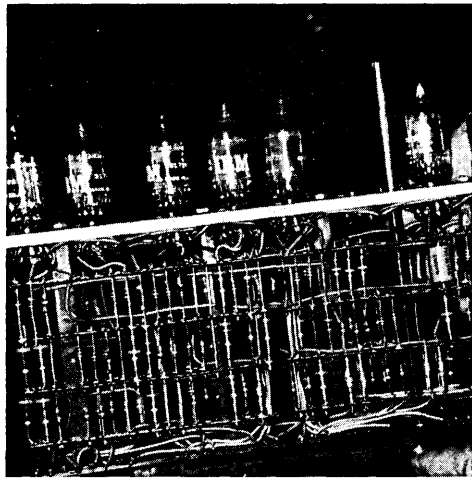
The first IBM channel, a real-time channel for use in missile firing control systems for early ICBM's, later did appear on the 704. It was added to the machine in the field by a bright young IBM engineer named Bob Evans, now President of IBM's System Communications Div. The original plan for the 704 included channels, but that part of the design wasn't finished in time and was held back until the 709 was announced. (The channels were the major thing that made the 709 different from the 704.) Still, for the record, the 704 was the first IBM machine to get a channel.

According to Dr. Amdahl, the 704 also had some built-in capabilities which have not yet been fully recognized. "Its table look-up instructions never caught on. Using them you could program with tables, for instance



Word size	36 bits
Instructions	91
Add time, fixed	24 usec
Add time, floating	84 usec
Core	to 32K words
Core access time	12 usec
Drum	to 16K words
Drum access time	12 msec
Tape transfer rate	15 KC
Card reader	150 or 250 cpm
Card punch	100 cpm
Line printer	150 lpm





take a BCD word in the accumulator, convert to binary, do a math operation, do a table look-up for a carry, return to BCD and do some checking. The feature was used for binary to decimal conversion, mostly, but it was more powerful than that." The power was never exploited, and the function now exists only in vestigial form for character translation in the 370 line.

Most of the rest of the machine's hardware features were not remarkable. Its line printer, card reader, and punch were derived from standalone eam equipment. They were the same pieces used later on the 709s, 7090s, and 7094s, and were closely related to units on the even earlier 650s and Card Programmed Calculators.

One piece of hardware seemed strangely advanced for the time, a crt display with a 35mm camera to record the screen image. The crt could produce plots or show intermediate results of computations, and of course it was often used as a novelty to show off the system. (As a comment on the state of the art in '54, it took the whole system, a roomful of gray boxes, just to drive the crt—a job that now can be done with a microprocessor chip.) But the crt and camera were not introduced with the 704; they had come into IBM's line with the 701 and 702.

The first operating system

Although the machine was impressive for its hardware, the 704 even more strongly influenced the future development of software. It was for this computer that the thing we call an operating system was developed. Some minor control of the flow of i/o and computation had been done on 701s, but the amount was small and many argue that what was done was performed in anticipation of the 704 rather than solely to make the earlier machine more productive.

The story of the development of the operating system includes more than software history, though, for it was one of the earliest examples of shared software development and of the proliferation of a standard software package.

The 701's "control program" was a single-stage affair. A General Motors programmer named Bob Patrick proposed the idea of a three-phase monitor which would control batched input, batched execution, and batched output. It was predicated on the new versions of magnetic tape drives IBM had just introduced for the 701, the model 727s. A great improvement over earlier tapes, these drives would provide the reliability and speed required for spooling input and output and for storing portions of the monitor.

The idea appealed to Owen Mock and some others at North American

Aviation, and in the end GM and North American joined in a common development. The result was two systems which were strongly related, called GM I/O System and the North American Monitor. One of these two operating systems, or a third produced in parallel at GE by a programmer named Don Shell, was used in nearly every installation acquiring a 704.

Shell went on to be the chairman of the SHARE working committee which produced the Share Operating System, or SOS, the monitor which carried the IBM line up to the introduction of IBSYS on the 7090. Patrick has played a number of roles since then, including being one of the founders of Computer Sciences Corp. and one of DATAMATION's contributing editors. Mock stayed at North American for some time, later joined CSC, and is now that firm's principal scientist.

The start of SHARE

In Mock's words, "The whole damn thing about the 704 is SHARE, and SHARE's pushing IBM into the software business." Those computer users who were to buy 704s gathered to discuss data processing as a formal organization of IBM customers some time after the 704 was announced but before any had been delivered. At the time, most of them had 701s, but Mock and some others are convinced that the 704 announcement provided the impetus for SHARE's formation. Their first meeting was in Los Angeles. Frank Wagner was the president and Fletcher Jones, another North American employee and CSC founder, the first secretary.

Though the group had little influence on hardware development, according to Mock, they were effective in forcing IBM to distribute and support software for its machines—a responsibility which previously had not been assumed by the company.

The first modern assembler

SHARE was an effective body. It succeeded, for instance, in moving IBM to drop the development of its Assembly program for the 704 in favor of one produced by Roy Nutt of United Aircraft. Nutt's free-field, variable format, symbolic assembler is the granddaddy of all modern assemblers. Many assemblers existed before his was written, including one for the IBM 650 called SOAP. In fact, assemblers of one form or another—regional assemblers, relative assemblers, fixed format assemblers, and one done by GE's Don Shell called CAGE—proliferated. Nutt's SAP had many advantages over all of these, including the use of symbolic notation and the ability to do arithmetic on the symbols. SHARE saw its advantages, and after making some last-minute concessions to allow easier conversions for GE, pressed IBM to drop its New

THE IBM 704

York Assembly Program in SAP's favor.

The first compiler

Though programmers had the index registers and even assemblers, one thing they lacked at first with the new hardware was a higher level language. Higher level languages hadn't been invented. That too was left for the 704 user community.

The first true compiler was FORTRAN. Its inventor was John Bachus, an IBM project team leader who still works for the company. He brightens noticeably at the memory of the 704 project and recalls his greatest fear was that the hardware guys wouldn't put in floating-point hardware. (An ungrounded fear, according to Amdahl, who says that *his* plans for the machine always included floating-point even if IBM's formal plans didn't. Bachus was still half right. The 705, the commercial counterpart of the 704, *didn't* get floating-point. It was considered too sophisticated for commercial users.)

FORTRAN wasn't rapidly accepted for all its advantages over lower level languages, recalls Dr. Barry Boehm, an early user who is now at TRW. "I was at Convair Astronautics around '57 or '58. Donn Parker was down there then; he brought FORTRAN into Convair. There was a cataclysmic rift. I remember he even had the people on his side wearing 'FORTRAN' t-shirts."

The birth of compatibility

Once all the components were assembled—the reliable hardware, an operating system, an assembler, FORTRAN, and SHARE—things happened very quickly. Once compatibility between installations had been assured by common languages, a library of routines and programs rapidly developed. Program reliability, now a great concern, was assured then by a simple mechanism—that of attaching the programmer's name to the name of the routine.

Getting a jump on Univac

Hardware and software thus assured, sales of the machines began to roll in. Far more machines were sold than IBM originally anticipated. Awed by the machine's 24 usec add time, IBM's marketing management had thought the machines to be so powerful that only a few customers could make use of them.

"About four or five months after I'd been given the charge to do it," Amdahl says, "we had our first meeting with the people from market forecasting. They said 'probably about six machines.' I told them 'no way. We sold about 17 model 701s. Go back and look at it. We'll at least replace all those.' Six to eight weeks later they had

upped the sites to 12. I told them it had to be larger. They came back saying '18.' We made all those and were being pressured to make more. They came back a month later and said '32.' Close to 160 or 180 were finally built."

If the numbers at first surprised IBM, the company responded quickly under T. J. Watson, Jr. Some say it was when his appraisal of the computer market proved out that his father started stepping back and letting him run more of the business. Whatever the actual events, the 704 and IBM took off.

The money-maker

According to Amdahl, the 704s were the most profitable program in IBM's history in terms of percentage profit vs. revenues. That may be a gross understatement. The 704 may have been economical in terms of price vs. performance, but they were not cheap. A minimum configuration would have had an equivalent purchase price of \$1.25 million. A typical configuration would have been worth \$2 million.

IBM, like any large, smart company, estimates how many machines of any type it will sell, and prices them in a way that recovers the development cost as well as manufacturing costs and marketing costs. If more machines are sold than estimated, the profit percentages get much higher. In the case of the 704, the development expenses were maintained very low. Amdahl's crew was held to 25 people while the 705 project ran with 150. So the machine would have been priced to recover the purposely low development costs by the time less than 16 or 18 units were sold, but 10 times that many actually went out the door.

Not only were there 10 times as many 704s as expected (at \$2 million each), but at least 50 very similar and therefore cheap to develop 709s were placed (at about \$2.6 million). Together, they brought in about a half billion dollars of revenue at a high percentage profit.

On top of that, the 705 (about 175 units placed at \$1.6 million each) shared the technology and components of the 704, further reducing manufacturing costs for both.

Then came the second-generation 7090 series (over 400 machines at about \$3 million each) which was the same architecture done in transistors and which used some of the same peripherals (again building up the manufacturing numbers and the profits).

There were at least 80 of the 705 follow-on, the 7080, made (at \$2.2 million each?) and the list can go on through the 7010, the 7030 (Stretch), the 704X and 707X lines.

The point is that IBM realized tremendous leverage by increasing its

manufacturing quantities, and therefore tremendous profits. The 704 turned out to be a 36-bit floating-point money-making machine not much less efficient than the Treasury Dept's. printing presses. Unexpected success with the 704 and its brethren begot money which begot more success. And Univac ceased to be the leader, ceased even to be a substantial threat.

The Tulsa machine

For all their high cost and competitive importance, the machines are worth almost nothing now if any are left. Their decline in value was rapid, too. The Tulsa machine is a perfect example. The mainframe was first acquired by Bell Aerosystems. Accepted from IBM on December 1, 1957, it rented for about \$33,250/month. It was used by Bell for rocket engine design, trajectory analysis, and inventory control. By the early '60s it had been so far outshone by newer equipment that it was warehoused.

Next it was acquired by Pan American Petroleum in Tulsa for an unknown price in 1964 as an upgrade of the firm's 8K system. It worked diligently there until November of 1967, just 10 years after its first installation, when it was sold to Southwestern Computing Service—its last user—for \$1.

It toiled away at Southwestern from 1967 until April 1 of this year doing largely the same work it did at Pan American, that is, oil exploration and production research. (Southwestern operates as a service bureau for firms wishing to set up natural gas processing plants, among other things. Customers have come to them from as far away as Teheran, Iran, customers who only wanted results and might not have known or cared what computer did the processing.)

Price makes all the difference in obsolescence, however. And price eventually killed this 704 as it had all the others. The machine cost \$800/month, roughly, to power and cool. The 7094 which is replacing it (no sense upgrading two generations at a time) will be cheaper to operate as well as more powerful.

Misconceptions die hard

The fact that the 704 made it nearly 20 years should dispel some misconceptions about what has happened over the hardware generations. One very popular misconception about first-generation vacuum tube machines is that they were unreliable. Not exactly true. Gene Usdin, of Southwestern, admits to being rather laissez-faire about maintenance with the machine. "The only time it gets PM is when it doesn't work," he said. And "we clean the tape drives about once a year. The

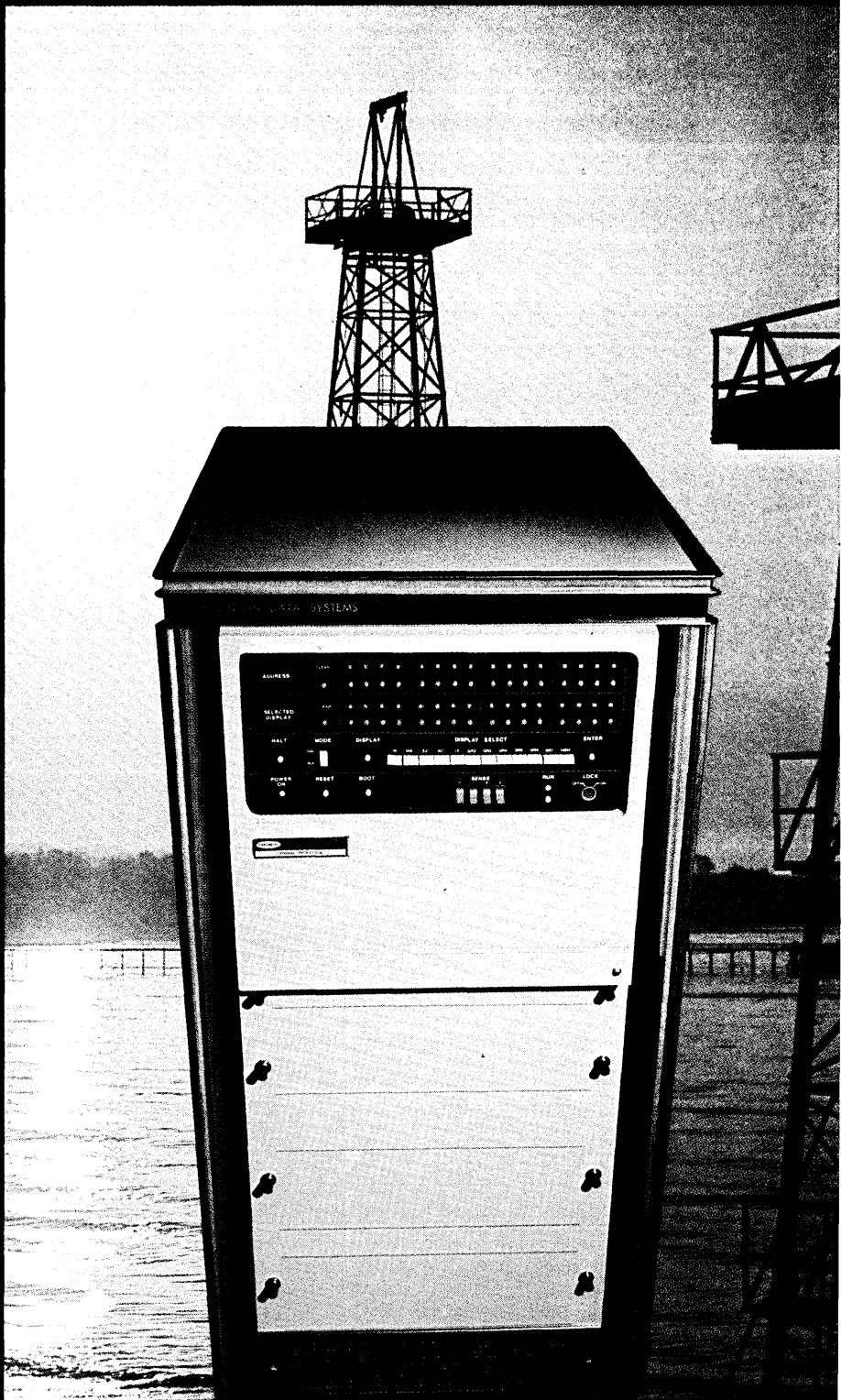
A DOZEN OIL COMPANIES ARE USING RAYTHEON MINICOMPUTERS ON 6 CONTINENTS. THE WORD'S GETTING AROUND.

Raytheon's RDS-500 minicomputers are involved today in world-wide seismic processing: analyzing soundings from deep inside the earth to give oil exploration teams clues to hidden arteries of crude.

The Raytheon mini's are also helping a major glass-products company control production processes. They're at work in cardiac research, finding flaws in railroad tracks and updating auto-parts inventories.

Raytheon PTS-100 intelligent terminals are also busy — serving banks and insurance firms, a stock exchange, eight Canadian telephone companies, worldwide airlines and a leading chain of 530 motor lodges.

Get the word on data-handling systems that are advanced, reliable, cost-effective. Write Raytheon Data Systems, Marketing Department, 1415 Boston-Providence Turnpike, Norwood, Massachusetts 02062 — or call 617-762-6700. When you build better information processing systems... **theWord** gets around.

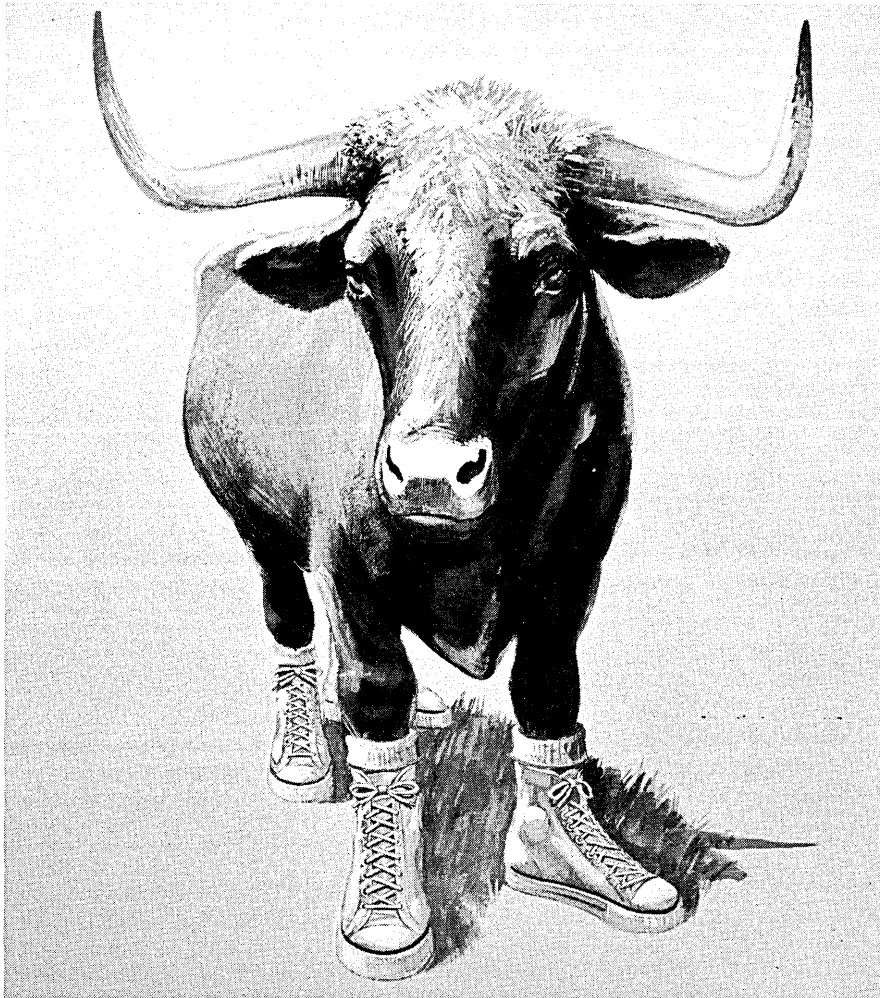


INTELLIGENT TERMINALS, MINICOMPUTERS AND TELECOMMUNICATIONS SYSTEMS

RAYTHEON DATA SYSTEMS

RAYTHEON

THE QUICK BROWN OX



Maxell M-90 Data Cassettes end all read and write errors due to dropouts.

We don't spot-check the M-90. We painstakingly examine each and every one.

Sure it takes more time, but it's worth it. We developed a memory system-data handling cassette that makes sure your clever thinking stays just as clever.

All Maxell M-90's are inspected and certified to insure dropout-free operation. And our new low-resistance, static-free binder protects reliability, pass after pass.

The cassette shell is made with tough,

high impact resistant styrene. The four carbon impregnated guide rollers make tape guidance errors almost non-measurable.

Basically, the M-90 is the best data cassette made. It gives you the chance to run ahead of the pack (where you want to be). Or don't use it and then wait for dropouts to leave you with hay on your face.

Maxell Corporation of America, Moonachie, N.J. 07074. Available in Canada.



THE IBM 704

727s are very forgiving."

Most of the incidents Marty Sadler, operator / programmer / maintenance technician at Southwestern, remembered had to do with water problems. The 704 is air cooled, but broken pipes had dripped water on one or two, putting the machines down for maybe half a day. What would water dripping into a 370 do? Probably much worse.

Tubes burned out at the rate of about one per day, on this particular cpu. This was true of the machine during its last month of operation and as far back as anyone at either Southwestern or Pan American (now Amoco Production Co.) could remember. Tube replacement usually took only a minute or so. Finding the problem was also easy; in the worst case, with an operator who didn't know how to diagnose the problem, someone would turn the lights off in the computer room and look to see which tube wasn't glowing.

Air conditioning was more of a problem. Sadler remarked that if the machine overheated due to an air conditioning failure, the 704 would power down automatically—and a bell in the back of the cpu would ring as it did—and everyone would rush to open doors and fan the tubes to cool them.

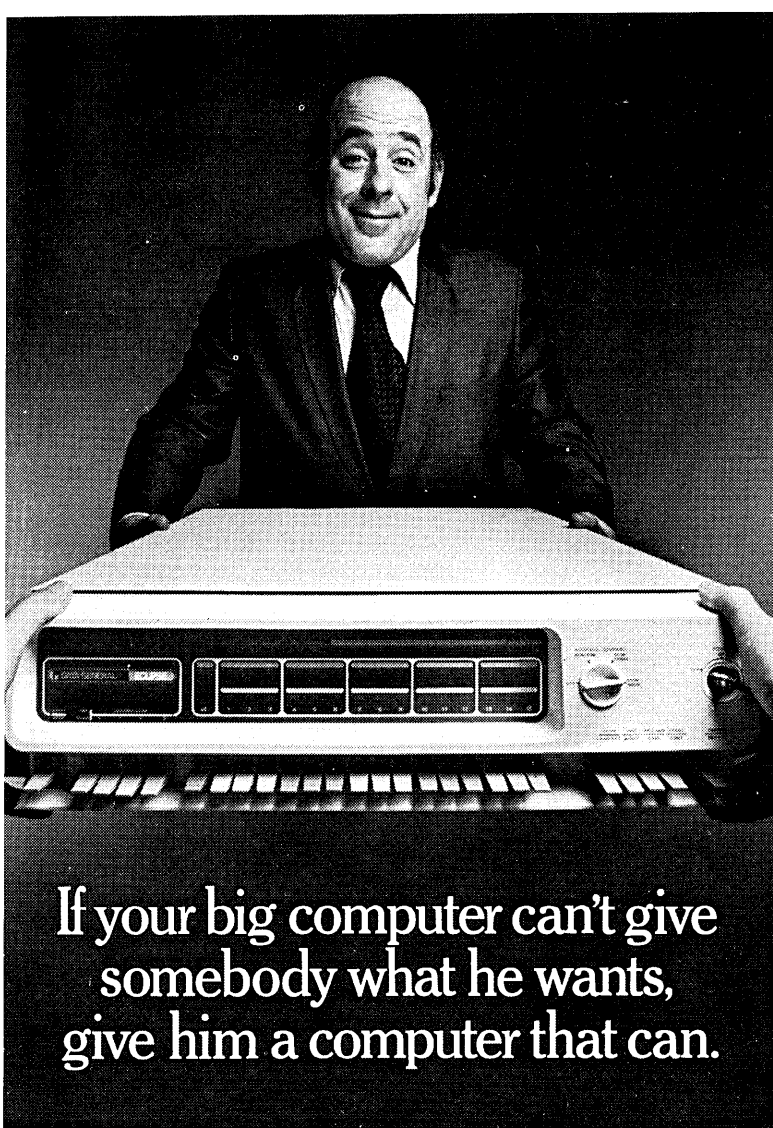
Another myth that might be dispelled by the 704 is that of the migration of programmers who desert those shops which are not leading edge. Also not exactly true. Usdin claims he's had no trouble keeping programmers—for one thing, they like the hands-on use of the machine—and at least one programmer learned the assembly language so he could code new jobs for the "obsolete" system.

The end

Of course they eventually became obsolete and had to be replaced. But the 704s did their job. They demonstrated the feasibility of many hardware and software advancements, ranging from core memory to operating systems. They and other machines from the same mold made hundreds of millions of dollars for IBM. They did more, too. They put IBM hardware and IBM-compatible software in hundreds of prominent, leading edge, rich U.S. corporations at a critical time in the competition for the computer business.

Finally, on April 1, 1975, someone stored the right bit pattern in the display registers of what was probably the last operating 704 so the lights could spell out the message "THE END." One last picture was taken. The Power Off button was pushed.

Somewhere in the back of the cpu a bell sounded. *



If your big computer can't give somebody what he wants, give him a computer that can.

It's hard for one computer to be all things to all people.

So if your big computer can't do what somebody wants done, get a small computer to do the job.

A Data General computer.

At Lowe's Companies (a group of 130 building material stores) the central computer knew the current prices and stock levels of the 7,000 items in stock at each store. But the salesmen didn't.

So Lowe's data processing management put Data General computers in their stores to give the salesmen all the information they needed. Our computers cost a third less than the IBM 370 it would have taken to do

the job. And ours do the job better.

At the end of every day, our computers automatically report to the computer center in the home office. And by the beginning of the next day, the central computer sends each store the latest prices and new stock information.

Data General computers not only make order-taking easier and more accurate, they also cut the time needed to take an order by 30% and reduce inventory carrying costs, pricing errors, and bad debt losses.

