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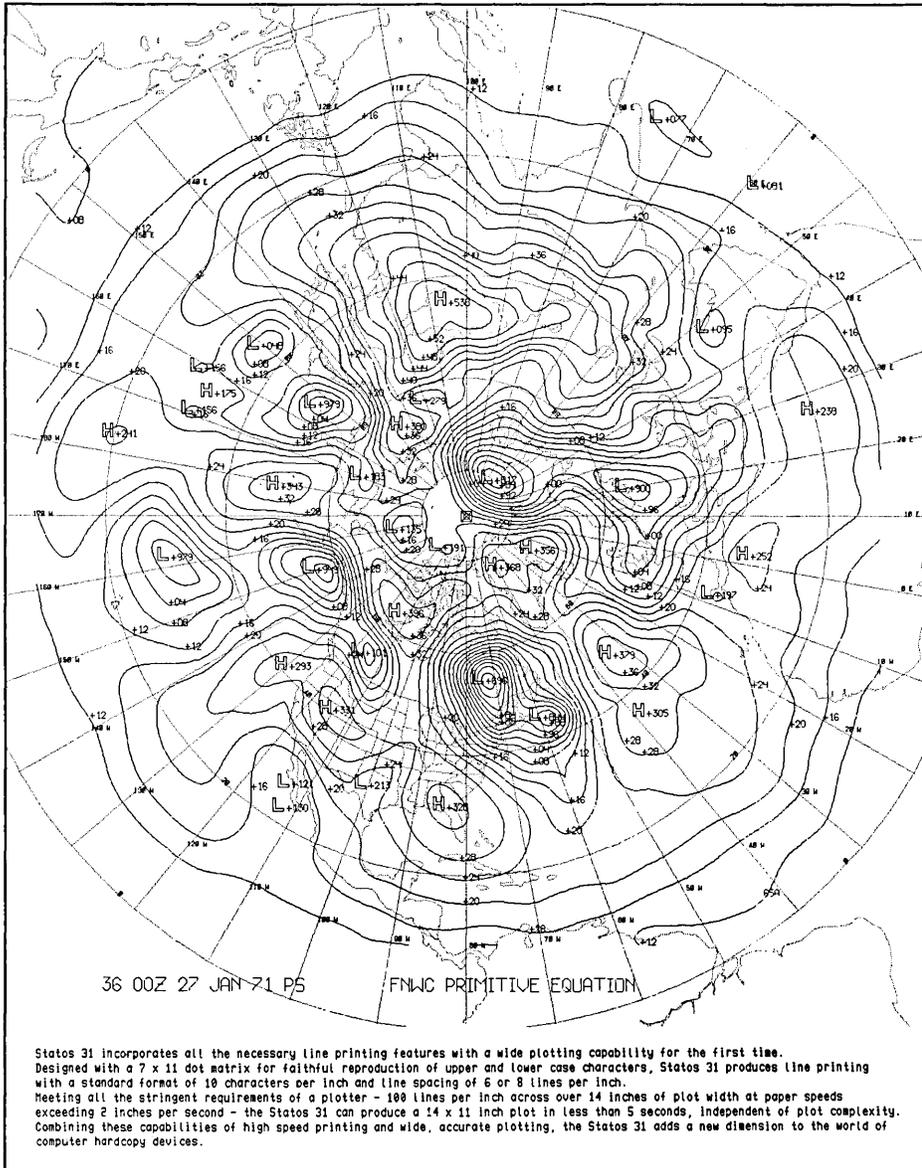
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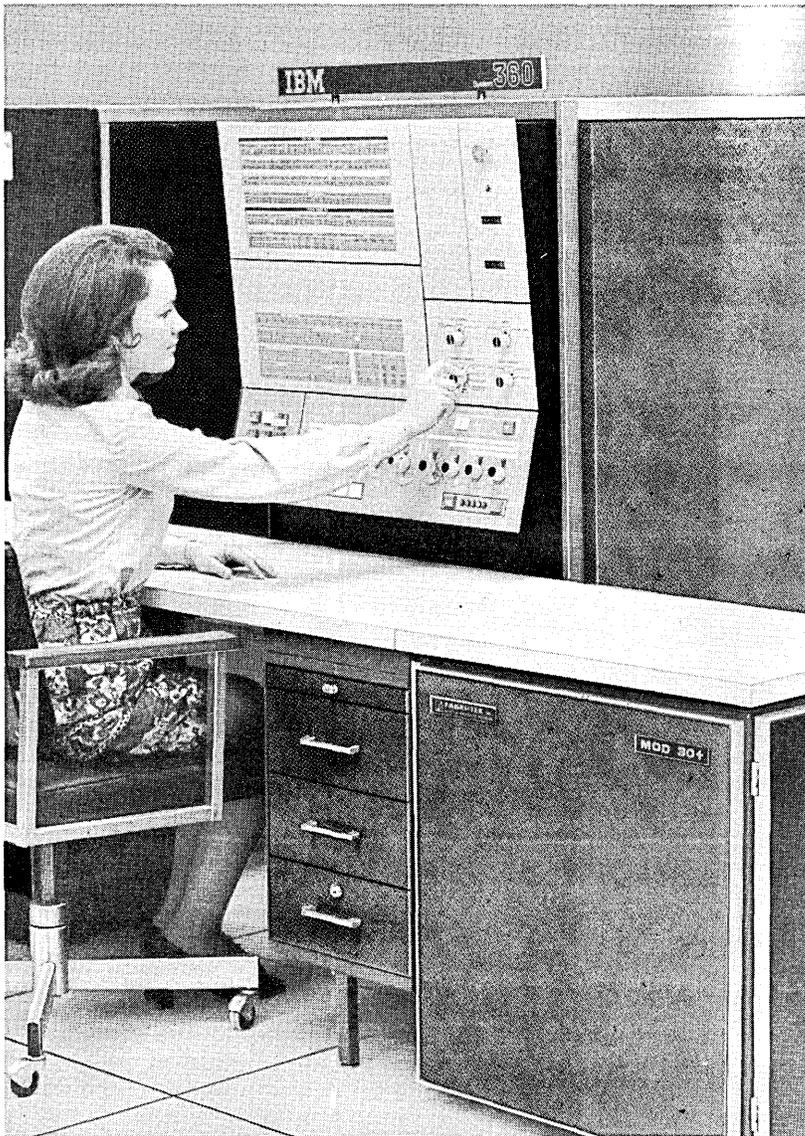
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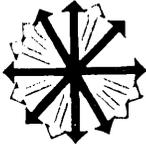
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MAY, 1972
volume 18 number 5
This issue 115,709 copies