RCA Records put our computers in the hands of their operating management so they could do order processing and inventory control without getting caught up in the complications of a big computer.

One of the largest banks in the Northeast put a Data General computer in their trust department to give their portfolio officers access to vital investment information in their large IBM computer. And our computer does the job for much less than it cost for the large computer to do it alone.

So instead of giving people reasons why your big computer can't do something, write for our brochure, "The Sensible Way to Use Computers."

Then when somebody starts complaining about your computer, you'll know enough to tell him where to go.

NAME

DAT-875

TITLE

FIRM

ADDRESS

CITY

STATE

ZIP

Data General, Dept. G, Route 9, Southboro, Mass. 01772 (617) 485-9100. Data General (Canada) Ltd., Ontario, Data General Europe, 15 Rue Le Sueur, Paris 75116, France. Data General Australia, Melbourne (03) 82-1361/Sydney (02) 908-1366.

Data General

CIRCLE 59 ON READER CARD

INFO 75: It's for the User's User—Almost

Second annual user-oriented conference and exposition also plays to the dp professional. Sixteen conferences and an exhibit of 130 companies.

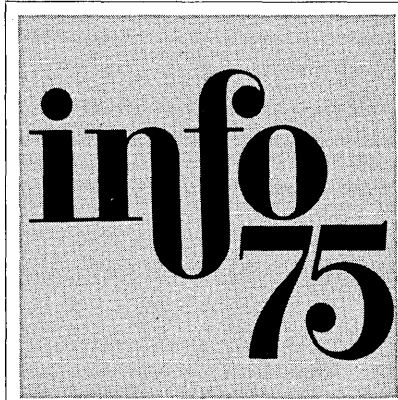
INFO 75, a conference and exposition about computer applications, will use computer technology to help its audience locate the applications. A system called a "Selectronic Directory" will be installed at the four-day exposition in New York next September to help visitors locate rapidly the more than 10,000 applications the sponsors think are offered by the 130 exhibitors.

INFO 75 next Sept. 8-11 is the second offering by Clapp & Poliak, the show management company, of a large-scale user oriented conference and exposition. The first, INFO 74, which was co-sponsored by the American Management Associations, attracted 10,453 persons to New York's Coliseum in September of last year. A concurrent conference drew just under 3,000. "In today's uncertain economy, the conference should draw about the same as last year," says Richard S. Wolcott, a vice president of Clapp & Poliak who is general manager of INFO 75. However, he's hoping for a larger turnout at the exposition, "perhaps on the order of 15,000."

He's added innovations and made some changes to assure the larger turnout. Although the conference—which is really 16 conferences within a conference—is being held at the Americana hotel, eight blocks away from the exposition site at the New York Coliseum, it's been programmed so that conferees have mornings or afternoons off to attend the exposition. (Exhibitors complained last year that the conference kept potential exhibit visitors away.) He's also added a shuttle bus service between the hotel and Coliseum which was not available last year. A mail advertising program was launched early this summer when the sponsor mailed more than 300,000 invitations to prospects, including 88,000 dp managers, corporate information officers, and systems executives in computer using industries. Last month Clapp & Poliak was preparing to follow up with copies of the program.

Tymshare's file

The innovation Wolcott likes to talk most about is the Selectronic Directory. Applications offered by exhibitors (Service Bureau Corp., the CDC subsidiary, has up to 2,000 in its library) will be collected in a file maintained by



Dates: Sept. 8-11

Exposition: New York Coliseum, 11 a.m.-5 p.m. (Mon-Wed.) and 11 a.m.-4 p.m. Thursday.

Conference: Americana Hotel, New York.

Registration: Exhibits, \$5, (\$1 with exhibitor's courtesy card). Conference, four days and show, \$120; two days and show, \$70; one day and show, \$45.

Information: Information and copies of advance program: Clapp & Poliak, Inc., 245 Park Ave., New York, NY 10017, Tel. 212-661-8410.

Tymshare, Inc., which operates the time-sharing network. Visitors will be invited to request up to three applications at a time. Operators will key the requests into the Tymshare network from four terminals in the registration area of the Coliseum and these requests will be matched with the exhibitors providing the applications and printed out on two 600 lpm printers. Each application name will contain an additional five-word descriptor. Wolcott said the system has been designed to handle as many as 600 people an hour. (Tymshare two years ago automated the tricky job of conference time scheduling at a large conference of the American Society for Information Science. People attending keyed in their special interests at a terminal near the registration desk and out came a list of the sessions that matched their interests.)

In mid-July, INFO 75 had signed up

120 exhibitors and another 30 to 40 were considered likely to sign up by the end of August. They seem, according to Wolcott, to represent the same wide mixture as in the 1974 affair—firms representing everything from cpu peripherals and data base systems to microfiche readers and visual aid displays.

One of the exhibitors is IBM, expected to display a "new product" developed in Atlanta. That could be the firm's recently announced System/3 model 12 semiconductor computer or, according to some speculation, its long-awaited minicomputer which has been under development in Atlanta under the code name Peachtree.

Much for the dp pro

Although the conference portion of INFO 75 is billed as appealing to the computer user's user, there is much that is directed strictly to the dp professional. In fact, the topic given heaviest coverage at the conference—with 70 speakers over a four-day period—is "EDP Technology." Some 30 speakers also will be featured on another four-day session entitled "EDP Management."

Also on the program are conferences addressed to manufacturing, insurance, banking, retailing, minicomputers in business, hospitals and health care organizations, transportation, records management, telephone communications, public utilities, financial, office systems and marketing and sales. The Society for Management Information Systems (SMIS) will hold its annual convention at the same time and in the same hotel as INFO 75 and each group is offering the other discounts for participation in their sessions.

The SMIS' opening session Sept. 10 is billed on the INFO 75 program as a joint session of both groups. Two other SMIS sessions on Sept. 11 are also billed as joint sessions: one is entitled "Organizing the Information Function for Effectiveness and Efficiency in Assisting Top Management Decision Making." The other is "Organizational Implications of MIS Implementation." The "general chairman" of the joint SMIS-INFO 75 sessions is Herbert Z. Halbrecht, president of a New York recruitment firm called Halbrecht Associates, who also is to be chairman of

four other sessions that are part of INFO 75. The sponsors have issued a detailed program that, hopefully, will guide attendees through the maze of related and non-related conferences.

Explains Wolcott, ruefully: "Last year, we promoted the conference more so than we did the show. It is otherwise this year."

They're used to computers

The conference, however, does bear down on some exceedingly pertinent topics for the ultimate user of information processing systems—the user that Wolcott says supposedly "defines to the information technologist the tasks that have to be done." He's a smarter user today, according to Wolcott. "He's like the kids who have grown up with television. To him there never was a time when he was without computers."

A brief rundown of the conference topics:

EDP Technology: A four-day conference that examines trends in software, communications, reliability, security, data base administration, data entry, auditing, graphic displays and fourth generation system architecture. A pioneer in microprogramming, Laszlo L. Rakoczi, now with Tymshare, Inc., Cupertino, Calif., will deliver a paper in the fourth generation architecture session, entitled "A non-manufacturer looks at the fourth generation." Univac's Norman Weizer will discuss fourth generation software, and George A. Champine, also of Univac, will discuss the tradeoff considerations in configuring such fourth generation systems. That session, on opening day

Sept. 8, will end with a panel by the participants.

In the data communications sessions, papers worthy of note are "Design and operational requirements for network management," by Sal Catania of Coopers and Lybrand; and "Considerations and early experience in using Datran's Datadial service," by Earl C. Young of Republic Financial Services, Inc., Dallas. (Two other speakers were being sought as the program was being put together in July to discuss their experiences with Telenet's packet switched service and the telephone company's Dataphone Data Service. There also is to be a session on new data link control protocols.)

Max A. Butterfield, of the Social Security Administration, is to head a session on new mass storage systems featuring speakers from suppliers Ampex Corp. and Control Data Corp. and from users from Ketron, Inc. and G. A. Saxton & Co.

EDP Management: Nine sessions that cover subjects such as education, cost reduction, five-year plans, security, recruitment and dealing with top management. Norman Gelbwaks, a vice president with Chase Manhattan Bank, will head a session on the provocative subject: "What does it take to get the approval of top management in presenting an information systems proposal?" David Allen of CBS leads a session on the "Five Year Plan—Key to Effective Information Systems."

Manufacturing: Some 40 speakers, most representing management (not dp management) discussing topics related to manufacturing control sys-

tems. The program opens with a plenary session, "How Top Management Satisfies its Information Needs to Plan and Manage a Complex Company." William H. Stieger, Kennecott Copper Corp., who organized the manufacturing program, is chairman of a seemingly interesting session on "Engineering the Job"—the use of computer technology to get work moving.

Insurance: Five sessions cover subjects relative to insurance company management. A sixth addresses the timely subject, "Privacy of the Individual's Data in a Life Insurance Company—Short and Long Range Systems and Cost Performance Considerations." The cast of speakers: Carole Parsons, of the Administration's Domestic Council on the Right of Privacy; Attorney William A. Fenwick of Palo Alto; and TRW Credit Data lobbyist Cheri L. Cole.

Retailing: Retailers talking to retailers. An interesting session, chaired by Morton Weitz, president of the Datamor division of Korvette, Inc., discusses the information system in the retail operation. IBM's Paul Gibfried is chairman of what could be a crowd-drawing session: "Putting it all Together—the Total Retail System."

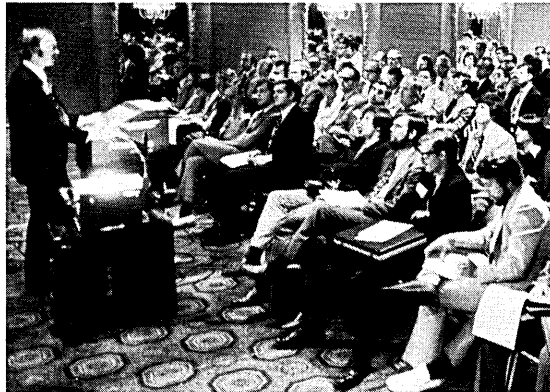
Minicomputers in Business: An interesting travelogue through manufacturing, offices, distribution, business and banking where minicomputers are used. The four-day session opens with an introduction to minis and how they're used in business.

Hospitals & Health Care: This seven-session program is highlighted by a session on a topical issue: "Auditing the Elusive Measure of Quality in Health Care." Headed by Dr. Conrad E. Herr, Rutgers Medical School, it discusses information systems support for PSRO's quality-of-care measurement, certification of length-of-stay, and facility feasibility all in the context of current and coming legislation.

Transportation: The trucking people discuss fleet management and the energy people discuss car pools.

Office Systems: A three-day "mini course" on office systems management with part of the discussion addressed to "word processing" systems. The thrust: rid the office of paper. "Most offices are deluged with paper, and attempts to improve office operations just generate more paper," says Paul G. Truax, general chairman of this program.

Marketing and Sales: This program includes a look into how top consumer marketing executives satisfy their information needs. The speakers are information managers Rex Struble, of Anderson, Clayton Foods of Dallas, and Robert Weller of General Mills in Minneapolis. *



Richard S. Wolcott, general manager of Info 75, and scenes from 1974 event which drew 10,453 to New York coliseum.



\$969.*

Get an ASR terminal from us for less than a KSR terminal from someone else.

Compared to our competitors' KSR terminals, the Teletype® model 33 ASR's price is unbelievably low.

For example, our \$969 ASR includes as standard many of the features others charge extra for. Features like paper tape reader and punch, answer-back, even-parity generation, automatic carriage return and line-feed (if you need it), as well as a pedestal.

The ASR version sends and receives automatically at 100 words per minute using standard one-inch paper tape. It's also compatible with most mini-computer and communications systems. This compatibility is just one reason why over 500,000 model 33's have already been sold.

There's another big reason for our popularity. Flexibility. You can double the data transmission capacity of the model 33 with a simple wiring option. Called "full duplex," this option permits simultaneous sending and receiving.

If you think our \$969 price tag is rock bottom, you're wrong. We've got KSR's for as little as \$693* and RO's starting at \$584.* So whatever your mini-computer operation, don't pay a maxi-price for a data terminal.

Service? As much or as little as you need. You tell us and we'll come up with a plan that suits you to a "T." No matter where you are. Or what you need.

But when you come right down to it, you won't need much service. Because the model 33 is one of the most dependable terminals in the industry.

We set all the standards. And we live up to our name.

The model 33. It's what you need. At a price no one can touch.

For more information, write or call: TERMINAL CENTRAL, Teletype Corporation, 5555 Touhy Ave., Skokie, Ill. 60076. (312) 982-2000.



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*Prices subject to change without prior notice.

Mainframers

IBM: New Stock Coming in

Prices slashed on 90 products to stimulate sales

While the East Coast was flooded this bicentennial summer, IBM was flooding the computer industry with announcements. In a seeming "everything must go, new stock coming in" sale, IBM slashed purchase prices by 10 or 15% on various 370 and System/3 central processors and on a host of peripherals and terminals.

A few days later IBM began announcing new products to replace some sale items. And in the same period it announced a far-reaching international reorganization of its small computer (General Systems) and Office Products divisions. This was close on the heels of a massive reorganization of the Data Processing Products Group.

If that wasn't enough, the giant computer company reported its unexciting second quarter revenues which were up a scant 7% over the corresponding period in 1974 (see p. 80).

The price cuts and new products were a welcome sign for stockholders and financial analysts, some of whom now think that IBM's growth in the last six months of 1975 will jump 15% over the corresponding 1974 period. They see the price cuts being done just for that reason—to stimulate purchase when the life cycles of major products are tailing off and new ones are about to begin. The models 115, 125 and System 3/6 and 10 cpu's were each cut by 15% in purchase price. The System 3/12 was announced immediately after for the small computer user to consider as an upgraded alternative to buying his installed 6 or 10 model, or to opting for the Honeywell Liberator 3, ICL 2903, Burroughs B1700 and Univac 90/30. The 115 and 125 haven't been replaced, but the 118 and 128 were rumored in the mill for fall announcement. At least one IBM watcher thinks that market will be handed over to the General Systems Div. and there will be no 370 replacement.

Ninety products

The price reductions covered 90 different products. But the 10% discounts on the 3330 and 3340 disc drive were

most notable, since IBM immediately offered the users other alternatives, or complements, in the 3350 and 3344 disc drives.

It's understood the IBM salesman, who is being given quota points for converting users from rental to purchase, is armed with computer printouts explaining each customer's alternatives. A mathematical exercise will show what IBM has done.

Users can accrue toward purchase 40-60% of their monthly rental or lease costs—for up to three years and 50% of the purchase price. For example, a user with a 125 cpu with 98K bytes that has been installed since April, 1973 (first shipments), would have accumulated \$61,983 in rental accruals, \$64,476 in lease accruals. Knock that off the reduced price of \$201,650 to get his cost today.

With a 3330 mod 11 (two-spindle, 400 megabyte), if the user received the first

for the peripheral manufacturers to chase." He sees users being urged to take a mix of 3330, 3350, 3344 and 3340 drives, some rented, some purchased.

Buy old equipment?

Who will buy? The dp manager of a big multinational firm "won't look at the reductions" because the IBM new product announcements are coming thick and fast and he sees no reason to buy old equipment now. A manager in a West Coast bank isn't interested because the price cuts signaled not only new products but new technology. He expected enhanced 3330s rather than a fixed disc replacement. A manager of a furniture manufacturer's installation laughed, "Spare me the details. We don't have an IBM disc on site and our IBM printers would cost a fortune to maintain if we purchased."

IBM might expect some help in purchases from a few leasing companies, if DPF Inc. is an indication. DPF is considering offering a package deal to users, in which DPF would buy the customer's system, using his accruals and the reduced price. What's new is that DPF usually makes its best deal by offering independent, rather than IBM, peripherals. The IBM price is good enough to consider, eliminating the aggravation of a multiple-vendor package, says DPF. Intel's Dick Lussier says to us a 10% price reduction only means 1-2% in the package deals Intel offers users, so would have no competitive effect on them.

Regardless of who is saying what, financial analysts see IBM's outright sales revenues increasing nearly 10% as a percentage of total revenues in the third

PARTIAL LIST OF REDUCED ITEMS

10% off:

3330, 3333, 3340, 3830, 2305, 2319 disc storage & control units
3410, 3411, 3420 (including 6250 bpi version) mag tape units & control
3203, 3211, 2213 printers
3881, 3886, 1287, 1288, 1231, 1232 optical readers

15% off:

115, 125, System 3/6 & 10 cpu's
3704, 3705 communication controllers
3735, 3780, 2780, 2740, 2741 terminals
3275, 3277, 2265 display stations
3284, 3286, 3288 printers

shipment in March 1974, he would have accrued \$17,355 under rental and \$14,200 under lease. So right now he'd give IBM about \$50,000 for that disc (\$67,860 purchase without accrual). He could also opt to buy the bigger, faster 3350 B2 (635 megabyte) fixed disc drive for \$49,500, or rent it for about \$500-600 less than the 3330 mod 11. IBM seems to have made the pricing on the two systems fairly comparable.

A technical expert at a leasing company sees the price cut/new product combination as an effort to "fragment the market, creating a moving target

and/or fourth quarters. That's 10% of more than \$3.5 billion a quarter. One analyst also points out that IBM has been realigning its pricing policies in the last few years to prevent purchase cycles from impacting its long term growth curve. Hourly maintenance and systems engineering services have increased by 18% in the last 18 months. Monthly maintenance fees have jumped 10%. Purchase prices were raised only 2% for all but the three largest 370s (8%), while rental has jumped for most 370s and System/3s by 10 and 12%. Program products were hiked just 2%, but may

increase in price as the newer versions come out.

Reasonable ratio

IBM has clearly been bringing down the purchase: lease ratio, which was about 50:1 when 370s were first announced. Some see this as a stimulus to purchase, and others see it as part of that redistribution of revenue sources. "It gives the appearance that IBM has created a better purchase:lease ratio," says one analyst. "It is a marketing strategy that could accomplish much, including satisfying legal critics who say IBM's purchase:lease ratio has not been 'commercially reasonable'."

IBM says that none of its moves have been made to satisfy the Justice Dept. One source felt that the reason IBM put the 115 and 125 on sale was to eliminate that system from the 370 line and hand it over to the small computer General Systems Div., with its ever-growing System/3 and /32 line.

And that, IBM watchers say, could be tied with IBM's reorganization of GSD and OPD internationally. First, these divisions have been given overseas product management responsibility, which used to be controlled by the two World Trade operations, Europe/Middle East/Africa (EMEA) and Americas/Far East (AFE). Then IBM superimposed an International Operations Div. (IOD), run by vice president Steven Warren, to give functional guidance to General Systems and Office Products. That guidance takes 400 persons located in New York's Westchester County and involves productivity of marketing, manufacturing, and service, and assessments of business plan performances.

In each of 17 countries, IBM has appointed a general manager of the two divisions, who will report to the country general manager and the International Operations Div. Office Products and General Systems already have separate

sales, systems engineering and maintenance forces around the world.

Hypothetically, IBM now has created a worldwide resource-independent U.S.-controlled organization for small computers and office products. Still under World Trade, IOD ultimately could be slid out from under it. In fact, if World Trade Corp. were split from IBM, the worldwide GSD-OPD operation could still be a single entity under its own or IBM's control.

In the same vein, when IBM reorganized the Data Processing Products Group it realigned software responsibilities in a way to suggest a brand new IBM. While corporate staff of the group took on systems design and definition, the System Products Div. took on the implementation of operating systems along with its manufacture of components and general purpose computers. The language and data facility (IBM, GIS) development went to the peripheral-making General Products Div. Telecommunications access methods, job entry, and network support software went to the System Communications Div. Some can see these divisions as separate profit centers offering their own hardware (each manufactures different hardware) and software. "Can't you just see a 3350 fixed disc system with an indestructible untouchable IMS recorded on it selling as one 'bundled' firmware item?" wondered one IBM watcher.

"In fact the way IBM is organizing," that watcher said, "it could become a holding company over a set of subsidiaries—a marketing company, a regulated common carrier in satellite transmission, a communication system company, a general purpose computer company, a peripheral and data base systems company and a small computer/office products company."

—Angeline Pantages

ed a wholesale grocery concern \$53,200 for breach of warranty against IBM, and in 1969, a federal district court in St. Paul awarded an automotive and electrical wholesaler \$480,811 in damages against IBM in a fraud suit.

Suit for back rent

Ironically, the Catamore case was initiated by IBM which sued the jewelry company for \$68,000 for back rent. IBM was awarded that amount by the jury in the case. "The jury's decision that Catamore must pay the amount it owes IBM is correct," said IBM chairman Frank T. Cary. "However, we completely disagree with the jury's decision on the counterclaim and we are going to appeal." An IBM spokesman said the computer company was appealing the decision to the first circuit federal court in Boston. While attorneys specializing in computer industry issues were still assessing and interpreting the importance of the decision a few weeks after it was announced in early July, there seemed to be general agreement that the case was unlikely to be eventually appealed to the U.S. Supreme court, because the issues of the case do not fall in the area of interest of the highest court in the land. Jury decisions are generally difficult to reverse, so the Catamore attorneys believe their victory will hold up. In addition there is always a possibility of a settlement in the case.

Although the landmark decision is not generally thought to be likely to carry great legal precedent, it could carry great psychological precedent. To wit: the Catamore case showed that a relatively small company with limited resources could enter into legal battle with a huge corporation and win. IBM, for instance, was represented by Edwards & Angell, leading Providence law firm. One of the attorneys on the case was former Rhode Island governor and former secretary of the Navy John Chaffee. IBM's prestigious New York law firm, Cravath, Swaine & Moore, was involved in the case, too, as was the office of IBM's legal counsel in Armonk. An accountant representing IBM said his firm's bill in the case would be about \$110,000, which is considerably more than the \$68,000 IBM was attempting to collect from Catamore.

On the other hand Catamore was represented by two young attorneys. Christo, Catamore's lead attorney, is just 27 and barely three years out of law school, and his associate attorney, prior to the case, specialized in real estate law.

Started in '68

Essentially, the background of the case is this: Catamore, a firm that logged more than \$7 million in sales in 1969, had been interested in acquiring its first computer since 1968 following meetings with the firm's president Rob-

Litigation

Case of the Jeweler and IBM: Jury Accepts Oral Agreements in \$11.4 Million Finding

The computer, as some computer users know, can be an instrument of horror when it doesn't do its job, although it is commonly depicted in the folklore of the business world as an instrument that brings joy and efficiency to the happy fellow that has one.

The unhappy user now has some vicarious commiseration, if not hope, in the form of a federal district court decision in Providence, R.I., in which a small jewelry company has been awarded \$11.4 million in damages from IBM.

The Rhode Island jewelry company, Catamore Enterprises, Inc., had charged IBM with fraud, negligence, and breach of contract and warranty. The six-

member jury delivered a unanimous decision on the basis of compensatory damages. Punitive damages were not cited, and the precise charges that figured in the verdict were not spelled out as is the custom in jury verdicts.

"The real issue here is corporate responsibility," said Thomas K. Christo, Catamore's attorney. "And the real point is that the law is there for users who have been abused. If computer users have a just grievance, jurors or courts will rule in their favor."

While the Catamore decision was not entirely the first of its kind, it was by far the largest settlement of its kind. In 1968, a Boston U.S. district court award-

news in perspective

ert Catanzaro and an IBM salesman.

A 360/20 model 4 with 12K storage was ordered, but later was upgraded to a 360/20 model 5 with 16K storage. Delivery of the machine, however, was deferred. After the machine was delivered, it was later replaced by a 360/25. The whole issue was complicated somewhat

by the fact that IBM announced "unbundling" in the midst of protracted dealings with Catamore.

During the 57-day trial—which incidentally, was the longest jury trial in the history of the state—Christo hammered away at IBM on the issue of fraud. Christo told the jury in his summation at the

end of the trial: "This is the case that can alert every Chairman of the Board of every large corporation that they cannot shun the law; that they cannot step outside of the law . . . It goes against our grain to believe that things like this can happen in America, but we have to try and understand that they do happen."

Christo attempted to link up top IBM management with the fraud issue by introducing evidence including documents that indicated top IBM manage-

"It's Not Business; It's Religious Warfare"

It is February of 1975 and a thin, unshaven student carrying a box appears at an administrative office at Brown Univ. in Providence, Rhode Island.

"I'm supposed to deliver this for the trustees' meeting," the student says. "Where is it?"

"University Hall" is the answer. And, in that moment, the student has the information he wants.

The "student" who is not a student at all but attorney Thomas K. Christo, has the information he has been seeking. He had received an anonymous phone call and the voice on the other end of the line had told him the Brown Univ. trustees would be holding a secret meeting to discuss the delicate issue of removing tenured faculty members.

IBM's Thomas J. Watson Jr., a Brown alumnus and trustee, was expected to attend the meeting, since he is known to have an intense interest in the issue and since he seldom misses a trustees' meeting.

Christo wants to subpoena Watson to compel him to appear in court in connection with the case in which Christo is representing Catamore Enterprises against IBM. University Hall is staked out—two private detectives and two federal marshals all carrying walkie-talkies and subpoenas.