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About the Cover:
Our art director faced the music this month with the resulting harmony, tone, and colorful chords.

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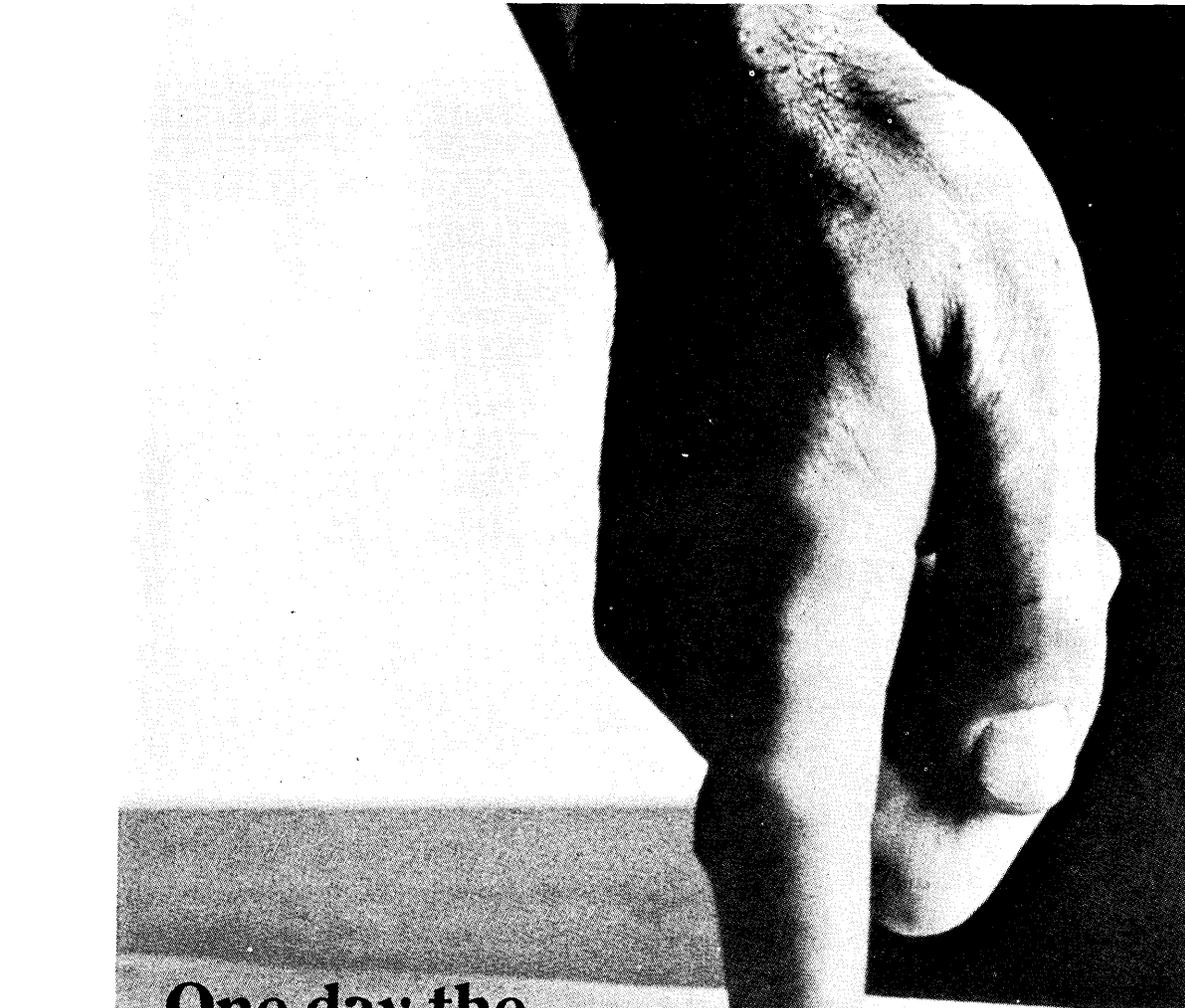
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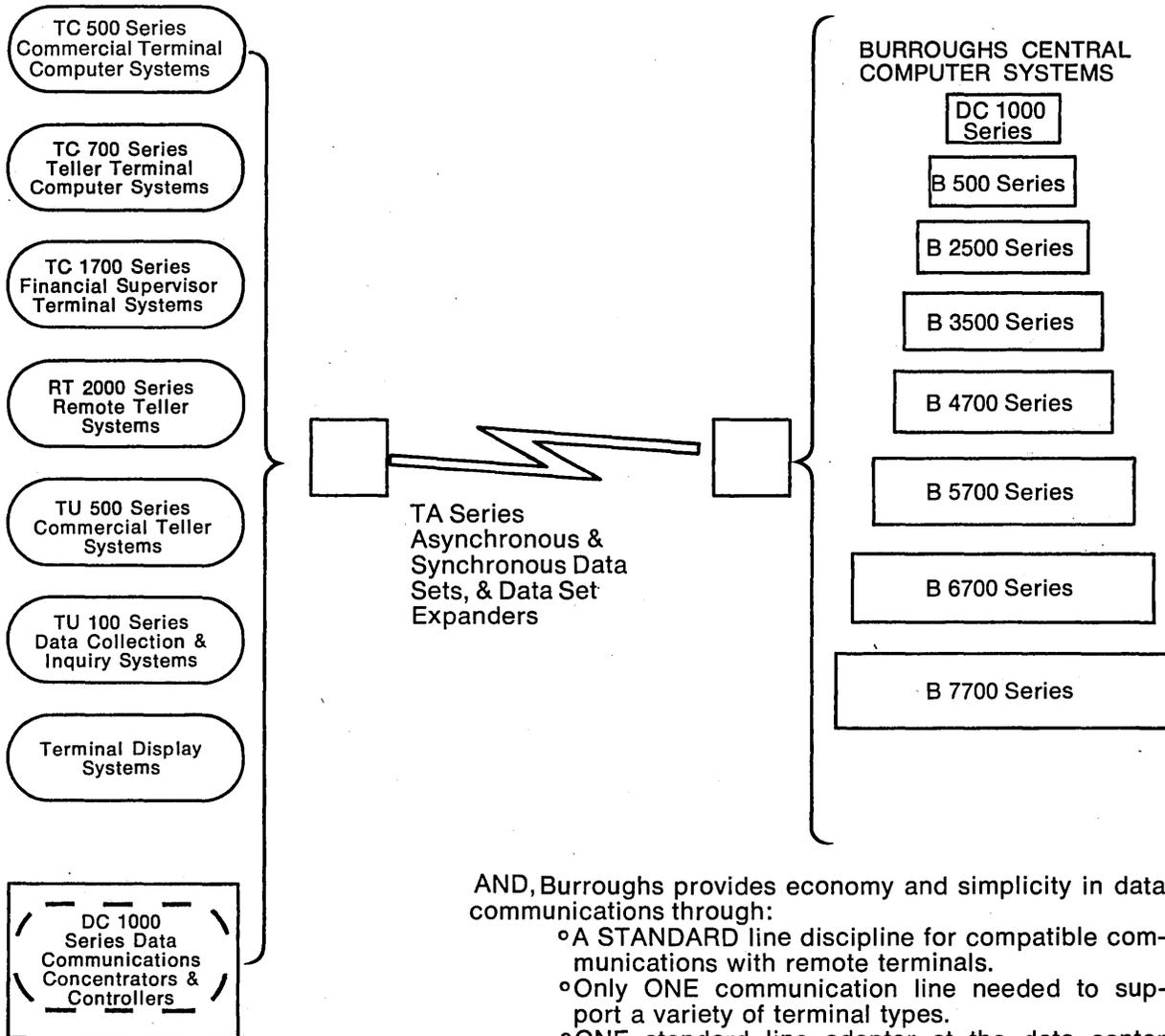
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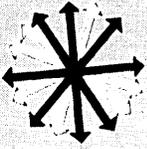
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Look Ahead