"We really thought we had Watson," said Christo in discussing the incident recently. "But he didn't show up. Someone must have tipped him off."

The incident tells a great deal about why Christo and Catamore won the landmark case against IBM and—perhaps—a great deal about why others seem to lose when they face IBM in the court. In a typical legal encounter with IBM in a court case, the opponent is not so bold as to be "staking out" Thomas Watson, one of the most prestigious persons in the computer industry. Typically the IBM opponent finds himself smothered under piles of motions, documents, and briefs, unable to get to the real issues in the case.

"We do the attacking"

"We beat them at their own game because we do the attacking," says Christo. "What we're doing is in every sense guerilla warfare in the courts. Our biggest weapons were surprise, inventiveness and hard, solid work. We were a gang of marauders."

While the number of Christo's "marauders"—two fulltime attorneys and three fulltime paralegals—was not exactly overpowering against the withering legal fire power of IBM, their victory was overpowering indeed.

Throughout the case, Christo displayed a sense for the jugular that made "Jaws" look like a story about a pet goldfish. He adopted a prosecutorial manner, hammered away at witnesses on the stand and, as he strutted around the courtroom, he made a habit of sitting on the IBM attorneys' table. Moreover, his manner had to be all the more galling to IBM, which has long had a penchant bordering on mania for hiring towering six footers. Christo is 5 ft., 5 in. tall, and weighs 120 lbs. The young attorney exudes self confidence without appearing to be cocky.

More important, though, there was a total commitment to winning the case displayed by Christo and the others on the team—Rosann Madan, the attorney who worked with Christo, and the three paralegals, Claudia Aufenhauser, Tom Buchan and Alan Taylor.

"Other lawyers may look at this as business," says Christo. "It's not; it's religious warfare. We all gave up our social lives, our families, and our salaries. There wasn't a waking moment during the past year and a half when I wasn't thinking of this case and nothing else." Indeed, Christo became so involved in the case that he neglected to pay his phone and electricity bills at his Boston office with the result that both services were shut off.

There were indications that the case was not an easy one for the IBM lawyers either. The lead attorney

representing IBM was told by his doctor to withdraw from the case in the middle of the trial.

Five turned it down

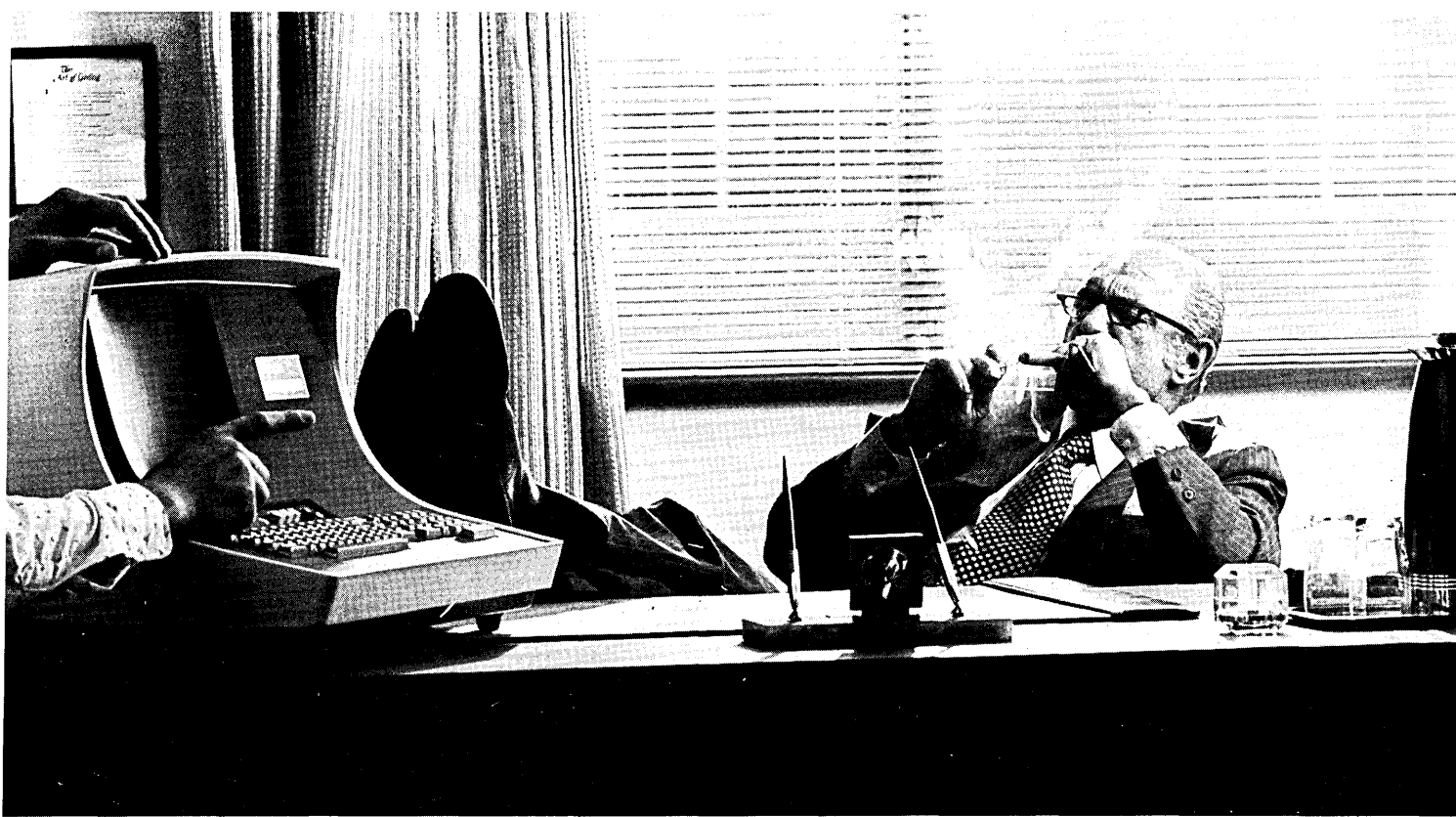
Christo took the case when Taylor, a software specialist who had been working on the case as a paralegal, contacted him. The two men had once worked together as editors on *Computerworld*, a publication where Taylor continues as a columnist. Five other attorneys had turned down the case before Christo took it. Christo took the case "on consignment"—without pay. If the appeal holds up, however, Christo stands to receive a very handsome fee. (Before the verdict in the case was delivered, the judge said "whether it would stick on appeal I don't know . . .")

Christo, a former systems analyst, views the case as a landmark in the computer consumer area. He says he doesn't represent vendors and has two other user suits currently against two other major mainframe firms. "We like to think of ourselves as a consumer movement for the computer user," he said.

Christo had initially filed antitrust charges against IBM but these were later withdrawn although Catamore has the option of pursuing them in the future. Christo feels that it's extremely difficult to "nail" large corporations on antitrust charges because "that's the legal game they know best," and because of the massive difficulties of proving market share.

He reasons that since the deck is stacked against winning antitrust cases, it makes more sense in user suits to challenge on the basis of the older common laws like, say, fraud and negligence. "In the final analysis," says Christo, "it's not the Tel-exes of this world with their antitrust complaints who get the short end; it's the users, and the consumers right down to the general public."

—W.D.G.



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"Yes, yes, yes. Tell me Bascomb, how's your croquet game?"

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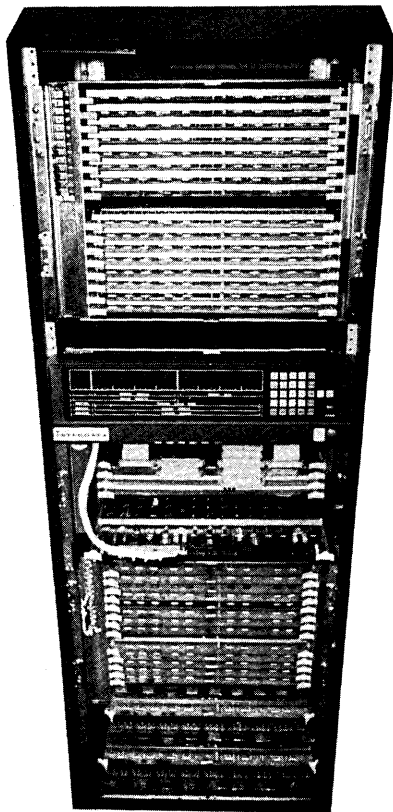
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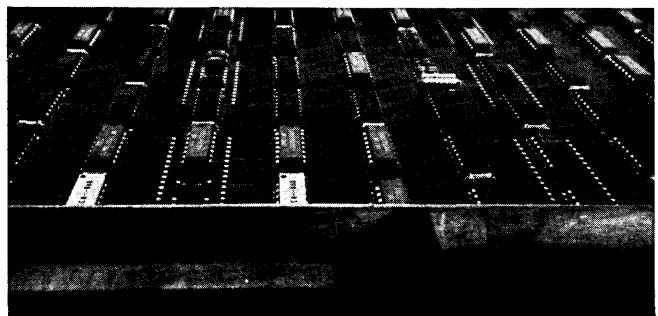
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INSTRUCTION TIMES (Register to Memory)					
Integer Add	1.25	1.8	.9	1.8	2.5
Multiply	3.54	6.2	2.0	3.9	8.8
Divide	5.8	14.4	9.9	8.3	11.2
Floating Point Add	2.3	6.1	2.4	8.25	5.5
Multiply	3.0	9.1	2.3	11.25	7.2
Divide	5.35	23.3	8.9	12.25	7.9
HARDWARE I/O	Yes	Yes	Yes	No	No
MAX. DMA RATE/SECOND	6MB	4MB	6.7MB	4MB	2MB
DIRECT ADDRESSING RANGE	1MB	1MB	16MB	64KB	64KB
GENERAL PURPOSE REGISTERS	2 stacks 16 each*	4 stacks 16 each	1 stack 16 each	2 stacks 8 each	1 stack 4 each
PRICING (Basic Configuration)					
CPU + 128KB Memory	\$51,900	\$128,700	N/A	\$54,600	\$32,500
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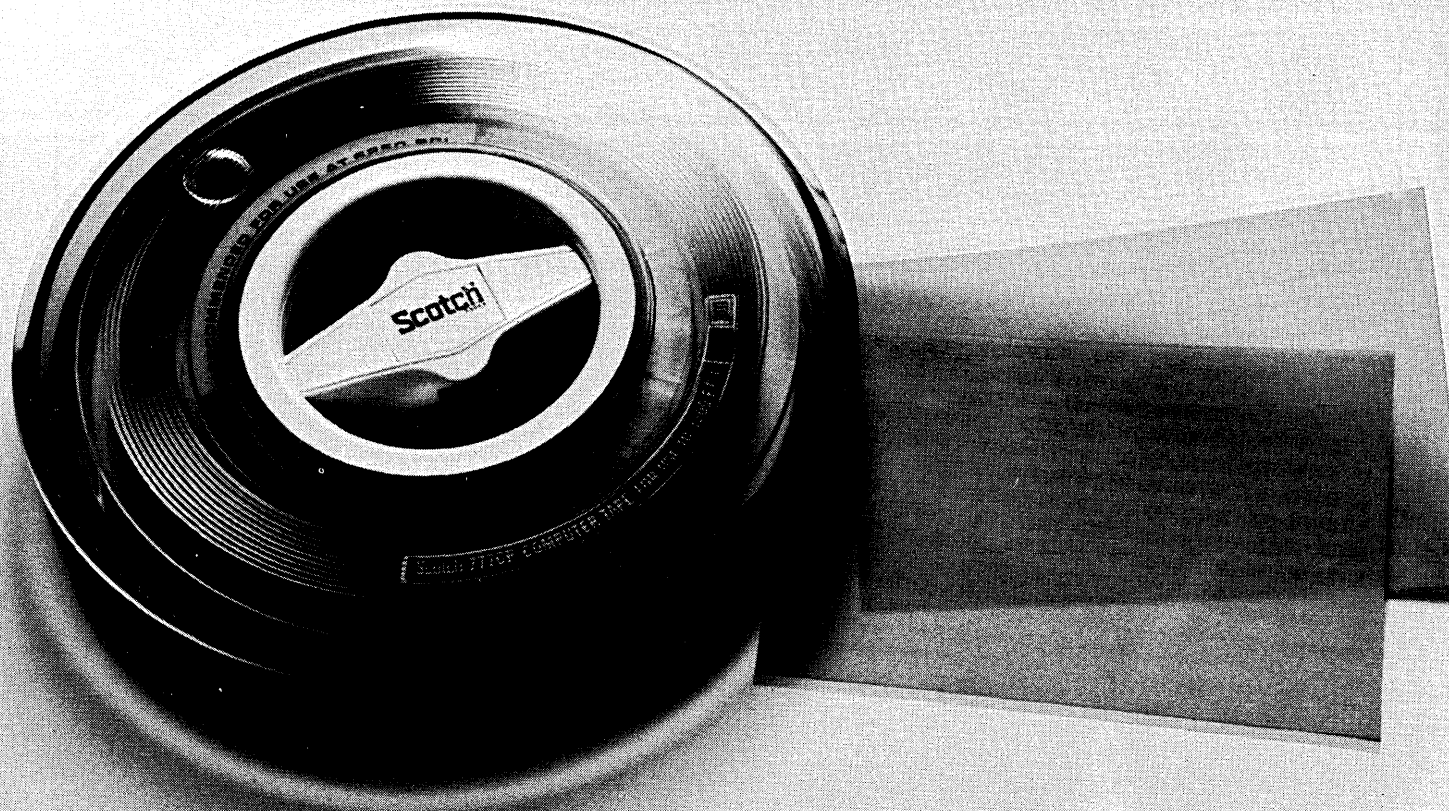
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news in perspective

ment knew that unbundling with its higher prices and potential disruption was coming for users and potential users including Catamore, yet IBM's lower management levels were not informed. This meant that Catamore wasn't warned of the possible difficulty that could be associated with unbundling.

Locked in

Catamore charged that IBM had "locked in" the jewelry company by convincing Catamore to change its inventory system from a manual system to an eight-digit numeric system for use with the IBM computer. Once converted, however, Catamore could not use its former inventory system and the new system was virtually useless when the delivery of the computer and its successful operation were delayed. The jewelry firm claimed it never received an operational production control system as promised.

Christo maintains that IBM had utilized a "bait and switch" policy with Catamore in which the jewelry firm was "baited" with a small machine, and, after it was locked in by a new inventory system, was "switched" to larger and more expensive equipment.

Catamore said IBM was never able to deliver a hardware-software system that was able to perform as IBM had once promised for delivery in December of 1969. Catamore alleged that it was strung along for months on end by IBM.

Finally, Catamore charged that problems stemming from the computer began to collapse the firm and that Catamore president Robert Catanzaro was hard pressed to save his faltering company.

"Bob Catanzaro left his family and moved into the factory and lived there," Christo told the jury. "He worked 80 to 90 hours a week . . . he was trying to save his business. There was a pile of invoices and the pile of inventory and they couldn't match it and it was chaos and it was disaster."

Finally, in April of 1972, the IBM equipment was removed. The firm returned to manual systems and has also installed a PDP-11. Christo said that only a concerted and intensive effort by Catamore had saved the company from failure.

Denial by IBM

On the other hand, IBM vigorously denied the Catamore charges. Stephen A. Fanning, Jr., the attorney representing IBM, pointed out that the case had started as a simple collection suit but then had escalated to a \$250,000 counterclaim by Catamore, and finally to a \$26 million counterclaim.

"What does it all boil down to?" Fanning asked in his summation to the jury. ". . . We boiled that down until the only thing he (Catanzaro) really didn't get was programming, application programming or tailored library packages. Why didn't he get them? Because his own people didn't write them. IBM never promised to write them."

During the trial, the IBM attorneys maintained that Catamore had agreed with various changes and upgrades in equipment. IBM also argued that Catamore had slipped in failing to train an employee to perform programming for the jewelry firm and that was the cause of the software snafu.

The IBM attorneys also argued that Catanzaro began to take over additional and new business enterprises and these pulled him away from giving proper attention to his computer operation. Fanning told the jury:

"Well, I want to suggest to you most sincerely and without being nasty, without being ornery, without being recalcitrant. I want to suggest to you that what

International

Airlines vs. IBM: Raise Overhead Or the Volume of the Complaints

An epic squabble between IBM and 14 airlines, led by British Airways, has had another public airing following a meeting May 13 between the protagonists. The airlines, locked into IBM hardware and the IPARS software, are accusing IBM of sloppy work and high-handedness, while IBM responds with its customary attitude that gentlemen don't air their problems in public.

The problems have been growing gradually, and part of the trouble is the increasing complexity of the airlines business, with its proliferation of fare structures, particularly internationally.

IBM's three standard offerings for airlines are PARS, developed originally in conjunction with American Airlines in the U.S., then IPARS a PARS derivative in which BOAC (now British Airways) was the original partner, and more recently, for smaller airlines, CP-Sim/E, which runs under DOS/Vs on configurations as small as a pair of 370/125s.

The complexity of the international business is not only the rate structures but also the pool partnerships by which British Airways, for example, writes tickets for Air France—an arrangement that is not allowed in the U.S. U.S. and international teletype systems are different, which affects the data communications support, and the algorithms for long-haul airlines are dif-

ferent than those for domestic flights in the U.S.; Australia's Qantas on a five-stop flight from London to Sydney doesn't want many passengers for the London-Paris leg if it can fill the seats more profitably. This turned out to be a major difference from a computing viewpoint. On the rate side, IPARS was designed 10 years ago to handle a growth in volume, but no one anticipated the proliferation of special fares we know today, with excursion fares, affinity fares, stopover premiums, and seasonal rate changes.

O.K. to oral agreement

One area of the decision that appears to be particularly important is the idea that the jury accepted an oral agreement between IBM and Catamore as evidence. Like most computer users and potential users, Catamore had signed a machine services contract which covered the hardware of the system. Software issues are commonly made orally and the Catamore case may have set something of a precedent in this matter. The jury also appeared to have accepted the idea of admitting as evidence a warranty orally made.

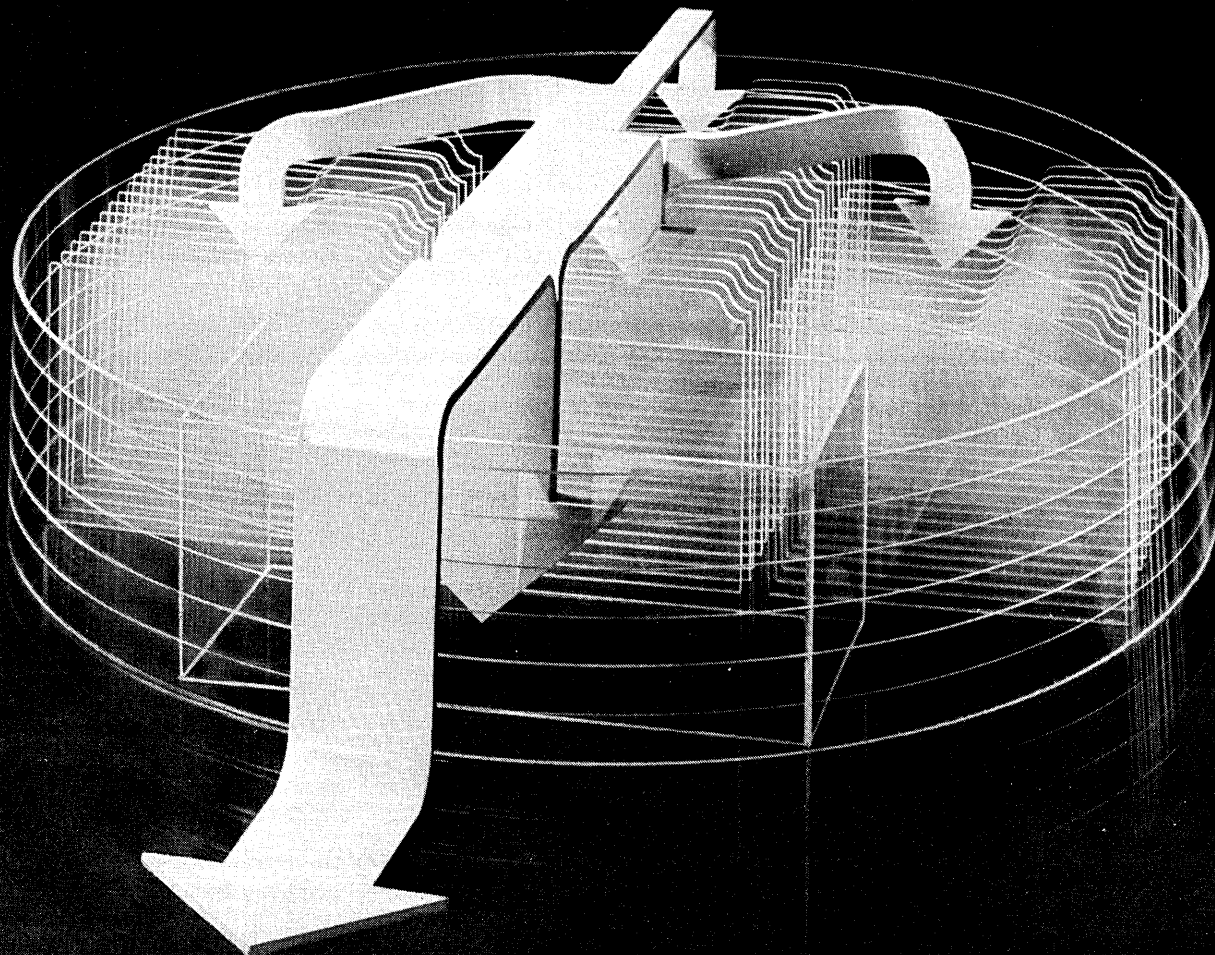
The jury was not specific on the charges it found against IBM. However, based on the guidance given by the judge in his instructions to the jury, the consensus is that the jury did not find in the area of fraud but did find against IBM in the areas of breach of contract and warranty. On the final issue of negligence, it was not clear how the jury ruled.

—W. David Gardner

Leader of the band

British Airways not only worked on the original IPARS but also sold its own packages of airline software to a number of other airlines, and is thus the leader of the band of frustrated airline users today—and the one known to be in the deepest trouble. KLM, Swissair and Alitalia are also understood to have major problems, while the other 10 (including Qantas and Pan Am) are mainly there for a show of force. Their current complaints center around three issues: ACP8, VM, and Hypervisor.

"At first, IBM simply didn't want to know," says BA's Peter Hermon. The airlines grew increasingly obstreperous and after a January meeting with IBM's top brass from Paris, the airlines leaked



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the story to the London *Times*. By the time they reconvened on May 13 IBM was asking for their suggestions, and a formal IBM response was due late last month.

ACP8 is the latest version of ACP4, which was the original PARS concept created for American Airlines and other U.S. carriers at a cost of about \$100 million. There were interim ACP5 and ACP6 and so on, but ACP8 was a disaster.

Hermon says: "There were lots of errors we had discovered in ACP4 and fixed. Not just a few of these but dozens of them reappeared in ACP8. We considered this evidence of somewhat slipshod work." Although the airlines don't want to go into details, one of the most serious malfunctions is understood to be ACP8's inability to cope with today's much more detailed uses for IPARS on the fares side.

We'll call you

According to Hermon, IBM is now fixing the errors carried over from earlier ACPs. The other ACP8 problem is that the users were never consulted during its development. "We told IBM not to come back with ACP9 or ACP10 when they felt like it; we want to be able to tell them not only what we need, but when we need it."

According to another airline, in August and September last year the four airlines who are harnessed to ACP8 (BA, Swissair, KLM and Alitalia) were generating at least twice the number of major breakdowns that IBM's CE's and software people specializing in airlines could handle. IBM too often had to respond that it didn't have the resources to cope—a response that angers users these days, when IBM's liquidity and profitability are so well known. Thus the situation deteriorated still further.

The major problems, though, are likely to be in the alternative IBM has proposed, with classic disregard for the budgets of the users. This is to replace ACP8 with a combination of VM and Hypervisor—a solution that would depend on fulltime use of two large cpu's. The trouble is that the airlines seem unwilling to accept a solution that can only utilize, at best, 50% of the cpu power—and that's the kind of overhead this solution carries.

Hermon says: "Both VM and Hypervisor have attractive goodies, but they carry such enormous overheads that their use is virtually ruled out."

Armonk task-forcing

The publicity surrounding the issue since March has forced IBM to cope in a goldfish bowl, and the company has responded with even more tight-lipped

'no comments' than usual. Inside, with top Armonk officials involved, there is a lot of task-forcing going on. The airlines rejected a sophisticated presentation about the merits of IMS software, in which IBM tried to show that IMSI and IMS/vs had drastically improved the quality and reliability of IMS over the past several years—a point that is likely to be made much more publicly after the end of the year, when IBM turns the spotlight onto IMS as the answer to every user's problems. But in this case British Airways had already tried to run its reservations and technical systems in IMS on its dual 168 systems, and failed notably.