RCA SERIES ONE MAY MAKE IT YET

The West Palm Beach computer manufacturing plant of RCA may well be humming soon with the sounds of--believe it or not--a brand new g-p computer. The RCA Series 1, which was never introduced by RCA, may be introduced in Europe by RCA's licensee, Siemens. The machine was on the low end of the RCA series, and the company's decision to leave the computer business resulted in its being shelved. Siemens may also be placing orders for some 20 RCA 6s at the Florida plant. (It will manufacture at least twice that many in Germany.)

The West German industrial giant had the good sense not to introduce the RCA 2 and 3 for fear the machines would impact its existing equipment. Ironically, the West Palm Beach manufacturing deal looks particularly inviting for Siemens, we're told, because RCA has chopped overhead. More than 10,000 persons are gone from the defunct computer operation.

Also recently removed: a limousine and chauffeur which were provided L. Edwin Donegan, Jr., former RCA computer chief.

SYSTEM/3 MARKETING SHIFT CONSIDERED

Marketing responsibility for IBM's System/3 line may be shifted from the Data Processing Div. to the General Systems Div., which manufactures the S/3. The move is said to have the blessing of president Frank T. Cary. Profit margins on the System/3 are known to be lower than IBM is accustomed to, and many feel the breakout of the lower line will eventually help correct this reversal. And that's not all General Systems could be picking up: Some items from the Office Products Div. may be moved there, possibly including copiers. Line managers currently are attempting to set up the new organizational chart which might eventually look like the new Xerox line-up.

AVIS' WIZARD A 20,000-UNIT WHIZ

The Wizard of Avis, ITT/Avis Rent-A-Car's on-line reservations and car control system, is one of the few national on-line systems to go up on time--and within budget. How did No. 2 do it? Part of it could have been job control. The project was divided into work items, such as coding of a program or program specification; and these were further divided into work units, each equaling one man-day. The whole project involved 20,000 work units. Both items and units were coded and computer stored so reports summarizing the status of any particular part of the project could be generated at any time. Four major centers for the modified PARS system were expected to be activated last month, linking 80 cities for reservation making. Rental counters go on-line, starting in June; and all Avis offices are expected to be on the system by early 1973.

JAPANESE SEEK COMPUTER-HEP SOCIETY

Is the industrial revolution being replaced by the computer revolution? Many say this, but nowhere do they take it as seriously as in Japan. There, a Computerization Committee has proposed a major revamping of Japanese schools, business, and government in preparation for "the Information Society of the '80s." Its interim report cites such long-range goals as home terminals, a national t-s network, and computer-familiarity courses--plus a

Look Ahead

society as hep on computers as it now is on industrial processes.

Perhaps that should be a society blasé about computers, one that uses computers with the same facility with which it now uses electricity or the phone. Toward this end, the committee recommends an immediate start on computer-oriented education at primary and junior high school levels, emergency and rural medical information systems, automated vehicular traffic control, air and water pollution alarm system, and automated supermarkets. Already victims of groupthink, the Japanese may be first with computerthink.

EVERYTHING FROM CARS TO FERN LEAVES

We were told recently by a dp manager in Poland: "IBM is our best car salesman." The comment is explained in the way the Polish Ministry of Machinery hopes to pay IBM for a 370/145 it's just ordered to add to its cache of two 360/50s and a 40.

We're told the 145 will be paid for in Polski Fiat cars--but IBM can't say now what kind of a barter deal will be set up because neither the U.S. government nor NATO has approved delivery. But Polish autos did pay for part of the 360 bills. Because the East European countries don't have convertible currency, most western edp manufacturers help to arrange a sale of goods--ranging from cars to machinery to fern leaves--to another country so that they can obtain the needed dollars. In the case of the 360s, IBM "introduced" Poland's trading agency, POL-MOT, to English agent, Geoma Impex, which in turn arranged for the sale of 500 cars to Nigeria's Midmotors. Voilà!

After a little hassle on how slowly Midmotors paid and over the Africanizing of the Polish cars, the bill was paid.

WHEN MAX GETS BACK

Millionaire activist Max Palevsky, almost fully recovered from open heart surgery in Santa Monica March 8, is off to Europe for the Cannes film festival May 3-19. When he returns at the end of the month, the founder of Scientific Data Systems and until this month a director of Xerox Corp. will fully resume his non-Xerox interests. These include: getting financial backing for the campaign of Sen. George McGovern; running Cinema X, a motion picture firm now turning out two documentaries, one of them on the fighting in Northern Ireland; and publishing a new weekly Los Angeles tabloid, as yet unnamed, but to be patterned after New York's "The Village Voice."

ELECTIONS AND COMPUTERS: HAS THE MARRIAGE MADE IT?

This may be the year of bug-free computerized elections, say the people who make punch card voting equipment. "Punch card voting is too simple now to cause problems," says one. For California's June 6 primary, three counties have made changes to correct problems of the past.

Los Angeles County will use 42,000 punch card recorders from a new supplier, Computer Election Systems. Fresno County has a new computer, an IBM 360/40, which late last month replaced a Honeywell H-3200 that twice had been blamed for late election results. The county's administrative officer Mel Wingett blames lack of support, not the computer. Orange County, which found its Coleman optical scanning voting devices too slow in 1970 and supplemented them with Cubic Corp.'s Votronic Systems in '71, has gone back to Coleman--but with a system modified for more speed.

The city of Detroit, which probably has the worst vote problem

(continued on page 183)

When you buy a a lot of people to talk to. hook it up, you

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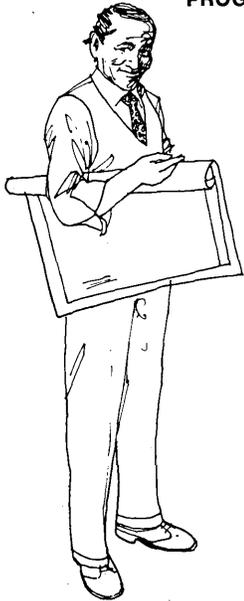
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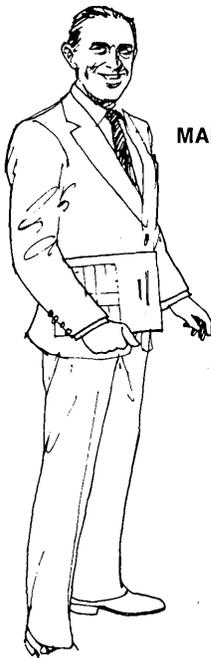
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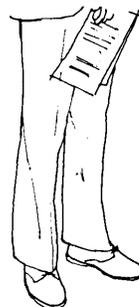