The Hypervisor/VM solution from IBM was late, and the vendor admitted it would give only 50% usage of cpu's. More important, IBM admitted privately to seven of the airlines that it saw no real breakthrough to improve the usage for at least another two years.

With all the problems, the likelihood that other vendors (notably Univac) could capitalize on the battle is very low. The airline users have too much money (and all the training of their people) tied up in IBM hardware and software. All they can do is increase the volume of their complaints, and hope that IBM will involve them more closely in planning for future systems.

—Nancy Foy

Communications

Protocols: Progress in Standards Arena

Development of a standard link control protocol for data communications networks took a significant step forward this summer when two key components being considered by the International Standards Organization (ISO) reached a final ballot.

Meanwhile another new communications protocol surfaced—Burroughs Data Link Control (BDLC). Burroughs said the protocol has been designed to be compatible with ISO's High Level Data Link Control (HDLC), with IBM's Synchronous Data Link Control (SDLC) and with the proposed U.S. link control standard called Advanced Data Communications Control Procedure (ADCCP).

Voting on Draft International Standard (DIS) 3309.2, which defines the frame structure of the proposed link control scheme, was due to be completed Aug. 12. The second component (N4335), "elements of procedure," defines the commands and responses to be used on the link, as well as a frame

numbering scheme. Balloting on N4335 probably will begin next October or November and be completed six months later.

There are some differences between IBM's SDLC protocol and the two ISO proposals. For example, the IBM discipline allows up to eight information frames to be transmitted across a link before the receiving terminal has to return an ACK or NAK, N4335 permits transmission of up to 128 frames before the first ACK/NAK. But these differences aren't considered likely to produce serious problems for users or manufacturers.

Elsewhere, a delay

ISO's sc6 subcommittee is still working on one other element of its proposed HDLC standard. This part is called "codes of practice." Essentially, it describes how to use the commands and responses for various applications.

There is still some disagreement regarding the codes—mainly between the U.S. delegation and the other participants, so it may be a while before this section is finalized.

Also, the U.S. wants to add more commands and responses. Reportedly, the U.S. will support the elements of procedure as now drafted, but will seek changes after they are adopted. Thus, even if ISO promulgates a data link control standard before next summer, as seems likely, its value will be limited.

Meanwhile, work on ADCCP, the proposed U.S. link control standard, remains in limbo, pending further progress at the international level. There is general agreement within the American National Standards Institute (ANSI) that the U.S. standard should be identical, if possible, with the international standard. "But what that really says is, we want them to agree with us, rather than vice versa," explains one source. And so work on a domestic standard has been sidetracked while U.S. standardizers have been wooing their international associates.

The major disagreement at the moment seems to involve the codes of practice. sc6 is supposed to meet in Washington next October, and this difference will be a major item on the agenda. Possibly, work on ADCCP will resume afterward.

A federal standard?

Charles C. Joyce, Jr., assistant director of the Office of Telecommunications Policy (OTP), said in an interview that if ANSI doesn't revive ADCCP soon, he will launch an effort to develop a federal standard. During the next 12-18 months, said Joyce, the feds plan to acquire several functionally-similar teleprocessing systems, and there is a need to make them interoperable—so that users of one system can communicate with others. "We can't wait for ANSI for-

New IBM data entry system helps operators work faster with greater accuracy.

*A sloped keyboard, a sharp, bright display panel
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A high-capability data entry system which reduces the required number of time-consuming tasks performed by the operator has been announced by IBM. The system can result in savings in the costs of data entry, an area with a heavy concentration of data processing personnel.

The system features IBM 3760 Dual Key Entry stations operating with a 3791 controller, which is linked to a System/370 virtual storage computer via direct channel attachment or data communications lines. It can relieve the operator of various entry, editing and verification routines. This makes possible fewer keystrokes per transaction and greater operator productivity.

Improved error correction.

Accuracy can be improved through automatic checks and edits which can detect many errors at the time of entry and flag them for the operator. Fewer errors reach the computer, reducing costly correction time.

Data editing and checking capabilities are provided at the 3760 key entry stations, each of which accommodates two operators. As material is keyed from source documents, the operator is guided and prompted by an easy-to-read display panel. Other operator-oriented features, such as quiet operation and line-of-sight design, reduce fatigue and contribute to high keystroke rates and productivity.

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The new data entry system operates offline for data entry and online for data transfer. Keyed transactions are recorded on disk in a nearby IBM 3791 controller, ready for computer entry. This makes intermediate media such as punched cards, diskettes and tape unnecessary, resulting in improved data handling and throughput and creating the potential for significant cost savings.

Up to 24 keyboards can operate concurrently with one controller, which handles such tasks as formatting, editing, checking and error correction before data is transferred to the computer. There is virtually no need for special data entry programming.

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The system allows the key entry supervisor to monitor jobs in progress and formats being used. Production statistics, reflecting throughput by jobs and by operators, are also available to the supervisor.

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When data is transferred to the computer, the 3791 controller operates as part of IBM's new System Network Architecture (SNA). The SNA family of hardware and programming allows terminals with different functions to be part of the same network, use the

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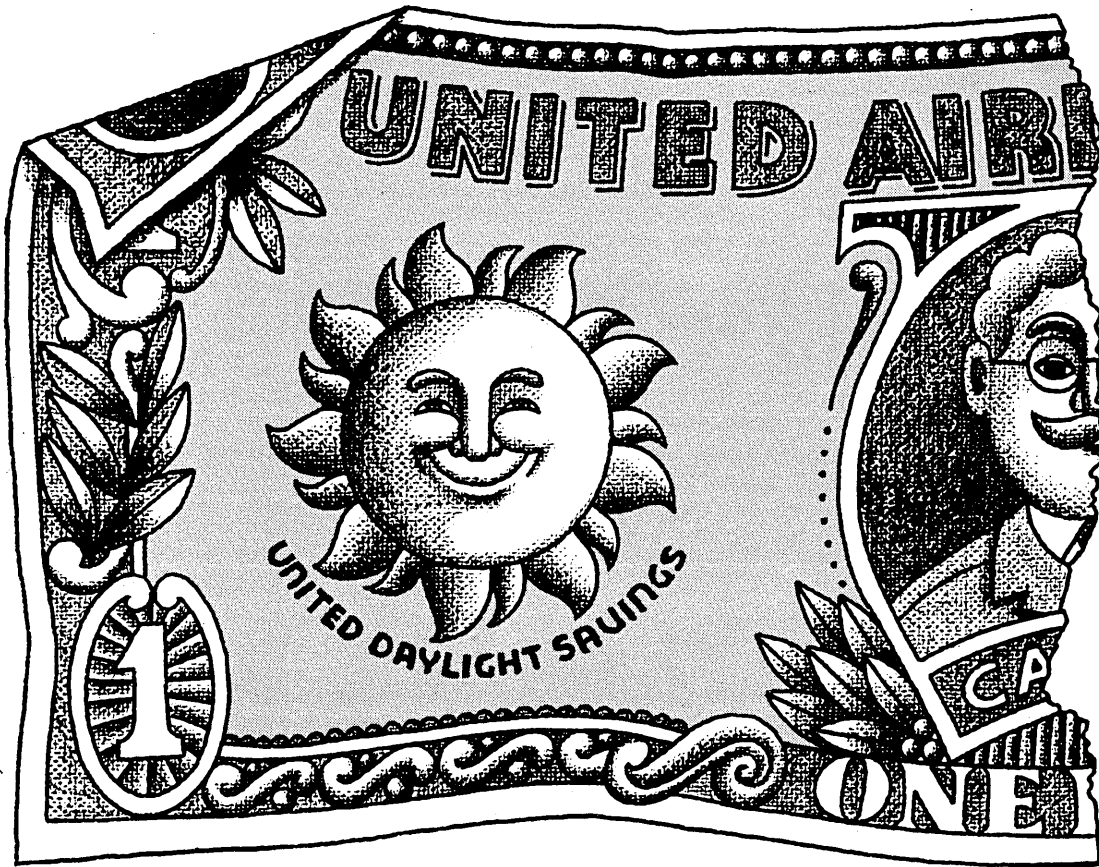
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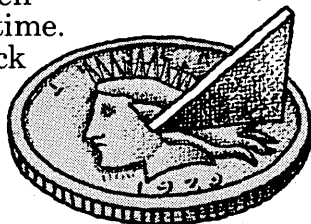
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Los Angeles	318	21.20	15.14	11.78	10.60	10.06

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ever," he added.

"Indefinite" support

Burroughs chairman Ray W. MacDonald said his company's BDLC can be incorporated into an existing network using the company's present communications control procedures. Burroughs will support both new and old procedures, he added, while neglecting to mention how long such support would be provided. A company spokesman, when asked about this, said support for Burroughs' character-oriented communications protocols would be provided "indefinitely."

Another Burroughs spokesman said BDLC consists basically of a 24-bit control portion, followed by up to 256 characters (bytes) of information, followed by a 16-bit cyclic redundancy check and ending with a boundary flag. The first 24 bits contain the same flag-address-control format included in SDLC, HDLC and ADCCP. All the commands and responses in the BDLC control section are compatible with those in SDLC, the spokesman said, but IBM offers "a few" not included in the Burroughs version. The missing ones can be provided by Burroughs, however. BDLC supports the same "Go Back N ARQ" error retransmission scheme used by IBM, and also can be modified to utilize a "selective repeat" procedure, which is more efficient in some applications.

BDLC will be available beginning the last quarter of this year. Initially it will be offered with Burroughs' TC3500 and TC3600 terminals and with the new B776 remote concentrator / controller announced in June. During 1976 and '77, BDLC software will be released for Burroughs' entire computer line (B700-B7700).

Price of the BDLC software "has not yet been established," said a company spokesman.

—Phil Hirsch

Software

Levitz the User Is Now a Vendor

Can a long time furniture man make it in the data processing business?

Sid Levitz thinks so. The name Levitz is to furniture what McDonalds is to hamburgers. Until last year, Sid was president of the family business, Levitz Furniture Co., a national chain of retail furniture stores. He feels his background ideally suits him for the niche in the dp field he's picked for himself. He's formed Integral Systems Associates

August, 1975

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line printer, a 300-cpm card reader... and, of course, DX980 operating system. This configuration enables users to have a \$65,500 minicomputer system that can support tasks normally assigned to computer systems costing \$100,000 or more.

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TEXAS INSTRUMENTS
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news in perspective

which initially is marketing a turnkey system for furniture retailers.

Levitz sees ISA as more than a company. He sees it as a marketing plan and as an association. "As an association it's one I would have joined had it existed before but it didn't so we had to start it."

His primary marketing target is the first-time system user. He sees ISA as consolidating for this user—giving him a single source for—the efforts of the



FOR THE FURNITURE RETAILER: Tom Moch (left) and Sid Levitz, furniture man turned computer man, inspect a report generated by a turnkey system they developed for furniture retailers.

turnkey system designer; hardware manufacturer; mechanical field service organization; operating system developer; local software company; and local service bureau.

For vendors too

For the turnkey system designer, ISA as Levitz envisions it, is an organization that can offer national marketing for his system. For a software company that associates with ISA the organization offers commissions on sales of turnkey systems, the economies of large-scale buying on hardware even for the company's custom systems, and "if an associate does a unique custom system that has market potential nationally, he will be

invited to make this system available through other dealers, the same as any other system designer, collecting a royalty each time his system is installed."

Levitz believes service bureaus can benefit from association with ISA because "many service bureau customers are purchasing in-house systems; the service bureau can either fight the trend or join it. The service bureau that already has the hardware and operating system available is in the best position to sell this customer rather than have competition steal the customers completely."

Service bureaus, he explained, can sell their customers small distributive processing systems whereby the data collection is made on the customer's site, and the summary information is transmitted to the service bureau where the large crunching can be done.

It all started with furniture and, of course, more specifically with Levitz Furniture Co. Some four and one-half years ago Sid Levitz decided the furniture chain, which was growing fast, needed some kind of a management information system. A consulting firm called in to help recommended a California software house, Integrated Business Computing, Inc., headed by Tom Moch. Moch and Levitz worked closely together on the Levitz system and Moch is now a principal in ISA.

Levitz knew the furniture business and Moch knew data processing. In the course of developing the Levitz system, each learned a lot about the other's area of expertise.

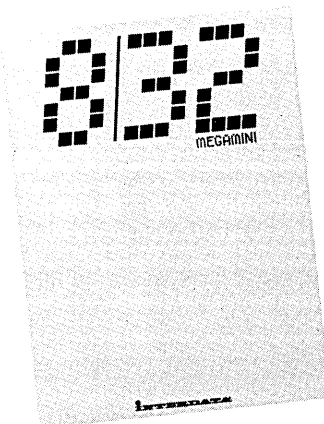
Levitz tends to be cynical about "data processing guys," both users and vendors. He feels they tend to emphasize hardware and the data processing function at the expense of end results. But he excepts Moch. "Tom Moch is the only data processing guy I've ever met who thinks like a businessman."

Inventory control

One of the functions of the Levitz system is inventory control including the pinpointing of the kinds of things that are moving and those that aren't. Moch demonstrated businessman-like thinking in talking about FISH. "You've heard of LIFO (last in first out) and FIFO (first in and first out) in inventory accounting," he said. "We've identified the FISH (first in, still here)."

The Levitz furniture chain has 60 stores, three separate national offices, and seven group offices. When the system is complete, and it nearly is, each store will have a mini and its own complete data base. The minis are polled each night by telephone via Autopoll, a system developed by Moch's IBC and

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summary data is fed into a 370/158 at GTE Data Services in Los Angeles. The national and group offices have terminals through which summary data can be accessed at any time.

When they first started developing the system they were going to use System/3s but they soon gave that up as too expensive and turned to Mesa/2s produced by Martin Wolf Inc. of San Diego.

Levitz is proud of the Levitz system, particularly with the economies of using "a few minutes of crunching time" on a service bureau 370/158. He's disappointed that the furniture chain is going to bring this function in-house. They've ordered two System/3 Model 15s which Levitz feels "will balloon their costs and won't do the job."

In selecting hardware for the turnkey furniture system, they decided a good operating system which would support virtual, real-time operation with concurrent foreground and background, was the key. "We'd been spoiled," said Moch, "having done most of our work with a large 370 system." They were looking now at minis. They found that no hardware manufacturer could supply the kind of operating system that they wanted but General Automation

had one under development. They opted for this and a General Automation SPEC 16/65 as their cpu. They had some problems initially but now, they claim, with some modifications of their own, the operating system is working fine. In addition to the 16/65, with a 960 nanosecond cycle time and from 32 to 48K words of storage, a basic system uses Wangco drives with 10 megabytes of storage, a Tally 200 lpm printer and ADDS crt's. General Automation puts the systems together for ISA and provides enclosures. GA also provides servicing.

Fortran used

The furniture system is programmed in commercial FORTRAN and is done in what Moch calls a "menu structure." When a user gets on he is shown a "menu" on the crt of the different subject areas for which there are programs. He selects one and is shown another "menu" of the kinds of things he can do within that area. He picks one and gets another menu and on and on until he gets the specific function he wants.

It's a big system with 330 separate programs, 173,000 different machine instructions, more than 50 different screen forms, and more than 50 different reports available. It accomplishes

seven major functions: inventory control for buying and sales; inventory control for security and accounting; sales recording and statistics; accounts receivable and cash receipts; personnel and payroll; accounts payable and disbursements, and general ledger. Cost of a system will be under \$2,000 per month on a five to seven year lease purchase plan.

ISA currently is installing its first turnkey furniture system in a store in Tucson. They hope to have this running smoothly by the end of September. Levitz says he will not sell a system to anyone who has not seen it running and talked to a user.

From furniture they've moved into other turnkey systems. Levitz' big concern is that a potential user—someone familiar with the vertical industry to be served as he is with furniture retailing—be closely involved with system design. Having been approached by an electrical distributors association, they're working with the association's help on a system for that industry. They feel this will lead naturally into a system for electronic distributors.

ISA also offers a basic bookkeeping package that IBC developed. One purchase of this package led to a vertical turnkey system for the farm feed industry. A feed company was buying the bookkeeping package and Moch, in working with the firm, found it could be expanded to cover things like how to mix feed to get the proper nutrients at the lowest cost.

They also have a municipal information system for small cities. This came from the outside. George Tamas, the system designer, heard about ISA and came to them for marketing help.

Levitz has backed his faith in the ideas behind ISA with financial commitment. He says he's invested half a million dollars in development of the furniture system and he's committed to GA for 100 SPEC 16/65s over a one year period. The firm has three demonstration systems up and running at its Harbor City, Calif., headquarters and "a number" of potential associates already lined up. Maybe the name Levitz will become as big in data processing as it is in furniture. —Edith Myers



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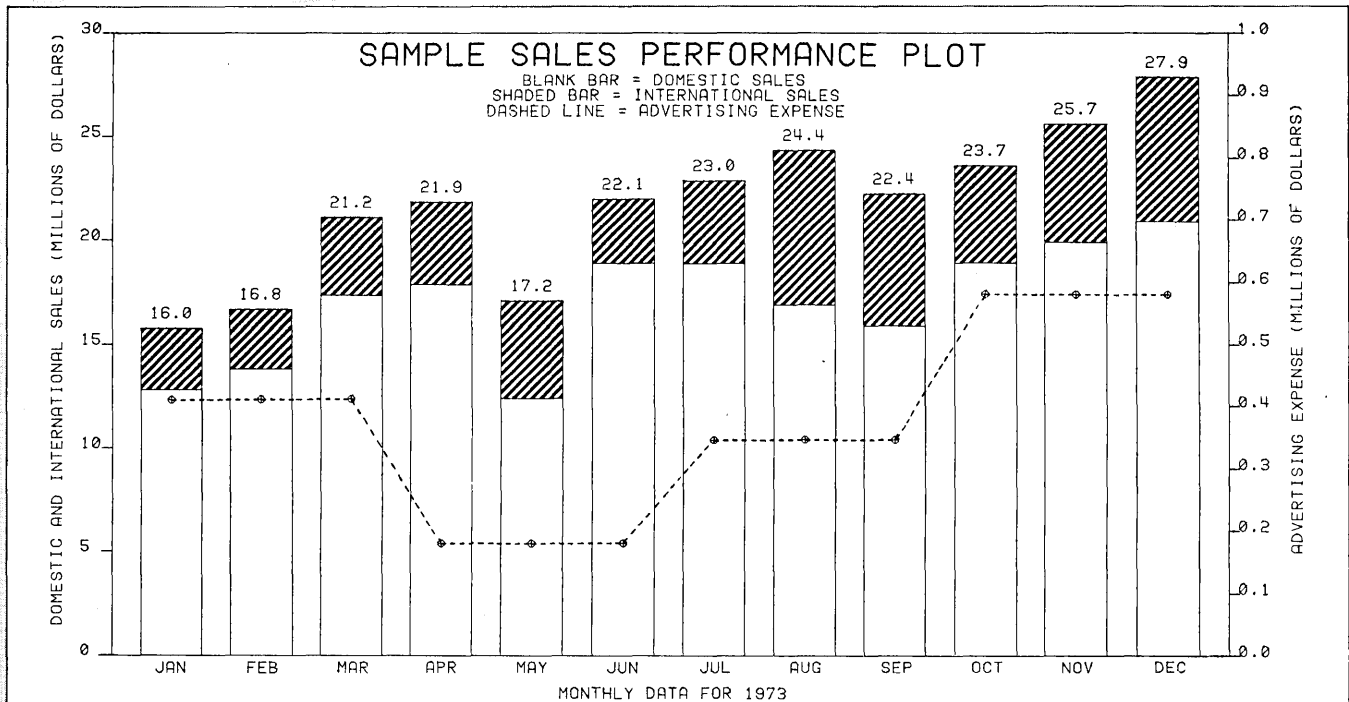
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Admission tickets (free) available from Dr. Rose or the Exhibitors.

Technology

New L.A. Firm offers 6250 bpi Drives

A fledgling Los Angeles company has become the second independent peripheral manufacturer to offer 6250 bpi tape drives.

Actually the drives are the first product of Gulliver Technology Corp. And the company stresses that it "is not in business to compete head-on with IBM." It plans to market to the "other" com-



One plot is worth thirty pages of printout.

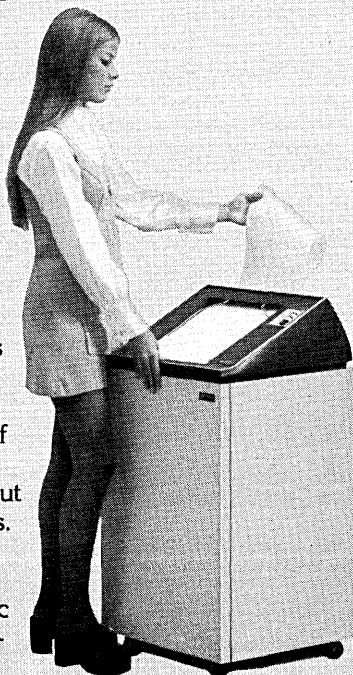
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puter manufacturers. Its prices, says president Dan O'Neill, formerly chief engineer, computer tape products, for Ampex Corp., will not only be under those of IBM but will be from 10-20% below those of the only other independent now offering 6250 bpi drives, Storage Technology Corp.

O'Neill said a big reason for the low cost of the Gulliver drives is the fact they're sticking to the speed range between 45 and 125 ips which means they can make their drives smaller. Their columns are only 12 inches long, about half that of the columns in IBM and STC 6250 bpi drives. The entire units measure 19" by 24½". O'Neill believes Gulliver has 20 areas of design in its drives that can be patented and patent applications are in.

In spite of the fact that its drives are smaller in size than those of the only competition to date (Lilliputian?), Gulliver Technology Corp. did not take its name from Jonathan Swift's Gulliver although O'Neill thinks they might want to make a connection in future promotion. The name came instead from a restaurant in Marina del Rey, Calif., where the principals of the company met fre-

quently in the early days of developing their business plan. They selected the name Gulliver, initially, on a temporary basis but, by the time they were ready to incorporate, early this year, they'd decided they liked it. "It's different and we're different," said O'Neill. They had to add the technology corporation part to avoid conflict with the restaurant.

Gulliver plans to market primarily to oem's and it's starting life with two healthy oem orders, one for \$1 million and one for \$200,000, both from controller manufacturers who will sell the drives with their controllers. "This'll give us some end user penetration right away," says O'Neill. —E.M.

Antitrust

Users Unprepared and Unwilling to Comment

Most of the computer-using community would be a mute bystander should the Justice Dept.'s antitrust trial against IBM end this year with a Consent Decree.

The situation became evident early this summer in interviews with users, professional societies and user groups that were asked to address these questions: Would the computer-using community be willing and ready to respond to the specifications of a Consent Decree this year? Would it be ready with expert, researched opinion within the 60 days that the courts allow for comment?

The answer is that very few individuals would be prepared, if willing, and none of the societies and user groups yet have the mechanism in place to inform their membership, let alone gather opinion to funnel to the courts. In fact, no user-oriented organization could be found that has even held a panel session or workshop on the issue.

One was contemplated, but then dropped, at the National Computer Conference last May in Anaheim. George Glaser, then president of the sponsoring American Federation of Information Processing Societies (AFIPS), said the possibilities in the IBM case were so varied that the proposed "what happens if" session would have had to select only a few scenarios. AFIPS, he said, would have appeared to be taking a position and its nonprofit status jeopardized.

Issue was dodged

The large IBM user organization, SHARE, also skirted the issue in its task force study on future requirements in computing, called SILT. It considered a variety of technical, economic and political factors, but not the IBM legal issue. Tom Steel of Equitable Life Assurance Society, a member of the SHARE task force, openly states the issue was dodged. On that task force, he explains, was an IBM employee restrained from discussing the case and several data processing managers from large companies that would never have allowed their participation if the issue were part of the study. *Appearing to take a position* was the problem.

Corporation lawyers traditionally prohibit their employees from comment in legal issues. But an added silencer in this case has been a controversial IBM-inspired "gag order" by the trial judge David N. Edelstein. (July, p. 70). Generally, only the parties in the case are affected by it, but several users feared to talk to a reporter because they were on the witness list. (Equitable's Mr. Steel takes a more rational interpretation of the ruling: as an IBM witness on standards, he will not comment on IBM's behavior in the standards arena. He says IBM's behavior "has nothing to do with" the question of what will happen to the user.)

But even if there were no silencers, most users simply do not have the time to deal with a set of speculations. "This thing will drag on so long, it's beyond

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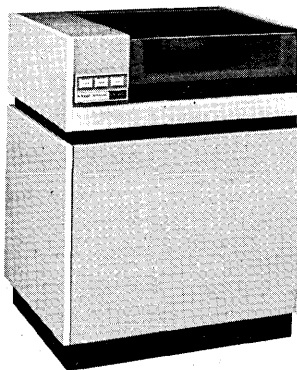
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my economic life," says Dr. Martin Solomon of the Univ. of Kentucky. Users have their day-to-day operations to worry about, the profit and loss statement and the budget. Data base standards loom large in Solomon's opinion. "There's more thought on that issue than on what the government is going to do," Solomon says.

Steel says that Equitable Life has looked into the implications. "It would be irresponsible if we did not." But there are "so many possibilities and we don't have the resources to examine them all," he adds. "Once it becomes necessary, we'll put together a task force to evaluate our responses. We hope we'll have sufficient understanding to do the job."

Question too big?

The user is gagged, or he doesn't have time, or the question is just too big. Or he feels "the world won't be so dramatically different after the case that it will make much difference to the way users operate." Users and user groups have survived transition through the revolutionary '50s and '60s, through the 360 model announcements, unbundling, the demise of mainframes and peripheral

companies.

Still to be addressed, though, is the question of who will speak with force for the user if IBM is dissected or if the customer is faced with new circumstances that are costly and technically disruptive. AFIPS is unlikely to do any-

thing about examining the issue because of its nonprofit status. It has opened a Washington, D.C. office (see p. 80) and Glaser said in a June interview that the office may be used to inform the membership on any Consent Decree or judgment and to funnel the opinions of individuals to the courts—but only as long as these opinions are not construed as those of AFIPS.

The Data Processing Management

What Some Users Want to See Happen

Users, interviewed for this report, listed what they would like and not like to see happen in the wake of the current antitrust case against IBM.

—To a manager, the user would like IBM to give him more advance information on products, software and standards—either via law or through *laissez faire*. In the latter case, big users think they could control IBM better with less government control.

—None would like regulation of any part of IBM. Many think any regulation or breakup would naturally result in higher prices, and expensive haggling with regulatory commissions.

—None believe their technical problems would be solved—reliabil-

ity, innovation, software performance, etc.—through an alteration of IBM, no matter what form.

—Overseas, some users think they would benefit from a separation of IBM World Trade Corp. from the domestic IBM. First, the U.S. government restrictions would not apply as they do now, so they could get more advance information, specially tailored products (rather than the "one world" product line), and pricing and support policies more determined by the needs and competition of each country. These users want more control over what IBM does, and want to see separate financial reporting so they can tell if IBM pricing is netting too much profit. *

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Association (DPMA), so long held as a weak sister by other societies, sounds considerably more daring. It feels it *must* play a role in helping and representing its membership in this issue. "We need to be concerned," says president Ralph Leatherman. "Internally IBM is organizing already to do whatever it needs to do without skipping a beat. We must keep the membership alert. As users, we have experience in knowing what it takes to run an installation. Knowing what IBM does for us, we can relate 'what happens if.' We missed a bet with unbundling. Keeping the user informed is the kind of thing that will make him say, 'DPMA is managing my interests.' We must create the climate that DPMA is essential for the managers' professional advancement."

Outgoing DPMA president Ed Palmer, speaking generally, said, "We must get ready to be able to provide DPMA positions on important issues. We must strategize on how to present opinions. If we don't, somebody else is going to do it for us."

Just as AFIPS, the DPMA doesn't want to become a lobbying organization, but it doesn't want to be mute either.

Both Leatherman and Palmer noted that the association is getting well organized to communicate up and down its ranks, having more than 270 chapters divided into regions and represented to

the international board by regional vice presidents. The association also plans to establish contact in Washington. "We will set up vehicles for communication this year. We have the kind of people who want to do it, too."

Another look

As for the user groups, SHARE president Shirley Pratch says that while she is personally interested, SHARE is not currently doing such a study. However, the executive board of the group recently went off on a three-day retreat to discuss SHARE's goals and plans, and the fate of IBM was to be a major underlying theme of the meeting.

Other SHARE members feel that the user group "should be embarrassed" by its lack of attention to the issue and indicated that they would bring it up at the next general meeting in New York this month. Still others were dubious that SHARE would consider it, being totally disenchanted with the user group as not even fulfilling its "bit-diddling" function. And still others felt that SHARE would be relatively unaffected by most things that could be done to IBM, except splitting it into multiple IBMs of equal balance. ("Which one would we deal with?")

Similarly, the major IBM user group, GUIDE, is not conducting any study. President Al Burriss told a reporter that

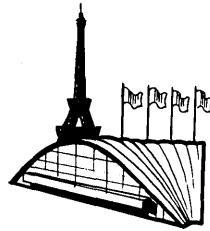
the group "preferred not to comment" on the question of whether such a study was an appropriate issue for a user group.

Some other user groups seem willing to bring up the issue to their membership. The Univac Users Assn., busy with its own problems, such as a proposed merger with the Univac (RCA) group, is willing to take up the question. So is the Honeywell Users Group, according to president William White. They say they are aware that whatever happens to IBM will affect their own vendors.

One thing that was found in the survey: most would be willing to meet with users, vendors, lawyers, economists and other concerned individuals to discuss the subject and find out the many effects that changing IBM would have. And if they can't do that, they would be willing to spend their own time studying the results of such a meeting.

Historically, the consumer in antitrust issues has been the last to know, to speak out, to respond in a judgment, for all the reasons noted above. The computer consumer is not unique. Evidently, however, there is a cadre of the concerned that would do something "if we knew where to start on the issue." A pan-industry meeting is a suggestion.

—A.P.



The worldwide fortnight

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News in Perspective **BENCHMARKS . . .**

Second Quarter Earnings: IBM, NCR and Honeywell were down while Burroughs and Control Data were up in earnings for the second quarter of 1975. IBM's slip of 2.9% to \$468.8 million or \$3.14 a share from \$482.6 million or \$3.28 a share a year earlier, was not as great as most security analysts had expected. The 1974 second quarter was the highest in the computer giant's history. NCR's slip also was slight—to \$18,472,000 or 76 cents a share from \$19,867,000 or 84 cents. Honeywell's decline was sharper, a 48% drop to \$10.6 million or 55 cents a share from \$20.4 million or \$1.07. Burroughs and Control Data were up 13.3% and 10% respectively in their second quarter earnings. Control Data, rebounding from a 28% decline in the first period, earned \$11.7 million or 69 cents a share in the latest quarter, up from \$10.7 million or 64 cents a year ago. Burroughs was up to \$38,438,000

or 97 cents a share from \$33,930,000 or 87 cents.

Reorganization at Honeywell: Honeywell Inc. has reorganized its computer marketing operations. The company will operate via a national accounts operation, a Western operation, and an Eastern operation. A central marketing operation organization to provide support services will be set up effective Sept. 1. Before the reorganization Honeywell computer marketing had been via Eastern, Western, Southern, and Central operations.

About Face for ADAPSO: The Association of Data Processing Service Organizations (ADAPSO) which had opposed both experimentation in and implementation of electronic funds transfer systems (EFTS) has reversed itself in part. The association still supports a ban on implementation of EFTS but now, it says, it will support the concept of EFTS testing. In a new position paper ADAPSO said, "While testing and experi-

mentation of EFTS action is of interim value, there is an urgent need to avoid implementation of EFTS action such as to warrant interference with the proceedings of the EFTS Commission or with potential recommendations of that commission. Accordingly, ADAPSO urges all those involved to limit action to reasonable testing and experimentation, and report their data, views and recommendations to the EFTS Commission." The paper noted that the EFTS Commission is still not appointed.

A Blessing for EFTS? There are those who say that IBM entering a market has the effect of blessing that market. If this is true then those politicians who would like to slow down the development of electronic funds transfer systems (EFTS) might as well give up. IBM is in that market now with both feet with introduction of two new terminals, the 3606 and the 3608 that can be used in retail stores to validate credit cards and personal checks and can be linked to a bank to transfer funds from a customer's savings or checking account into a merchant's account.

AFIPS Opens Washington Office:

The American Federation of Information Processing Societies, Inc. (AFIPS) launched a "Washington Activities Program" with opening in late June of a Washington, D.C., office in Suite 420, 2100 L St., N.W., Washington D.C. 20037. Director of the new office is Philip S. Nyborg, a graduate of the Univ. of Michigan where he received his Juris Doctor Degree and a former director of the university's Law School Computer facility. At an official inauguration of the new office AFIPS past president George Glaser (see accompanying pho-



tographs) expressed his views on information processing as a national resource. Waiting their turn to do the same were (left to right) Sen. John C. Culver of Iowa; Dr. Ruth M. Davis, director of the Institute for Computer

Sciences and Technology, National Bureau of Standards; Dr. Brockway McMillan, vice president of military systems, Bell Laboratories; and Professor Allen Newell of Carnegie-Mellon Univ. *

A Breach of International Scientific Standards?:

In spite of objections of the Special Interest Group on Artificial Intelligence (SIGART) of the Association for Computing Machinery (ACM) (Dec. '74, p. 17) the International Joint Conference on Artificial Intelligence is still scheduled to be held next month in Tbilisi, USSR. But there will be some things missing. Jack Minker, chairman of the department of Computer Science, Univ. of Maryland, one of the first to raise objections to the Soviet site on grounds selection of the city was "unsatisfactory and ill considered" won't be there. And a panel session he proposed to the program chairman of the IJCAI won't be quite as he'd envisioned it. Minker proposed a panel on "Cybernetics vs. Artificial Intelligence—Pros and Cons" and suggested as panelists himself, Dr. Alexander Lerner, a noted Soviet cyberneticist, Dr. John McCarthy and Dr. Bertram Raphael. The program committee agreed to hold the panel but Minker was not accepted as a panelist by Soviet members of the committee. Now, it seems, Dr. Lerner won't be on it either. A *New York Times* story on June 8 noted "Alexander Lerner, a 63 year old mathematician, was called in by the KGB last Monday and informed that he would be barred from accepting an invitation to join American scientists at an international meeting in the Soviet Republic of Georgia this fall. Mr. Lerner told Western reporters that he had also "been advised to withdraw his application to emigrate." *

Model 204

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Model 204: flexible, high level view of data / powerful, simple user language / interface to programming languages / protection of privacy / safeguards for integrity / concurrent online and batch operation / high performance / multiple key access / supports all classes of users / modular design / inverted files / teleprocessing monitor / interface to CICS, Intercomm, others / concurrent multiple online files / multi-threaded / multiple users / multiple application programs / **Data Structure:** variable length fields / variable length records / variable record format / 4096 fields per record / arbitrary number of key fields / 16 million records per file / 250 files online simultaneously / fields defined dynamically / fields updated at any time / dynamic space allocation / program independence / flexible data model / large and small databases / **Data Compression:** field names coded / field values coded / integers stored in binary / blanks not stored / data compression features optional / **Access Methods:** inverted file access method / hash key access / sorted file access / record number pointers / sequential search / access methods user independent / **User Language:** online retrievals and updates / terminal-oriented / English-like language / easy to use / easy to learn / ad-hoc queries / pre-stored requests / boolean retrievals / arithmetic computation / prompting segments / logical data manipulation / conditional execution / most complete dbms user language available / **Host Language Interface:** COBOL, PL1, FORTRAN, BAL interface / complete facilities of dbms / multi-threaded / high level view of data / subroutine calls / easy to use / application programs up quickly / programming effort reduced / **Security:** sign-on passwords / file passwords / user privileges / public, semi-public, private file modes / segment level security / record level security / record sharing / **Data Integrity:** checkpoint-restart / teleprocessing monitor coordinated / timed checkpoint / operator initiated checkpoint / automatic program checkpoint / programmer initiated checkpoint / user language checkpoint / back down dataset / audit trail / debugging aids / internal checks / all pointers and data verified / dump-restore / **Utilities:** file load / accounting / smf type records / statistics / analyze program / file evaluation program / **Services:** hot line service / application support / education support / user language course / host language interface course / database design course / file load course / Computer Corporation of America / **Call Us:**

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LOOK AHEAD

(Continued from page 18)

wide acceptance is Grumman Data Systems which recently began selling interfaces to hook 1403s onto systems of eight other computer markets. With 12 installed, it thinks it soon will be installing them at a rate of 10 a month.

Its first Burroughs product--the G 1403/B--is to be installed next month in the Washington D.C. area and a G 1403/U-9000 for the Univac 9000 series and some of the 1100 line is about to be announced. Most of the dozen installed have been on minicomputers and some large Xerox and CDC systems. The controllers to interface the 1403s with these systems are developed by a tiny Santa Monica company, Spur Products, which last December sold the manufacturing and marketing rights to Grumman. Spur's Ray Lorenz, a former engineer with Dataproducts, says the interfaces were developed "with full cooperation" from most of the mainframers. The exception was Burroughs which repeatedly refused to turn over technical details, despite the insistence of large users wanting to replace the B9240 buffered drum printer line with the IBM 1403 (July '74, p. 18). Lorenz built the interface with information from "a user with technical knowledge."

SDLC FOR NON-IBM SYSTEMS

While development of an international standard for link control protocol moves ahead and development of a national standard seems stalled, (see p. 65) a new Sunnyvale, Calif., company is concentrating on teaching users and vendors how to manufacture and use the current "de facto" standard, IBM's Synchronous Data Link Control (SDLC) in non-IBM systems interfacing with IBM equipment and protocol. The firm, Telecom Computer Technology, is headed by Saroj K. Kar who has held project management positions with Marconi Inc., Singer Business Machines and Memorex and has been a member of the Data Communications Standards Subcommittee X 3534 of the American National Standards Institute (ANSI). Kar has planned a series of fall seminars on designing and planning systems for SDLC and IBM's Systems Network Architecture (April, p. 51). First will be held Sept. 8 in Palo Alto, Calif., with others to follow in major cities throughout the country.

BUT DOES IT CHECK THE BOUQUET?

The Electronic Wine Captain is billed by its developers as the forerunner of "the computer in the kitchen." Sheila Hoffman & Associates, which has had the "captain" under development for three years, is testing two units in the Los Angeles area, one in the liquor department of a Von's supermarket and the other in a Vendome liquor store. Designed for use by customers, the "captains" consist of Sanders crt's atop Photophysics printers with tape drives for memories. A customer planning on entertaining at dinner chooses first from among meat, fish and poultry and pushes an appropriate button. If meat is the choice, 12 types of meat main courses are displayed on the crt and another choice is made. From there the customer pushes buttons for the number of people to be fed, desired price per person and desired price range for the wine (there are four). Another button brings it all together. A menu appears on the crt, complete with vegetables and other accessories and four suggested wines appropriate to the main course, by label, in the desired price range. This stays on the screen for a couple of minutes, then the printer prints out a shopping list showing the shopper exactly what to buy such as how many cans of peas and pounds of meat.

RUMORS & RAW RANDOM DATA

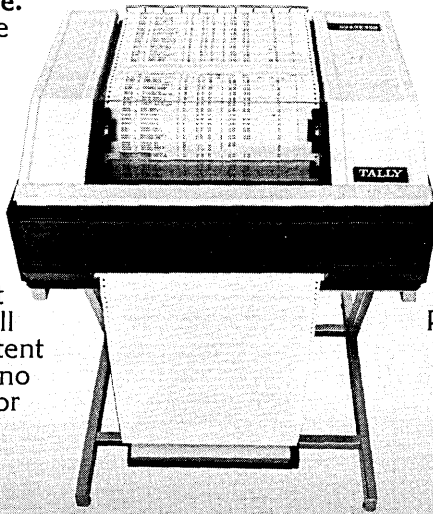
IBM and Comsat are committed to take in additional partners in their CML Satellite Corp., and while there had been no inkling of the partners' identity at this writing, the names of American Express and Southern Pacific Communications Co. were among those making the rounds...Key-to-disc maker General Computer Systems of Dallas next spring will begin shipping large communications oriented remote data processing systems similar in concept to IBM's 3790. First customer test installations for the 16K (expendable to 256K bytes) memory systems, code-named "Harold" will be in March...Another key-to-disc maker, Computer Machinery, Los Angeles, will announce a new system this month, the 1800, which will extend the systems architecture of its 16 and 18 systems to medium and low range users. Basic price will be \$950/month plus \$70 per key station.

ANOTHER PAGE FROM TALLY'S RELIABILITY STORY

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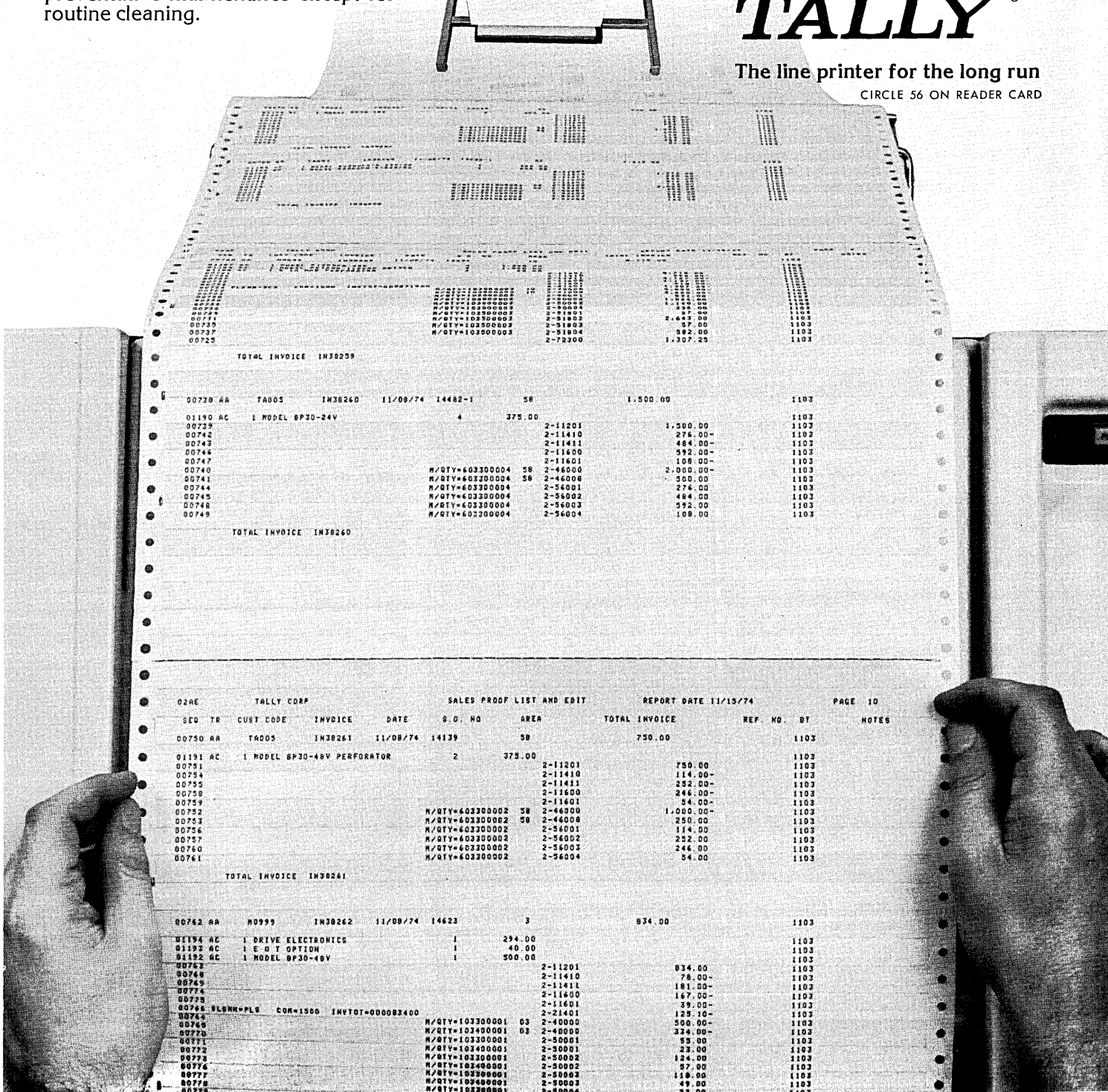
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00730	AA	TA005	IN38260	11/08/74	14482-1	58	1,500.00			1103	
01190	AC	1	MODEL 8P30-24V		4	375.00				1103	
00739							2-11201	1,300.00		1103	
00742							2-11410	276.00-		1103	
00745							2-11411	484.00-		1103	
00746							2-11400	592.00-		1103	
00747							2-11601	108.00-		1103	
00748							N/ QTY=603300004	58	2,000.00-	1103	
00741							N/ QTY=603300004	58	2,460.00	1103	
00744							N/ QTY=603300004	2-56001	276.00	1103	
00745							N/ QTY=603300004	2-56002	484.00	1103	
00746							N/ QTY=603300004	2-56003	592.00	1103	
00749							N/ QTY=603300004	2-56004	108.00	1103	
TOTAL INVOICE IN38260											
028E TALLY CORP SALES PROOF LIST AND EDIT REPORT DATE 11/15/74 PAGE 10											
00750	AA	TA005	IN38261	11/08/74	14139	58	750.00			1103	
01191	AC	1	MODEL 8P30-48V PERFORATOR		2	375.00				1103	
00751							2-11201	750.00		1103	
00754							2-11410	114.00-		1103	
00755							2-11411	252.00-		1103	
00758							2-11600	246.00-		1103	
00759							2-11401	54.00-		1103	
00752							N/ QTY=603300002	58	2-46000	1,000.00-	1103
00753							N/ QTY=603300002	58	2-46008	250.00-	1103
00756							N/ QTY=603300002	2-56001	114.00	1103	
00757							N/ QTY=603300002	2-56002	252.00	1103	
00760							N/ QTY=603300002	2-56003	246.00	1103	
00761							N/ QTY=603300002	2-56004	54.00	1103	
TOTAL INVOICE IN38261											
00762	AA	H0999	IN38262	11/08/74	14623	3	834.00			1103	
01194	AC	1	DRIVE ELECTRONICS		1	294.00				1103	
01192	AC	1	E - O T OPTION		1	40.00				1103	
01192	AC	1	MODEL 8P30-48V		1	500.00				1103	
00763							2-11201	834.00		1103	
00760							2-11410	78.00-		1103	
00765							2-11411	181.00-		1103	
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00770							N/ QTY=103300001	03	2-40000	334.00-	1103
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00772							N/ QTY=103400001	2-30001	23.00	1103	
00773							N/ QTY=103300001	2-50002	124.00	1103	
00776							N/ QTY=103400001	2-30002	97.00	1103	
00777							N/ QTY=103300001	2-40002	118.00	1103	
00778							N/ QTY=103400001	2-30003	49.00	1103	
00779							N/ QTY=103300001	2-40004	27.00	1103	

hardware

Off-line

With data communications recognized as the fastest growing segment of the data processing industry, Burroughs Corp. has just unveiled a new control procedure called Burroughs Data Link Control, BDLC. BDLC is very similar to IBM's SDLC, or Synchronous Data Link Control, which is not too surprising, as a general consensus has it that bit stream techniques are better than block transmission procedures for the communications task. The result of participating with ANSI, ECMA (European Computer Manufacturers Association), and the International Standards Organization, is a modular structure that can be modified, if necessary, to conform to any standard eventually adopted. Burroughs will support older communication techniques for the foreseeable future to allow its users to make a planned transition to the more efficient technique.

An upcoming issue of Datamation will feature a comprehensive survey of hardcopy terminals. If your firm manufactures one or more of any speed, or is planning to introduce one during this year, please write for a product questionnaire so that it can be included. Datamation Magazine, 1801 S. La Cienega Blvd., Los Angeles, Calif. 90035.

Japan's Hitachi has been spending time in San Francisco this summer demonstrating its OCR-59 optical character recognition system to interested oem's. The machine has sold so well in Japan the past two years (150 installed, orders for 200 more) that the firm thought it would test U.S. reception. Principal specs: off-line to 1,600 bpi tape or paper tape; 50 handprinted cps or 100 machine printed cps; postcard to letter size input; up to 29 lines/sheet readable.

Versatec, one of the big powers in electrostatic printing, has developed a unit capable of plotting images up to 72" wide--reportedly the widest ever built--to enter an as yet undisclosed new market. Follow on models with widths of 44", 36", and 24" are expected after the biggie, due around September.

The next generation of commercial aircraft is expected to be heavily digital in its electronics systems, and McDonnell Douglas is already using Varian minicomputer systems to simulate digital aircraft systems.

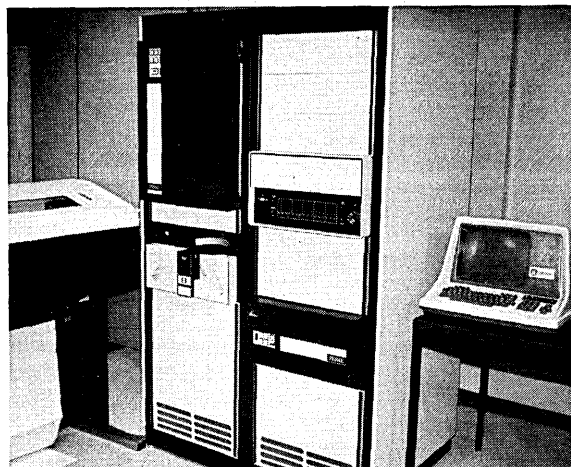
IBM Key-to-disc System

Welcome back to at least 1970. IBM is now saying what its competitors said fully five years ago about the advantages of key-to-disc techniques: "[They] can significantly improve productivity in entering large volumes of data into a computer system by helping operators achieve new levels of keying speed and accuracy." The attractive looking 3760 is a two-position key entry station that includes the keyboards and shares a gas panel for displaying entered data and control information to both sides. Two or three of the 3760s can be linked to form a data entry pool of four or six operator positions, and one 3791 controller (introduced with the 3790 communications system in February 1974, p. 104) can support up to twelve 3760s, or 24 operator positions. The 3760 is basically

designed for centralized data entry, but can also be used in decentralized applications—one or a few units located in various user departments as far as 2,000 feet from the controller.

The 3760 can fill in the full name of a state on a record in response to a two-digit code entered on the keyboard. In addition, customer or account numbers and product or item numbers can be checked automatically for accuracy. Other automatic functions include entering the date on a record, performing arithmetic operations and checking data to determine whether it is within specified numerical ranges. After each record is finished, data is transferred to the 3791's disc and stored for later batch transmission to the computer. Error records discovered by a mainframe application program

product spotlight



Time-sharing System

Imagine 32 users having access to their own 128K byte virtual memory computer system and having high-level languages such as FORTRAN, BASIC, available to them for less than \$5,200 per station. That is the challenge being offered by Prime Computer with its Prime 300 time-sharing system. The hardware consists of 512K byte of MOS memory, floating-point hardware arithmetic, 32-line asynchronous multi-line controller, line printer and 60 megabyte disc pack. It's time-sharing, but not in the usual time slicing sense: the 300 boasts true virtual memory management features, with all users having access to the memory, peripherals and cpu.

The universal disc controller is as much responsible for the 300's performance as the 600 nsec processor, it seems. Any combination of four car-

tridge or disc pack units with capacities of 6, 12, or 60 megabytes, plus a fixed-head disc can be attached to the controller. Even more disc capacity can be added, usually without having to purchase additional controllers.

Virtual memory disc operating software includes some new wrinkles to improve the efficiency of the large system. There's an automatic log-out feature that prevents inactive connected terminals from retaining system resources beyond a predetermined time limit. A read/write lock system for file security controls user access to all files. A main memory scan feature automatically tests main memory and can identify and bypass any faulty locations. At roughly half the price of Hewlett-Packard's 3000 system, the 300 looks like an able competitor. PRIME COMPUTER, INC., Framingham, Mass.

FOR DATA CIRCLE 224 ON READER CARD

Progress Report:

370/135 USERS: HERE ARE SIX UNIQUE REASONS WHY OUR NEW 370/STOR 135 IS THE BEST MEMORY YOU CAN BUY.

THE ONLY "SINGLE SOURCE" INDEPENDENT

Cambridge is the *only* independent supplier of 135 memory that designs, builds, services and enhances the products we sell. From our own static "n" channel semiconductor chips to finished systems and field maintenance, Cambridge is solely responsible for your 370/STOR's performance.

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Cambridge is the *only* independent supplier to build error correction logic into its 135 add-on memory. All single-bit errors are automatically detected and corrected; the error locations are recorded for later failure-anticipation analysis. All multi-bit errors are detected. This is accomplished completely apart from IBM circuitry — assuring simple problem identification.

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Cambridge is the *only* supplier of 370/135 memory that provides a user-operated maintenance panel for fast and simple fault isolation and diagnosis, and the ability to remove either IBM-resident or 370/STOR 135 memory completely from operation with just a turn of a dial. This provides both backup of IBM memory and off-line exercise of 370/STOR memory.

RAPID INTERCONNECTION

Cambridge's unique interface design minimizes the time and effort of installation. 370/STOR 135 requires less than half the number of interconnect cables and cards used by other suppliers. You can easily install Cambridge memory in less than a single shift, with a minimum disruption of production operations.

UP TO TWICE THE CAPACITY

Cambridge is the *only* supplier that has designed its 370/STOR 135 memory for expansion beyond its current limit of 512K bytes. Right now, you can get either standard IBM-size modules, or custom modules, in any configuration up to 512K. In the future, you will be able to expand up to one megabyte. That means your investment in 370/135 hardware is protected for years.

These unique features make our new 370/STOR 135 the most transparent stand-alone memory ever offered by an independent supplier. It's easy to buy. Easy to install. Easy to upgrade. Super reliable. And very economical (about 40 percent below IBM prices).

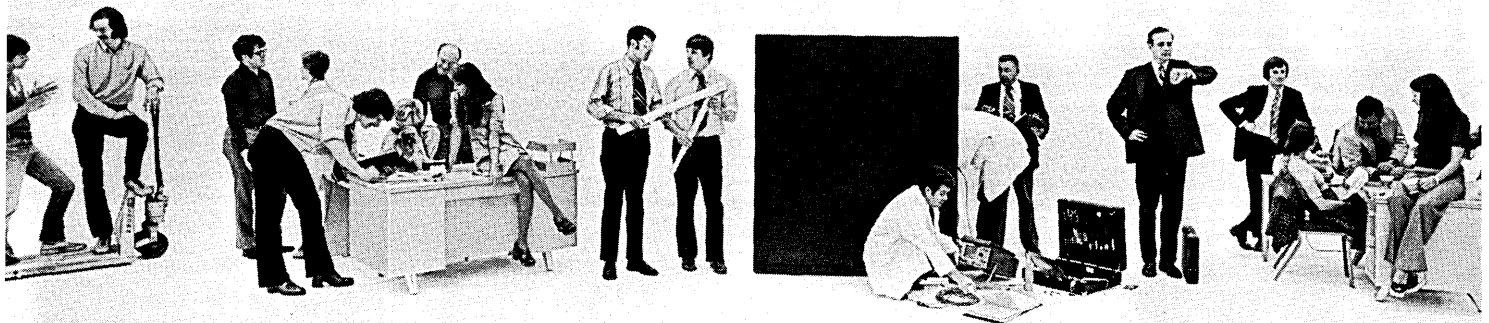
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Anyone who has a computer will tell you it breaks down now and then. The problem is, when the computer stops working, so do all the people who depend on it.

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Data General has everything you need to make a multiprocessor system go: dual ported Discs, Interprocessor Bus, Multiprocessor Communications Adapter, I/O Bus Switch, Power/Fail Auto Restart. And they're all part of the original design. Not stuck on as an afterthought.

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operating systems. So you can concentrate on your application.

And on some of our single processor systems we even offer options like Automatic Error Checking and Correction. It keeps the computer going by automatically detecting and correcting all single bit memory errors.

Data General computers are less likely to break down because they have fewer interconnections than most computers. But if one of our computers ever does go down, you can call in your local Data General service representative. All the major functions of our computers are on separate modules so it's easy for him to locate problems, and easy to correct them.

So if you don't want to be let down by your computer, put in a call to Data General.

That way, you won't suddenly find yourself out of work.

Data General

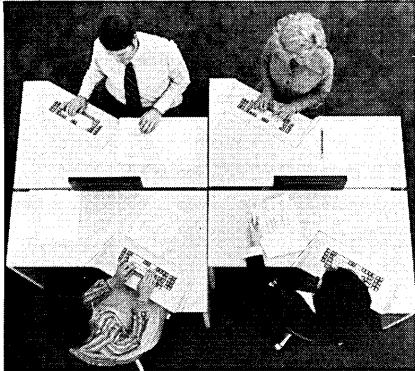
Data General, Route 9, Southboro, Mass. 01772 (617) 485-9100. Data General (Canada) Ltd., Ontario, Data General Europe, 15 Rue Le Sueur, Paris 75116, France. Data General Australia, Melbourne (03) 82-1361/Sydney (02) 908-1366.

CIRCLE 25 ON READER CARD

hardware

can be returned to 3791 for checking and correction by an operator.

The 3791 can hook directly to a byte multiplexor channel on 370 models 135-168 for operation under vs1, vs2, or dos/vs. For longer distance hook-ups, the 3791 must talk over an SDLC line. Software known as the Batch Transfer Program serves as an interface between the cpu and the key-to-disc system, and moves the flow



of data from the 3791 to disc or tape storage, a printer, or the computer's operator console. Data transfer is supported under VTAM.

A typical installation might include nine 3760s and the 3791 controller and rents for \$3,063, or \$2,608 on the extended term plan. Purchase price is \$108,880. Deliveries are scheduled for the fourth quarter. IBM CORP., White Plains, N.Y.

FOR DATA CIRCLE 229 ON READER CARD

New Add-on Memory Vendor

The name Intel certainly isn't a new one—the company ranks among the most advanced in the world in many memory development and manufacturing processes, but the fact that it is entering the direct end user marketing aspect should be good news to many IBM 370/135, 145, and 158 users. The in-7135 allows 370/135 users to expand memory sizes in increments up to a full megabyte. All IBM performance features and performance are retained. Leasing is available under two, three, four, and five-year terms. A typical in-7135 192K system rents for something under \$3K/month on a two-year contract, including maintenance. INTEL MEMORY SYSTEMS DIV., Sunnyvale, Calif.

FOR DATA CIRCLE 225 ON READER CARD

High-speed Discs

The minicomputer community is being offered a range of fixed-head disc memories with a range of access times to suit most any application, 16.8 msec to 4.2 msec. The manufacturer has

interfaces for most of Data General's Nova and Eclipse lines, the Digital Computer Controls 116, DEC's PDP-8, -11, and -12, and Interdata's 70, 74, 80, 7/16, 7/32, 8/32, 80 and 85. Capacities go up to 40 megabits. The 10/16 series is designed with a patented, fail-safe head lifting mechanism said to eliminate head contact and crashes. Multiple parallel channel capability is available as an option. A small, 16.8 msec access time unit is approximately \$2K in orders of 50 to oem's; a single unit 4.2 msec device is \$6,500. A Nova interface runs \$3K; a PDP-11 is \$5,100. ALPHA DATA INC., Chatsworth, Calif.

FOR DATA CIRCLE 228 ON READER CARD

Typewriter to Terminal

The Sperry Remington SR 101 electric typewriter can now be converted into an economical i/o device with the attachment of this manufacturer's baseplate. After conversion, any key depressed on the typewriter is simultaneously converted into data for transmission to computers, terminals, or other typewriters. The baseplate is available either as an oem standalone product or included as part of a complete terminal system for use with minis, programmable calculators, or crt/word-processing systems. In reasonable oem quantities, the Tycom baseplate is priced at \$575. TYCOM SYSTEM CORP., Fairfield, N.J.

FOR DATA CIRCLE 226 ON READER CARD

Graphics Terminal

Sophisticated graphics applications for use in advanced engineering design applications and complex manufacturing operations, primarily in the automotive and aerospace industries requires lots of number crunching support, and that's the reason CDC's latest remote graphics terminal, the 777-2 will only hook to the firm's 6000 and Cyber 70 computer series. Principal advantages over predecessor products include faster instruction capabilities, more rapid memory access time, and greater capacity—up to 64K 16-bit words. The terminal can be expanded up to three consoles sharing the memory, and a 300 cpm card reader and synchronous communication interface can also be added. A 24K version of this configuration is priced at \$132K, or \$3,050/month on a three-year lease, not including software. The software requires an initial fee of \$800 and monthly royalty of \$400. Somehow, the pricing seems high, but the equipment is probably as good as there is.

If you had something a little cheaper in mind, CDC also introduced software to support graphics activity

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You're sure to fall in love with the 4000's elegant blend of optimum throughput and whisper-quiet production. You'll appreciate the economy of a terminal so easy to use that costly special training is no longer needed. And your operators will relish its human-engineered comfort.

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CIRCLE 85 ON READER CARD

hardware

on the CDC 241 graphics subsystem, or Tektronix 4010/4014 series terminals priced at \$260 (initial fee) plus \$130/month. CONTROL DATA CORP., Minneapolis, Minn.

FOR DATA CIRCLE 227 ON READER CARD

Datapoint Memory

A one-board 8K memory module is offered for use with the Datapoint line of intelligent terminals. It allows a user to expand the 1100 model up to 8K, and can also be added to the 2200. The hook-up is said to be very direct, with no changes to wiring or adapters. The price for the unit is \$1,800 in 1-9 quantities. PINE ASSOCIATES, Rutherford, N.J.

FOR DATA CIRCLE 232 ON READER CARD

Line Printer

The T-7460 is basically a Data Products Charaband printer and interface set up for operation with Xerox Sigma mainframes. The print quality is said to be as good as the venerable IBM 1403, and there is a choice of 14 various speed models up to the top of the line which is rated at 1500 lpm for a 48 character ASCII subset on 132-col lines.

Other printers are available in speed ranges from 240-1,250 lpm. Features obtainable with the models include character set memory, code conversion, changeable fonts, self-test, parity check and hammer verification. Prices start at \$12,750 and run to \$55K for the T-7460. TELEFILE COMPUTER PRODUCTS, INC., Irvine, Calif.

FOR DATA CIRCLE 233 ON READER CARD

Oem Card Reader

The keyword in describing the Model 300 card reader is "simplicity." Capable of reading pencil marked or punched cards at 400 cpm (the numbers are correct—the firm just didn't match up speeds and model numbers) the unit has one rotating drum which does all the work of picking cards, transporting them past the fibre-optic read head, and stacking them.

A compact unit, the device is a foot high and weighs 50 lbs. It's priced at \$1,980 (roughly \$40/lb). TRUE DATA CORP., Santa Ana, Calif.

FOR DATA CIRCLE 234 ON READER CARD

Special-purpose Graphics

By compressing data by a factor of 70:1, the GCR-200 graphics communications terminal reportedly can support reasonable data transmissions using even teletypewriter speed lines.

Originally built for the Navy for weather map applications, the 200 is not an interactive system although a graphic tablet and keyboard for input are supported. Instead the system is expected to be used as a receiver of graphic information, and for adding annotations to graphics.

The 200 has two tubes, one for graphics and another for text or menu picking, a 10MB disc, 16K words (of 16-bits) of semiconductor memory, 4 megabits of refresh memory, and the unusual capability of producing images in "layers." Prices start at \$82K. GENISCO COMPUTERS, Irvine, Calif.

FOR DATA CIRCLE 235 ON READER CARD

PDP-11 Reader/Punch

A combination card reader/punch is now available to PDP-11 users using the RSTS/E monitor. Several models are available for either 80-column or 96-column cards, but the minimum reader speed is 200 cpm and the typical punch speed is 60 cpm. A 14-foot cable is standard, but the unit can be located as far as 50 feet from the PDP-11. Complete with interface, software drivers, and diagnostic software, the price is \$10,500. MNTL LOGIC LABS, Hampton, Conn.

FOR DATA CIRCLE 231 ON READER CARD

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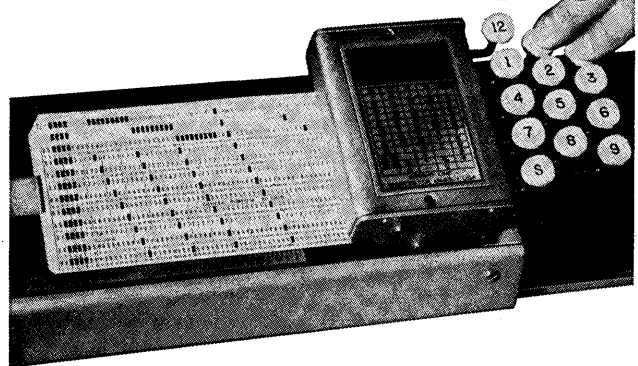
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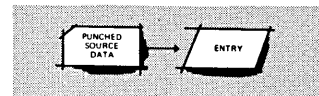
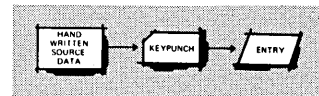
CIRCLE 98 ON READER CARD

PORTABLE KEY-PUNCH



SPEEDS SOURCE DATA ENTRY

Instead of using hand written source data which must go to keypunching before entry, you can punch source data at any location using the Wright Punch. These cards then go directly to data entry.



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NEW printing model for simultaneous sight verification. Plus manual and electric models for Hollerith punching plastic I.D., badge, and credit cards. Special units considered. Rental programs available in US and Canada.

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MEDIA MANAGEMENT SYSTEMS

CIRCLE 86 ON READER CARD

DATAMATION



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Here is a data communications system that does not know the meaning of the word "replacement."

You get *one* terminal system for virtually all your data communications jobs. When you add to it, you get only the added capability. Card readers, video display, line printers and disk drives all attach to our unique

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If you do require phone lines, our full duplex line control can double the capacity of the line and cut costs by allowing simultaneous transmission and reception.

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It supports up to 16 users. All at the same time. It offers a conversational source text editor. It's the only system its size offering a full-blown data-base management and retrieval system.

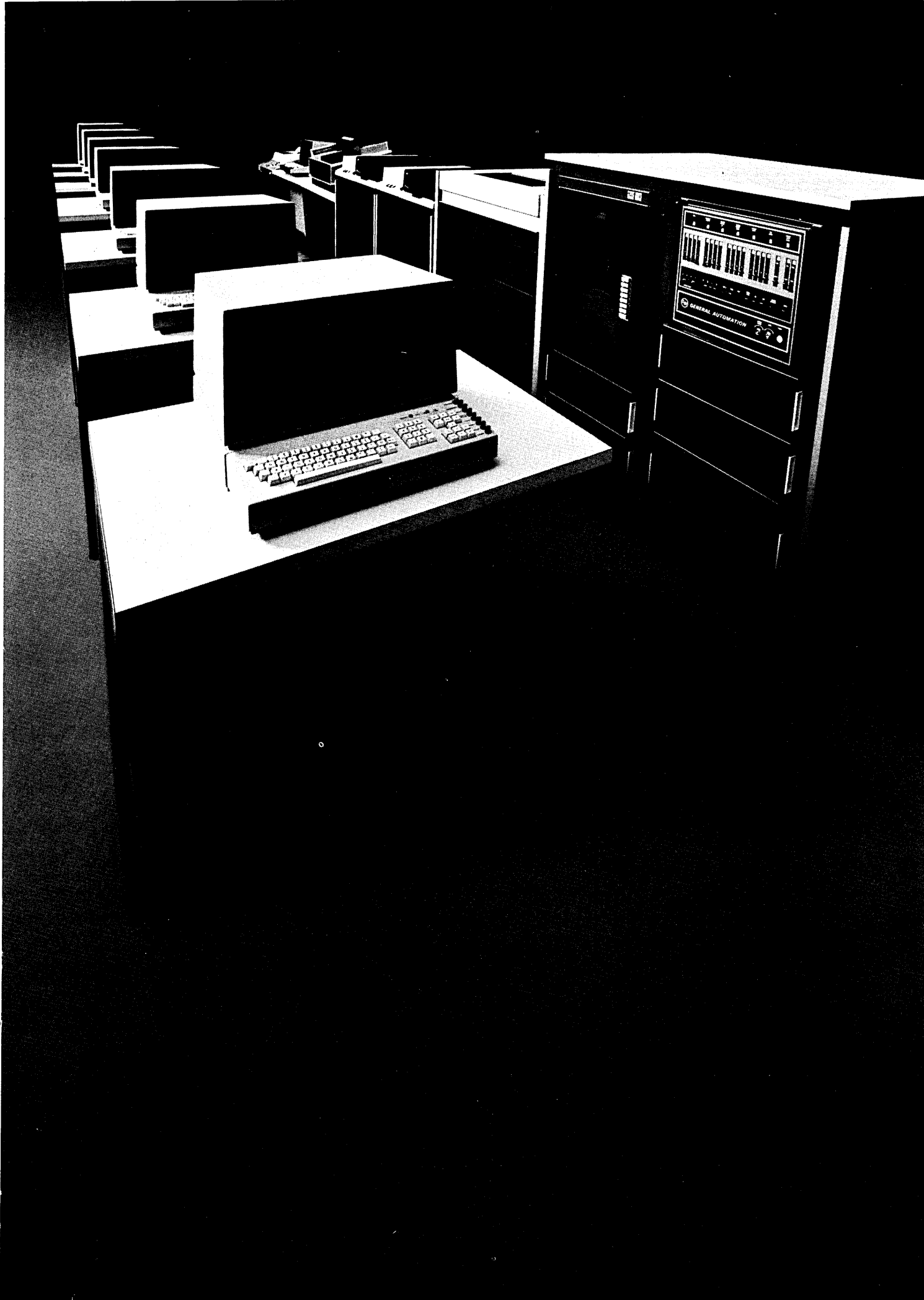
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software & services

Updates

The CODASYL Programming Language Committee, responsible for the continued development of COBOL language specifications, has approved the first specs for a data base facility in COBOL. The group has added new verbs and other facilities to give the COBOL programmer access to separately defined data bases. The ANSI committee for COBOL standardization is expected to begin work immediately to evaluate how the data base facility should be included in the next version of ANSI COBOL. The new facility is described in the form of page changes to the existing CODASYL COBOL specs and can be ordered from The Technical Services Branch, Dept. of Supply and Services, 88 Metcalfe St., 5th Floor, Ottawa, Ontario, Canada K1A 0S5. Orders should specify "CODASYL COBOL JOD Page Changes for May, 1975," and include payment of \$7.50.

In fiscal 1974, the federal government spent in excess of \$21 billion for civil engineering and computer related activities, including \$9.5 billion for technical functions, and \$260 million for software, says Civil Engineering Program Applications president J. Crozier Brown. His firm conducted a research project under a grant from the National Science Foundation which led directly to a recommendation that "substantial savings could be realized annually if a national center were established to coordinate development, dissemination, and use of software."

Boeing Computer Services, Inc., Dover, N.J., has announced the formation of BCS-Manufacturing Services "to better meet the computing requirements of the nation's small and medium sized manufacturers." The first offering of BCS-MS is the Manufacturing Data System developed by A.O. Smith Corp., Milwaukee. The package offers small to medium sized manufacturing companies modules for bill of materials, routing, order entry, forecasting, cost, WIP status, and inventory management.

Latest application mentioned for Goodyear Aerospace Corp.'s super-fast STARAN computer: analysis and forecasting of wheat yields. Oil companies are also said to be evaluating the computer's potential for speeding up data processing for oil exploration.

Medical Management

The Professional Office Management System (POMS) is the latest version of this vendor's Medical Administrative Management System, principally providing new features for the American Medical Assn. insurance form and touch tone input. The ANSI COBOL program is set up for IBM DOS systems and is furnished with complete JCL, test data, documentation, and user's guide.

POMS establishes the control parameters for each doctor, clinic, or professional office serviced and allows the service organization to process clients with varying and individual requirements in one pass. Complete patient billing and accounts receivable processing is provided. The file structures are designed to accommodate coding structures for procedure and diagnostic codes. Blue Shield has already installed the package at several operations, it's claimed. Additional processing capabilities include pending insurance claim reporting, patient ledger cards, cumu-

lative aged receivables reporting, microfilm patient history, and practice analysis reports by doctor. POMS supports IBM 1001 Touch-Tone or compatible 10-key touch tone input, keypunch input, and Entrex key-to-disc, Sycor, Datapoint, and Texas Instrument remote terminal communication. POMS is priced at \$19,600. OCCIDENTAL COMPUTER SYSTEMS, INC., North Hollywood, Calif.

FOR DATA CIRCLE 217 ON READER CARD

Text Editing

Editor is the name of this interactive, crt-based on-line text editing system available for Digital Equipment Corp.'s PDP-11 and Data General's Nova and Eclipse minicomputer lines. Special function keys move the cursor up, down, left, or right on the screen, allowing the operator to edit any part of the file that can be seen. Editing functions include type in, character insert and delete, line insert and delete, and text replication. The program has

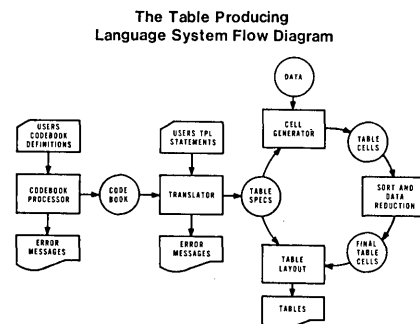
software spotlight

Table Producing Language

Table Producing Language was developed by the U.S. Dept. of Labor's Bureau of Labor Statistics to reduce the time between collecting new survey data and processing the results in statistical tables. The language is obviously of use to the business and academic communities, and in the short time the package has been available, users as far away as Australia and Geneva, Switzerland have obtained TPL for the nominal charge of \$200 to cover distribution costs.

If for no other reason, the package would seem a good acquisition if only to standardize terms and usage—for the bureau found there was little or no agreement among staff, economists, statisticians, demographers, and other social scientists on such basic terms as variable, data element, data item, and field. TPL would seem to be a must for any organization that could conceivably exchange table data with the government.

The key to the system is the way data is processed. Identification of the



data item to be retrieved and its retrieval are separate and independent from compilation and table preparation. At the heart of the system is a routine called Translator, which accepts user written TPL statements citing the variables needed and descriptions of how they are to appear in the tables desired. The user request is compared with the relevant data in the codebook file. Information about record type, field, length, location of variable values to be sought in the data file, and names for printing in the table heading, columns, and stub is extracted by the translator and converted to table specifications.

A medium to large scale IBM 360/370 mainframe is required, and TPL requires approximately 150K bytes of memory. The language is furnished in object code only on magnetic tape. U.S. DEPT. OF LABOR, BUREAU OF LABOR STATISTICS, Washington, D.C. FOR DATA CIRCLE 216 ON READER CARD

ASI-ST

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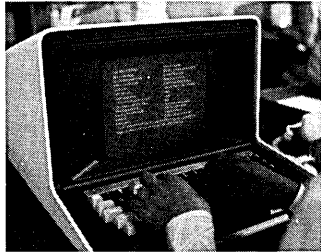


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You can save time and money by catching operator errors as they happen, prior to transmission to the central computer site. And reduced errors mean greater operator productivity, lower communication costs and reduced main-frame processing.

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TAL II. To extend the 440's power, use our new data entry language, TAL II. This easy-to-use, high-level language lets you customize data entry programs. Instructions are also provided for arithmetic operations, conditional data entry, range checking, table look-up, equal/compare and a host of other intelligent features.

Shared file access.

The 440 system lets you share and access files locally, reducing investments in telephone communications and central CPU resources.

Data entry made easy. Now each operator, at her own display, can make use of current data in

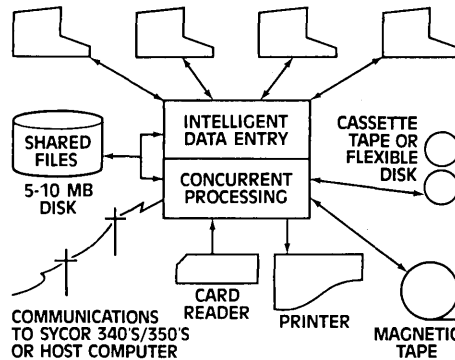
shared files to support data entry functions. For reduced keystrokes and lower error rates.

Inquiry/Response. File look-up is made simple with up-to-date information on-site, using the 440's own file management and disk storage capabilities.

System modularity.

Design your own system with a variety of options and peripherals.

Supports from 1 to 8 displays. Each is controlled by the Sycor processor and is capable of performing multiple tasks independent of other displays.



Choice of 5 and 10mb disks.

Store and retrieve programs, shared files, and data at remote locations.

Wide variety of peripherals.

And to complete our system configuration, choose from matrix and line printers, computer-compatible tape drives, card readers, and a variety of communications options.

Compatibility

There's full software compatibility with our Model 340 and 350 stand-alone terminals. Keyboard and operations are also compatible.

Programming. One program fits three different systems—340, 350 and 440.

Communications. Communicate with the mainframe, emulating IBM 2770, 2780 or 3780 protocols. Or use the 440 as a polling station at your central computer site to receive and transmit data to remote 340's, 350's, and 440's.

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And best of all, while data entry is being performed in the foreground, you can be doing other jobs concurrently in the background. Jobs that can save you time and money. Jobs like:

Remote job entry. Use the 440 with its card reader and 300 LPM printer for large-scale remote job entry. And since the system contains a CRT and a keyboard, you don't pay extra for them.

Multi-terminal printer support.

Each display can interleave print data to one printer as the data is being entered. So, you don't need a separate printer for each display.

Report generation. Sycor pre-packaged programs let you produce all sorts of management reports—sales analysis, inventory, or billing—at the same time as you are performing data entry.

File maintenance. And the Sycor 440 allows you to do editing, sorting, up-dating, and file transfer in a background operation.

The lowest priced distributed processing system.

When you consider all the advantages of our 440 system, and then consider its low monthly cost, we think you'll agree: it's the best system in the industry.

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SYCOR

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been designed with "scratch pad" features, meaning that the system remembers the last text deleted from the file, so that unintentional deletions can be recovered.

Editor runs under the Data General RDOS or DEC RSX-11 operating systems, and will support most crt terminals, including the DGC display, and the DEC VTO5 and VT50. The one-time charge for Editor is \$500, with update service available for an additional charge. SYSTEMS TECHNOLOGY, INC., New Haven, Conn.

FOR DATA CIRCLE 219 ON READER CARD

Order Processing

An on-line order processing system developed jointly by Honeywell and Les Pharmacies Universelles Limitee of Montreal is now being offered to wholesale drug distributors and other large manufacturers and distributors. The large program requires at least a Honeywell Series 60 Level 66 or Series 6000 mainframe with at least half a megabyte of memory, disc capacity sufficient to handle the user's data base, printer, card reader, tape drive, a

front-end commo network processor, and VIP 7700 display terminals or any tty-compatible terminals. The system is designed to operate from an integrated data base consisting of customer, vendor, product and other company files, providing order processing, inventory control, accounts receivable, accounts payable, sales analysis and other related functions. The system is sophisticated enough to handle multilevel discount policies, promotional offerings, customer returns and credits, merchandise returns to suppliers, automatic back orders and purchases, cash discount payments, customer credit ratings, etc. It even is bilingual, permitting product data to be entered and printed out or displayed in either French or English or both. Other languages can even be substituted by users within the format of the bilingual capacity. A one-time license for the system is \$19K, or \$920/month for 24 months. HONEYWELL INFORMATION SYSTEMS, Waltham, Mass.

FOR DATA CIRCLE 218 ON READER CARD

Mini Languages

If you're one of the hundreds of Digital Equipment's RSTS/E time-sharing operating systems on the PDP-11 and have wanted to program in something other than BASIC-Plus, you may be in luck. This vendor's product, called

OMSI-RT, provides the ability for any RSTS/E user to enter RT-11 and gain access to much of DEC's software, including ANSI FORTRAN IV and MACRO-11, DEC's macro assembler. OMSI-RT converts the I/O requests to be handled by RSTS and protects other users from errors that occur in the RT-11 job. The advantages of using OMSI-RT include faster execution times, the ability to run 28K RT-11 jobs, and the retention of all of BASIC-Plus' features. If there are any limitations to using the package, they center around the fact that RT-11 real-time and foreground/background are not available, the necessity to strictly run stock RT-11 I/O routines, and that discs are the only file structured devices accessible under RT-11. The package is priced at \$2,350. OREGON MUSEUM OF SCIENCE AND INDUSTRY, Portland, Ore.

FOR DATA CIRCLE 221 ON READER CARD

Data Base Services

Two more large data bases have been added to Lockheed Missiles & Space Company, Inc.'s DIALOG computerized information retrieval service: BIOSIS PREVIEWS covering the entire field of life sciences, and Economic Information System (EIS) made available by Predicasts, Inc., of Cleveland, Ohio.

BIOSIS PREVIEWS contains citations from *Biological Abstracts* and *Biore-*

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CIRCLE 97 ON READER CARD

Now Hewlett-Packard makes selecting your next terminal an open and shut case.

Plug-in character sets.

The 2640A can store four 128 character sets concurrently: optional math, line drawing, and upper/lower case Roman.

Smart memory (with 4K RAM's).

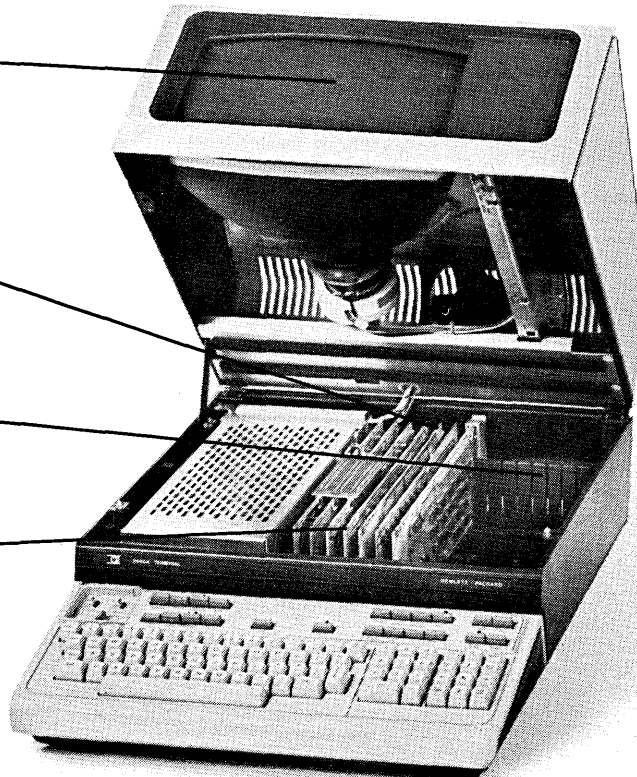
Store as many as 50 short lines with the standard memory, or over 3 pages with the maximum 8K memory.

Pop-in, pop-out modularity.

Want to add features? Plug them in. Need a repair? Pop out the old. Plug in the new.

Computer-born technology controls the show.

Microprocessor controls memory, data communication, keyboard, and display.



Inspect its features. At \$2640* you won't find another terminal that comes close. Inside or out. HP's 2640A. The terminal that grows with your system. It's from Hewlett-Packard. Come and get them.

A display that people like. Precise. Crisp, with 9 x 15 dot character cell. All sorts of options, such as inverse video, underlining, half bright, blinking.

Why wait on us? Self-test. Press the TEST key and the 2640A gives you a go/no-go indication.

Characters or blocks. You choose.

Transmit by field, line, or page at a time. Text can be composed locally allowing user verification before transmission. Character or line insert and delete, protected fields, and off-screen storage cut editing and CPU connect time. Plus, eight keys for user-defined function.



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August, 1975

CIRCLE 58 ON READER CARD

97

software & services

search Index, providing access to journal articles, books, technical reports and conference proceedings related to the life sciences, from aerospace biology through zoology. Approximately 850,000 items representing references from 1972 to the present, with some 20,000 new records added each month. The information comes from the BioSciences Information Service of *Biological Abstracts*, Philadelphia, Pa. References are displayed on a crt and/or printed on a hardcopy terminal, allowing users to view search prog-

ress and re-direct search activity as necessary.

FOR DATA CIRCLE 222 ON READER CARD

The EIS data base includes current information on 116,000 establishments operated by 67,000 firms with current annual sales of more than \$500,000 which account for roughly 90% of total U.S. industrial activity. The data available includes names, addresses, and telephone numbers, as well as information on the industry, employment, and sales volume. Perhaps the best way to think of EIS is as a national computerized industrial telephone directory organized by geographic location, industry, and size. Unlike census publications EIS, based on public records, identifies all large firms and estab-

lishments, including the corporate relationships linking parent companies to branch locations. It is possible to search or rearrange by major sic (Standard Industrial Classification) code categories and also by geographic location.

Users can gain access to DIALOG by various means. Users with in-house computer operations can use their own crt terminals and pay a connect time charge and a file usage charge. Most types of terminals are supported, and line speeds are 10, 15, 30, and 120 cps. Lockheed will furnish terminals for \$85-150/month, depending on brand selected. High-speed (480 cps) crt/printer service is available for \$400-500/month. The service can also be accessed through the Tymshare network. There is no initiation fee or minimum monthly charge for DIALOG. LOCKHEED MISSILES & SPACE COMPANY, INC., Sunnyvale, Calif.

FOR DATA CIRCLE 223 ON READER CARD

Manufacturing

Support programs for the manufacturing industry are undoubtedly the first of a long list of relatively vertical markets that IBM will address with its System/32. The nine new programs are called Manufacturing Management Accounting System (MMAS) and contain the following operation and financial functions: project definition and costing, production status and costing, inventory management, order entry and invoicing, payroll, accounts receivable, accounts payable, sales analysis, and general ledger. The applications can be installed on a stand alone or interrelated basis. When accounts payable and general ledger are being used, information common to both need only be entered into the system once, and information generated by one application can be used to automatically update the file of another. Eight of the applications can be installed in separate stages at different times, with the only exception being sales analysis which depends on information from order entry and invoicing, accounts receivable and/or inventory management. The monthly license fee for the programs ranges from \$18-27 and the initial charge ranges from \$405 to \$615.

Other enhancements made to the System/32 include a data file utility program that enables users to randomly inquire into the system's data file and produce reports or selectively retrieve stored records as needed, and a group of programs that expand the system's ability to talk and exchange data with 370s, including use of remote batch work stations. IBM CORP., GENERAL SYSTEMS DIV., Atlanta, Ga. *

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Major responsibilities exist in one of several departments involved in both large and small scale military software projects developing a new advanced state-of-the-art real-time software design systems. Our client is looking for individuals with outstanding technical credentials in the field of complex real-time software systems, preferably command and control, weapons, radar and communications. A background in some of these areas will be considered: Data Base Management; Radar & Communications; System Programming; Radar, Weapons, Missile Simulation; Operating System Software Development; Real-Time Software Systems Design; Software Project Management; Weapon System Software Development; New Business Acquisition; Micro Programming Systems; Real-Time Executive System Design; Computer Systems Architecture; Engagement Control Software; Command & Decision Software Definition; Structured Programming; Interactive Data Reduction Systems; Configuration Control; Chief Programmer (structured programming essential); and Software Documentation (preferably Navy with WS-8506, SEC-NAV-INST 3560-1).

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CIRCLE 113 ON READER CARD

DATAMATION

Mixed vendor systems and networks need more than on-call service.

We're more. We're maintenance managers.

Preventive maintenance...communications network maintenance...engineering support, as well as on-call service are all within the range of Raytheon Service Company capabilities. We're servicing customers with all these requirements and more — with a complete RSC systems maintenance management package.

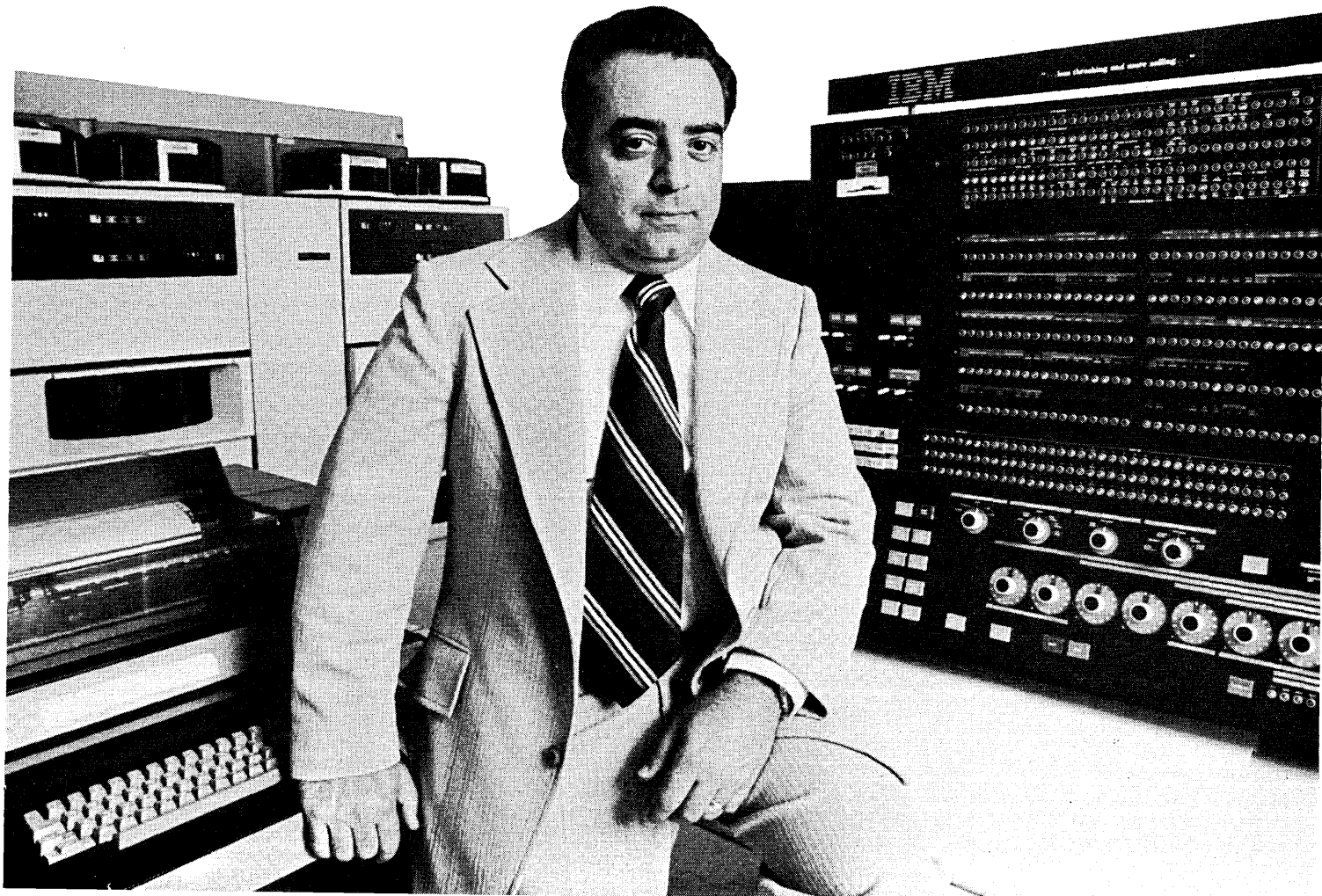
We have the capability because all RSC service people, in all RSC service facilities have a minimum of three years experience. Broad-based hardware and communications backgrounds. Solid experience with 360, 370, Honeywell and other mainframes

... and with peripherals from IBM, Telex, Ampex, Potter, CalComp, and more.

If you have a mixed vendor system or network, we'd like to show you how Raytheon Service Company can handle service more efficiently and economically than your present setup. We'll show you what we've done already for several airlines, government agencies and major industrial firms. Why not ask? Call Mike Salter, Director, Commercial Marketing, at Raytheon Service Company, 12 Second Avenue, Burlington, Massachusetts 01803, (617) 272-9300.



CIRCLE 71 ON READER CARD





MEET OUR YOUNG GIANT.

MAX III. HE KEEPS GROWING STRONGER.

We delivered our first MAX III operating system in 1971. It was the birth of a new state of the art in minicomputer software.

Since then, while other companies have been laboring to produce their first real-time multiprogramming software, ours has just been getting better.

Today's MAX III, in combination with our MODCOMP II hardware, is just about unbeatable for demanding real-time operations.

Unbeatable in performance. Unbeatable in price.

Hundreds of MODCOMP II/MAX III systems have already proved themselves. Working in every conceivable kind of industrial and scientific measurement and control application.

Consider a few highlights.

In MAX III, 256 execution priority levels give you more flexibility than you're ever likely to need. For everything from highest priority foreground to deferrable background tasks.

Task execution can be changed by the operator, or by other tasks, interrupts and timers. Unlike most systems, new compilations are not needed to change task execution parameters.

When it comes to programming, you can use the language best suited to the job. FORTRAN. Macro assembler. Or a mixture of both. With individual task protection to give you fullest security for all your programs.

Heavy software is only one side of the coin, however. Because none of it does a thing for you without the MODCOMP II hardware to make it all happen.

With up to 64K words of directly addressable memory, MODCOMP II gives you a lot more clout than most minicomputers that only let you address 32K 16-bit words at a time.

Four simultaneous access paths to memory allow non-cycle stealing I/O. Or may be used for multiprocessor configurations. With all four ports in operation, memory bandwidth is five megawords a second.

Fifteen general purpose registers and overlapped memory enable MODCOMP II to consistently outperform machines that offer only a handful of registers, with a cache memory that is supposed to solve all your problems. But often doesn't.

MODCOMP II/MAX III is fully upward compatible with all other MODCOMP computers, including the 32-bit MODCOMP IV. So you can add on at any time as your needs grow. Even expand into a multiprocessor network system, without reprogramming.

But, like we said. These are merely highlights.

For detailed specs, and benchmark data that shows how MODCOMP II/MAX III stacks up against the best anyone else has to offer, write us.

After all, we're very proud of our young giant. He's already conquered a good part of the world. He's out to beat the rest.

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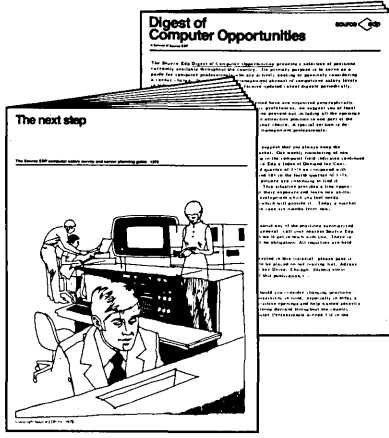
European Headquarters: 103 Mytchett Road Mytchett, Surrey, England. Phone (0252) 514251

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CIRCLE 108 ON READER CARD

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is devoted to a summary of FORTRAN and COBOL. Each chapter ends with a quiz for self-testing.

Economics of Informatics

A. B. Frielink, ed.
North-Holland Publ. Co. (American Elsevier Publ. Co.) 52 Vanderbilt Ave., New York, N.Y. 10017 (1975)
500 pp. \$38.50

This volume contains the proceedings of the International Symposium of the Intergovernmental Bureau for Informatics, IBI-ICC, held in Mainz in September 1974. The editor notes that the symposium emphasized methodology, that of assessing the value of computer use and of promoting the rational application of computers. Topics include the price of privacy, data processing center cost analysis, economics of small computers, training policy problems, international cooperation, and performance measurement.

Introduction to Computer Science

by Harry Katzan, Jr.
Petrocelli Books, 1975
500 pp. \$14.95

This comprehensive text covers conventional topics such as an introduction to computing, algorithmic processes, computer hardware, data structures, and numerical analysis, but also includes an introduction to automata theory, computer systems architecture, and an introduction to computer software. The book seems well organized, contains a substantial number of examples and illustrations, and lists additional suggested readings.

courses

Catalog of Seminars

IAT's seminars on data base technology, data communications, software technology, systems management, mini-computer technology, computer auditing, and security and privacy are held in various cities around the country. A 52-page catalog describes more than 70 specific courses in these areas in detail, and several are available on an in-plant basis.

Some specific courses and dates are: *Structured Programming* (Sept. 10-12, Washington, D.C.; Oct. 22-24, San Francisco; Nov. 19-21, New York City); *Minicomputers in Distributed Networks* (Sept. 15-16, New York City; Oct. 20-21, Washington, D.C.); and *Structured Design* (Sept. 8-9, Washington, D.C.; Oct. 20-21, San Francisco; Nov. 17-18, New York

City). THE INSTITUTE FOR ADVANCED TECHNOLOGY, Rockville, Md.
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Home Study FORTRAN
Fundamentals of FORTRAN Programming is a home study course offering student computer input and output. Programs written by students will be submitted to the school's computer, run, and the results returned. Instructions with 18 individually graded lessons is included. UNIV. OF WISCONSIN-EXTENSION, 432 No. Lake St., Madison, Wisconsin 53706.



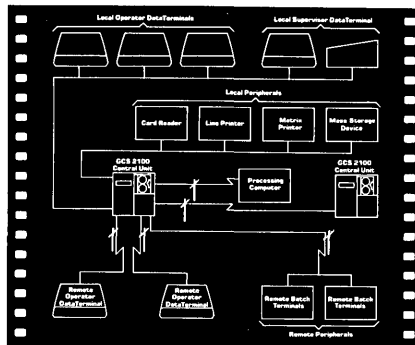
Terminal Supplies Catalog

A terminal users' supply guide covering a wide variety of terminal supply products is available. The products include tty paper, ribbon, stock continuous forms, custom forms, paper tape, tape handling equipment, magnetic cards, flexible discs, cassettes, etc. REMOTE COMPUTING SUPPLIES, Downers Grove, Ill.

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Computer Secrets

Two brochures, "Great Computer Secrets—gcs 2100 Data Entry System" and "Great Computer Secrets in Banking" set forth this vendor's "multifunction, multimedia" key-to-disc data entry system. The first brochure



presents information on hardware—data terminals, processors, disc storage—and software, and describes system features, supervisor functions, operator functions, installation, and maintenance. The second brochure, directly aimed at banking, presents a case for the product in this specific area. GENERAL COMPUTER/SYSTEMS, INC., Addison, Texas.

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Add-on Memories

Technical bulletins describing this vendor's 6000 Series add-on memory

TOTAL: the data base management system.

A complete integrated data base management system which performs all functions of data base maintenance, update, retrieval and data integrity *with any host language at the "call" level.* That's Cincom Systems' TOTAL.

With TOTAL, data is structured logically, non-redundantly in network-structured multi-file, multi-linkage environments. Requirements for demand and batch processing are optimally served. The system is continually self-optimizing. Eliminates both performance degradation and the requirement for periodic data base reorganization.

A Data Base Definition Language (DBDL) is provided for the definition and structuring of the data base. As data requirements change, new data elements and associations may be added without affecting application programs. Data independence is provided down to the data element or grouped data element level.

Application programs are insulated from their environment. So changes in operating system, hardware, language or processing mode have little or no effect on operating application programs.

With TOTAL, modular and evolutionary growth is facilitated. Conversion is eliminated as a way of life.

A Data Manipulation Language (DML) is invoked by the host language programmer at the "call"

level for all communication with the data base. Powerful commands make complex data manipulation easy. Control functions monitor and virtually eliminate error possibilities. The user programmer is presented *only* with data elements requested. Communication is always fast, flexible, secure.

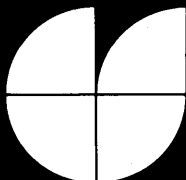
Hardware enhancing features minimize core and direct storage requirements. For example, I/O Pool Sharing allows sharing of common I/O areas providing more usable core. External indexes, directories and fixed overflow areas are eliminated, providing more usable disk space.

TOTAL functions in any environment. Provides facilities for processing in direct (demand) environments or batch serial modes.

Facilities include protection from Concurrent Updating, Dynamic Logging of Transactions, Automatic Data Base Recovery and Restoration for processing in dynamic environments.

These are some of the reasons why we call it TOTAL.

We'd like to show you why TOTAL has become the most widely and successfully used system of its kind in existence today. If you'd like more information or a personal presentation, write on your Company letterhead to Cincom Systems, Inc., 2300 Montana Avenue, Cincinnati, Ohio 45211. (513) 662-2300.



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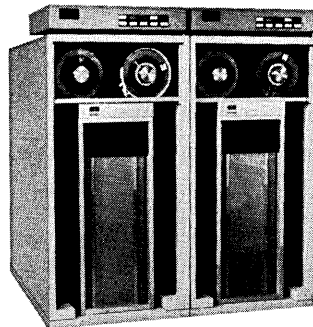
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Hear what our competition is saying about the SEL 32 mini?

Nothing.

Can you blame them? After all, the SEL 32 gives you more "bang for the buck" than any other minicomputer. And that's not idle gossip.

Remember Data General's claim that other companies didn't run benchmarks against the Eclipse? We did... including their famous Whetstone benchmark. The results? The SEL 32 ran significantly faster.

As for Interdata, they compare prices and specs of their 8/32 against the Xerox 550, IBM 370/158, DEC 11/70 and Eclipse. Why was the SEL 32 omitted? Truth is, the SEL 32 has better specs and lower prices than any of them. For example, the SEL 32 has a throughput rate of 26.67-million bytes per second compared to 6-million bytes per second for Interdata's 8/32. As for price, an 8/32 with 128K bytes of memory will cost you \$51,900. An SEL 32 with the same memory and floating point will cost you only \$43,900.

Since our competition isn't going to tell you anything about the SEL 32, call us or use the coupon. Our lips aren't sealed. Systems Engineering Laboratories, 6901 West Sunrise Boulevard, Fort Lauderdale, Florida 33313. (305) 587-2900. In Europe, 85 bis, Avenue Albert ler, 92 Rueil-Malmaison, France. Telephone 967-83-17.

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Send more detailed info on the SEL 32.

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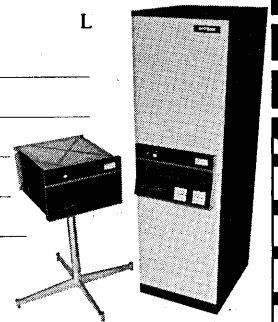
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SYSTEMS ENGINEERING LABORATORIES

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systems give details of each system's features, design and technical characteristics, performance specifications, and cpu upgrade capabilities. The systems, using the latest MOS technology, are compatible with IBM 360/65 and 370/135, 145, 155, and 168. MEMOREX CORP., Santa Clara, Calif.
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Computer Accessories Catalog
A 58-page catalog describing this vendor's full line of products is available. Media filing and transporting systems, media work stations, media protection devices, and supplies such as tape cartridges and card files are described. A section on how to select the products should prove useful. WRIGHT LINE, Worcester, Mass.
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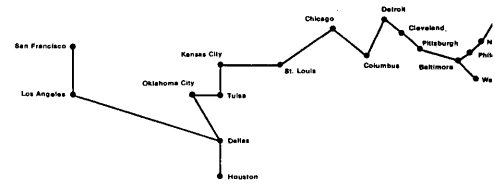
Intelligent Terminals
A 20-page illustrated brochure describes this vendor's Diskette 1100 and Cassette 1100 intelligent terminal systems, and their use in dispersed data processing. These integrated systems combine in a typewriter-sized unit capability for data entry and conversion, data processing, and data communication. The Diskette 1100 has

drives for four floppy discs, each holding 256,000 characters of information and fully addressable. There are two internal tape cassettes on the Cassette 1100. RPG II, BASIC, DATAFORM, DATABUS, DATAPOLL, and ASSEMBLER are languages available with these systems. DATAPOINT CORP., San Antonio, Texas.
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COM Recorder
This company's Model 3700 computer output microfilm recorder is described in a technical bulletin. Specifications include data input, character generation, page dimensions, camera set-up parameters, and environmental and physical characteristics. BELL & HOWELL, Chicago, Ill.
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CRT Monitor
The high resolution monochrome BH-15 crt monitor is described in a brochure. It is designed for applications requiring television display of high density information such as medical or industrial tv x-ray, tv microscopy, typesetting, and process control or inspection. Features include aperture correction circuitry, switchable line rate, switchable video inputs, and video inhibit control. BALL BROTHERS RESEARCH CORP., St. Paul, Minn.
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Datadial Transmission Service
The "only true digital circuit-switched, dial-up transmission service" is described in an illustrated brochure. The user, it is claimed, can communicate with multiple points, obtain multi-



faceted usage of his terminals, expand his network quickly, and be billed only for the actual time used rather than connect time. Specifications, costs, and comparisons to competitors are included. DATRAN, Dallas, Texas.
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Facsimile System
Specifications, operating instructions, and applications data describe the Alden 800 telefacsimile system in an illustrated brochure. This "convenience page size" facsimile system is aimed at the "low cost" market for "send only" or "receive only" applications. ALDEN ELECTRONIC & IMPULSE RECORDING EQUIPMENT CO., Westboro, Mass. *
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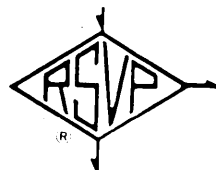
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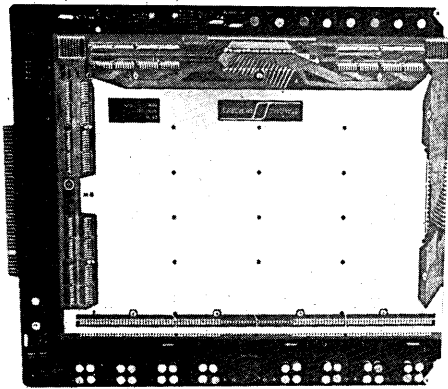
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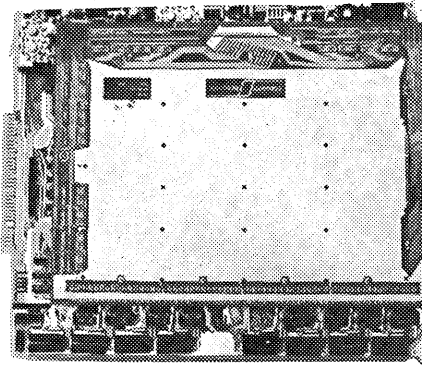
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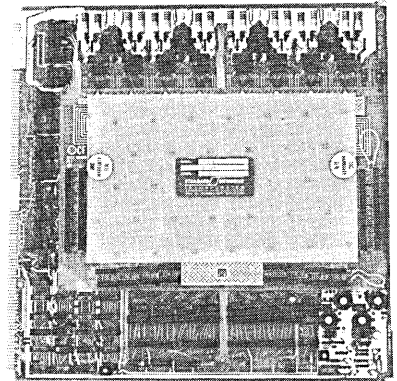
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QUEST SYSTEMS, INC. n. 1. A corporation founded in 1968. 2. The largest professional recruitment firm in the U.S. functioning solely in the computer sciences; its client companies pay all employment fees, interviewing and relocation expenses. Quest is known for its deep personal commitment to relate to each candidate as an individual with individual goals. 3. Its professional staff averages over 6 years of experience in EDP recruiting (additionally, staff members have direct hands-on experience in programming, systems, hardware sales, etc.) 4. Quest is presently searching for programmers and analysts (commercial, scientific, systems software) for over 3,500 client companies in the U.S. Quest has openings in over 700 U.S. towns and cities. 5. Methodology — see Questsystem.

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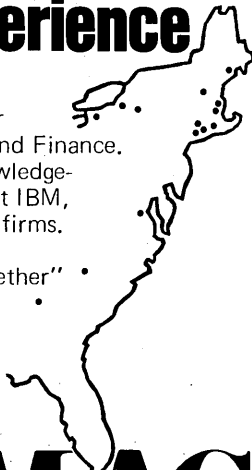


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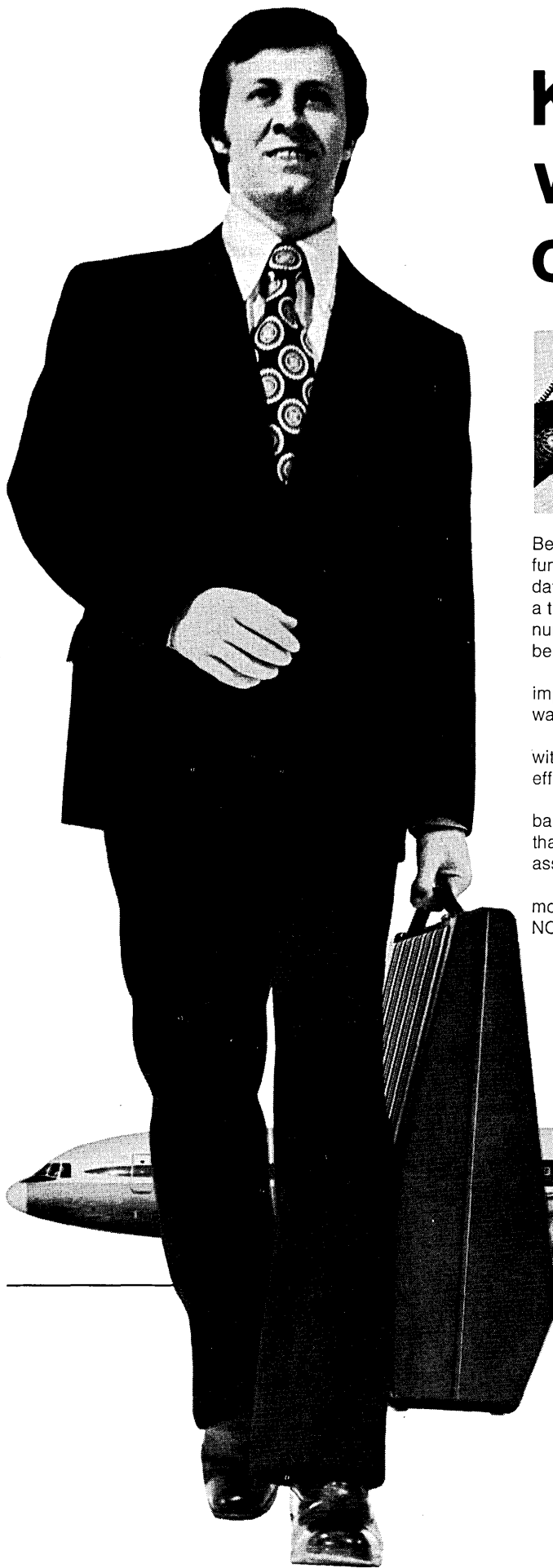
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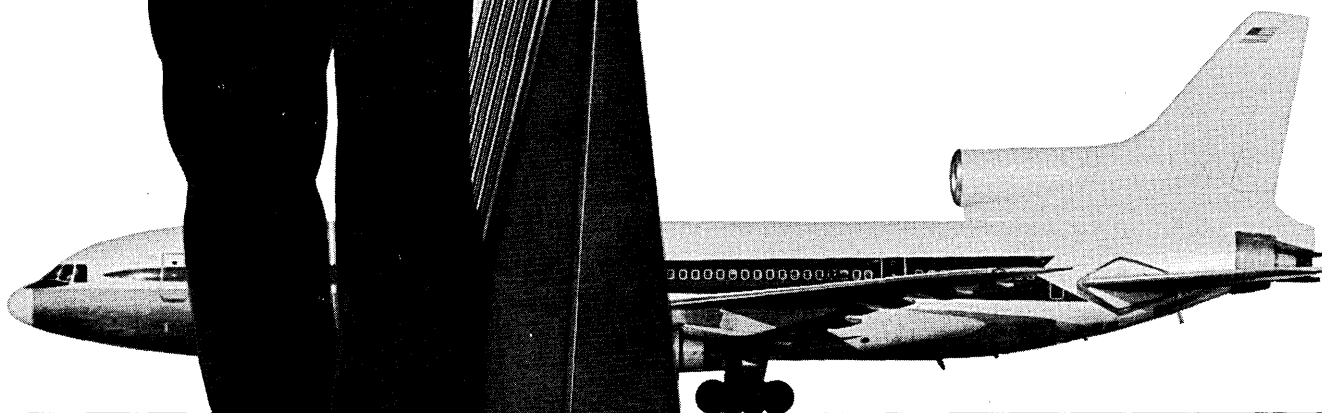
Besides portability, the NCR 260 KSR Thermal Printer provides all the functions required to send and receive numeric and alphanumeric data. Included is an integrated modem with an acoustic coupler, a thermal printer, and an alphanumeric keyboard with an imbedded numeric pad. And even the cabinet is functional. It opens and becomes a nesting place for the terminal.

Equipped with a 30-character per second printing rate and non-impact printing mechanism, the NCR 260 KSR is the quicker, quieter way to transmit and receive data.

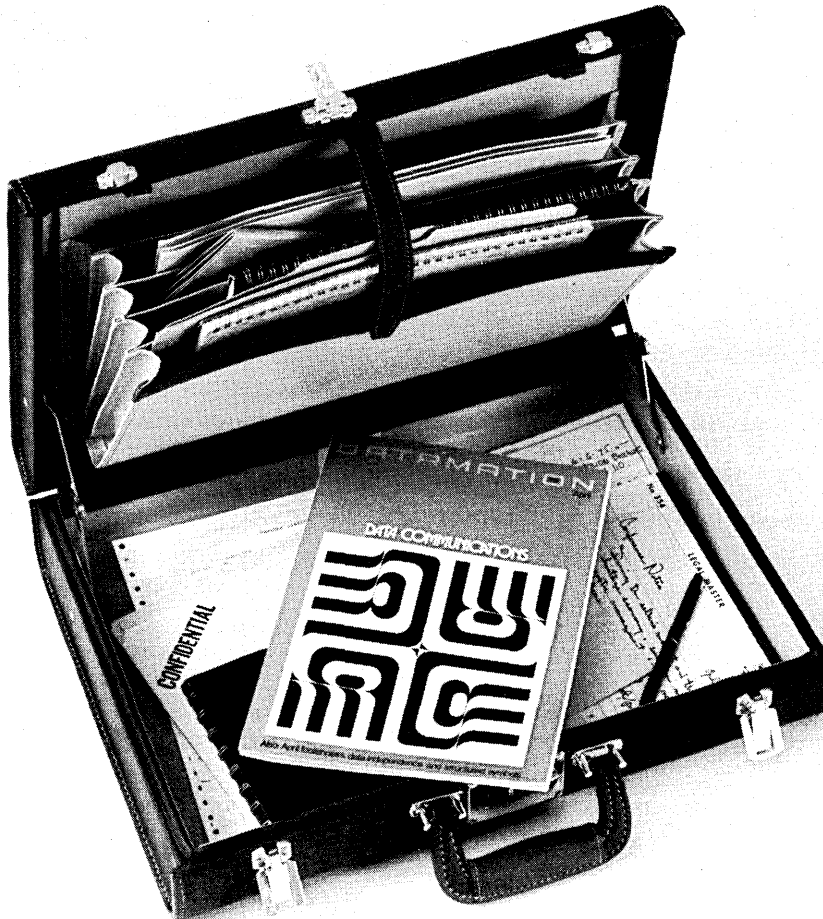
Portability remains the key, though. This advantage provides you with much more efficient use of computer time. And increased efficiency adds up to a better return on your computer dollar.

As with all NCR products, the NCR 260 KSR thermal printer is backed by the entire network of NCR support systems. With more than 7000 field engineers in more than 480 field offices, you are assured of fast, complete service when needed.

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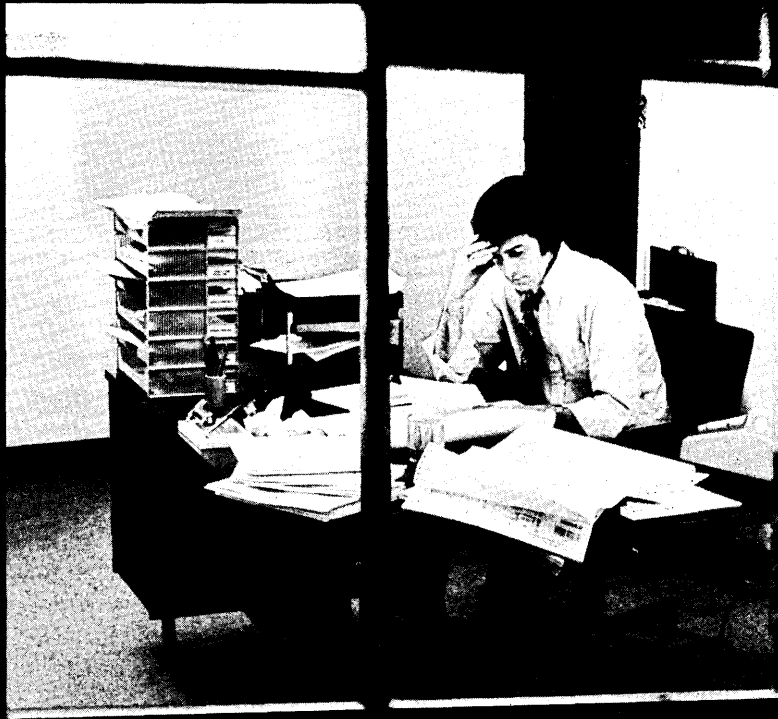
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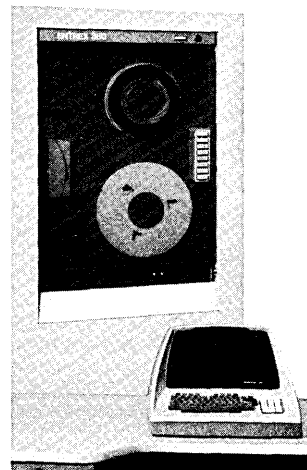
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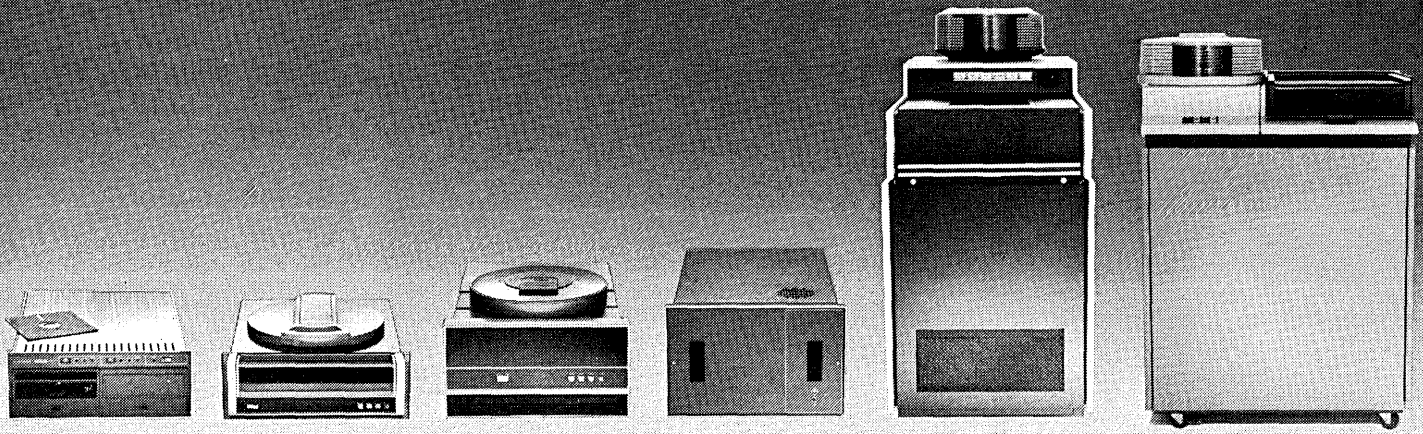
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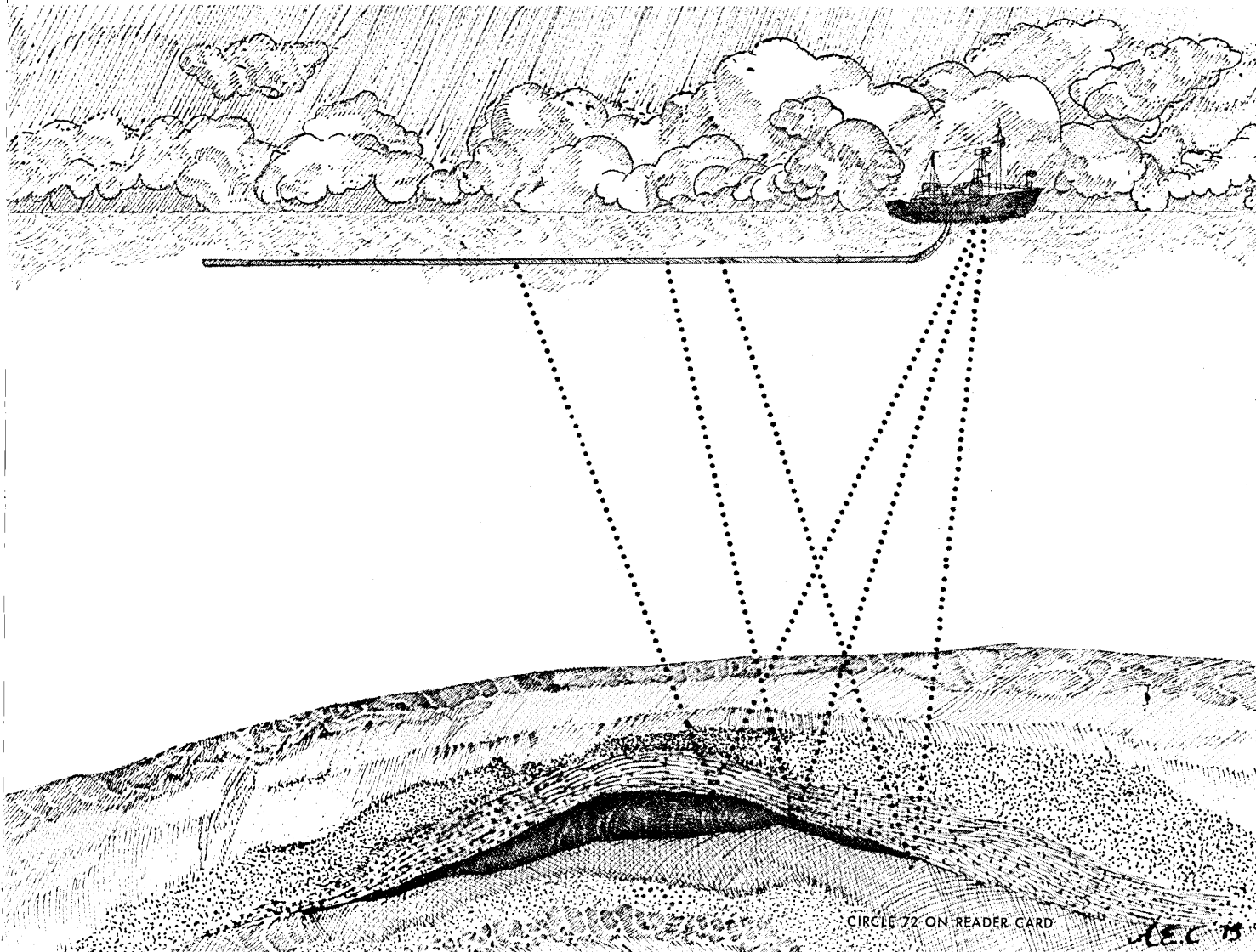
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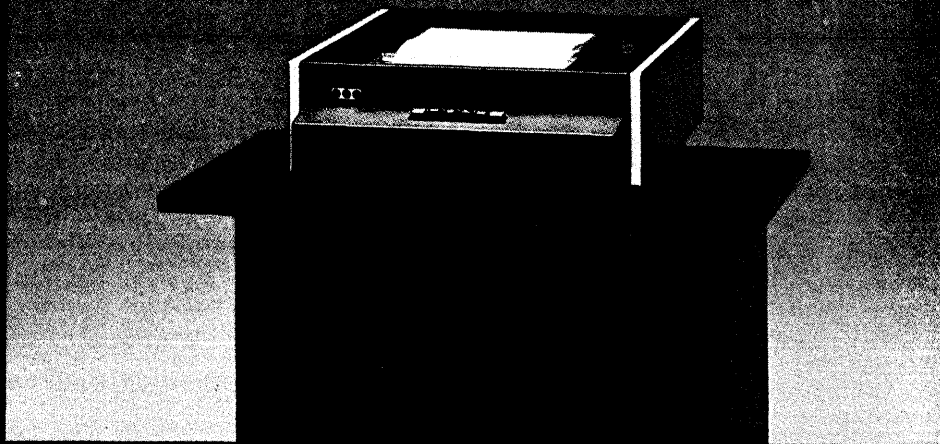
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