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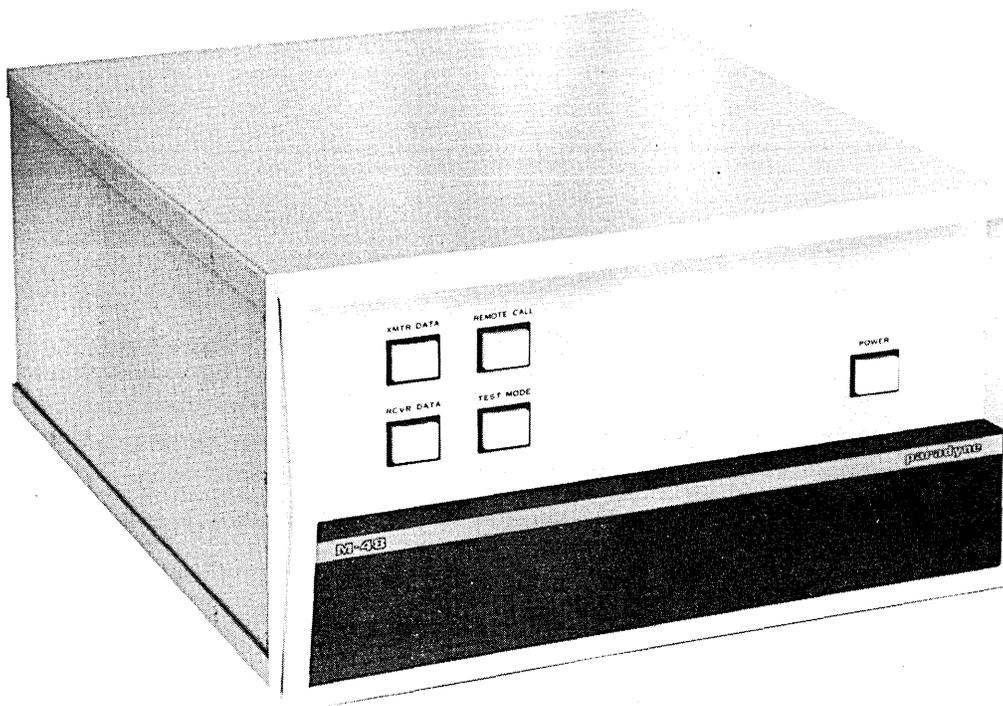
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Calendar

EVENT/SPONSOR	DATE	LOCATION	CONTACT	COST
Assn. for Educational Data Systems 10th Annual Convention	MAY 16-19	St. Paul	AEDS 1201 16th St., N.W. Washington, DC 20036	\$40, members \$50, others
Electronic Industries Assn. Meeting: Electronics 1985	18-19	Chicago	EIA 2001 Eye St., N.W. Washington, DC 20006	\$300, members \$350, others
Telecomputer Applications Group (TAG) Meeting	JUNE 6-7	Raleigh, NC	Ed Wilkins Olin Corp. 120 Long Ridge Rd. Stamford, CT 06904	\$7
OCR User Assn. Meeting: Real World of OCR	6-8	Park City, UT	OCR User Assn. 9415 S. Western Ave. Chicago, IL 60620	\$100, advance \$125, at door
International Federation of Automatic Control 5th World Conference	12-17	Paris	A.F.C.E.T. Centre Univ. Dauphine Place du Marechal-de-Lattre-de-Tassigny 75—Paris-16 ^e , France	\$450F.F.
SCi, ISA, AMS, AIChE Summer Simulation Conference: Modeling & Methodologies	14-16	San Diego	Dr. M. H. Horn Cities Service Oil Co. P.O. Box 50408 Tulsa, OK 74150	\$60, members \$70, others
IEEE 8th Annual International Conference on Communications: ICC '72	19-21	Philadelphia	Beryl O'Donovan RCA, Bldg. 108-112 Moorestown, NJ 08057	\$20, members \$30, others
NYU 1st Annual Government Data Systems Conference	26-27	New York City	Wm. A. Kulok, NYU Div. of Bus. & Mgt. 1 Fifth Ave., 2G New York, NY 10003	\$250
DPMA International Data Processing Conference & Business Exposition	27-30	New York City	Richard H. Torp DPMA 505 Busse Hwy. Park Ridge, IL 60068	\$90, members \$115, others
Data Communications Programming Seminar	JULY 17-19	Hanover, NH	Robert MacMillen Summer Programs Office Dartmouth College Hanover, NH 03755	\$250
ACM '72	AUGUST 14-16	Boston	Elden M. Levine 36 Parramatta Rd. Beverly, MA 01915	\$40, members \$65, others
ONLINE 72 Symposium and Exhibition	SEPT. 4-7	Uxbridge, England	Philip J. Kiviat Systems Control, Inc. 260 Sheridan Ave. Palo Alto, CA 94306	£48 U.K.
IEEE Computer Society Conference: COMPCON 72	12-14	San Francisco	Rowland C. Fellows IBM Corp. Monterey & Cottle Rds. San Jose, CA 95114	\$40, members \$50, others



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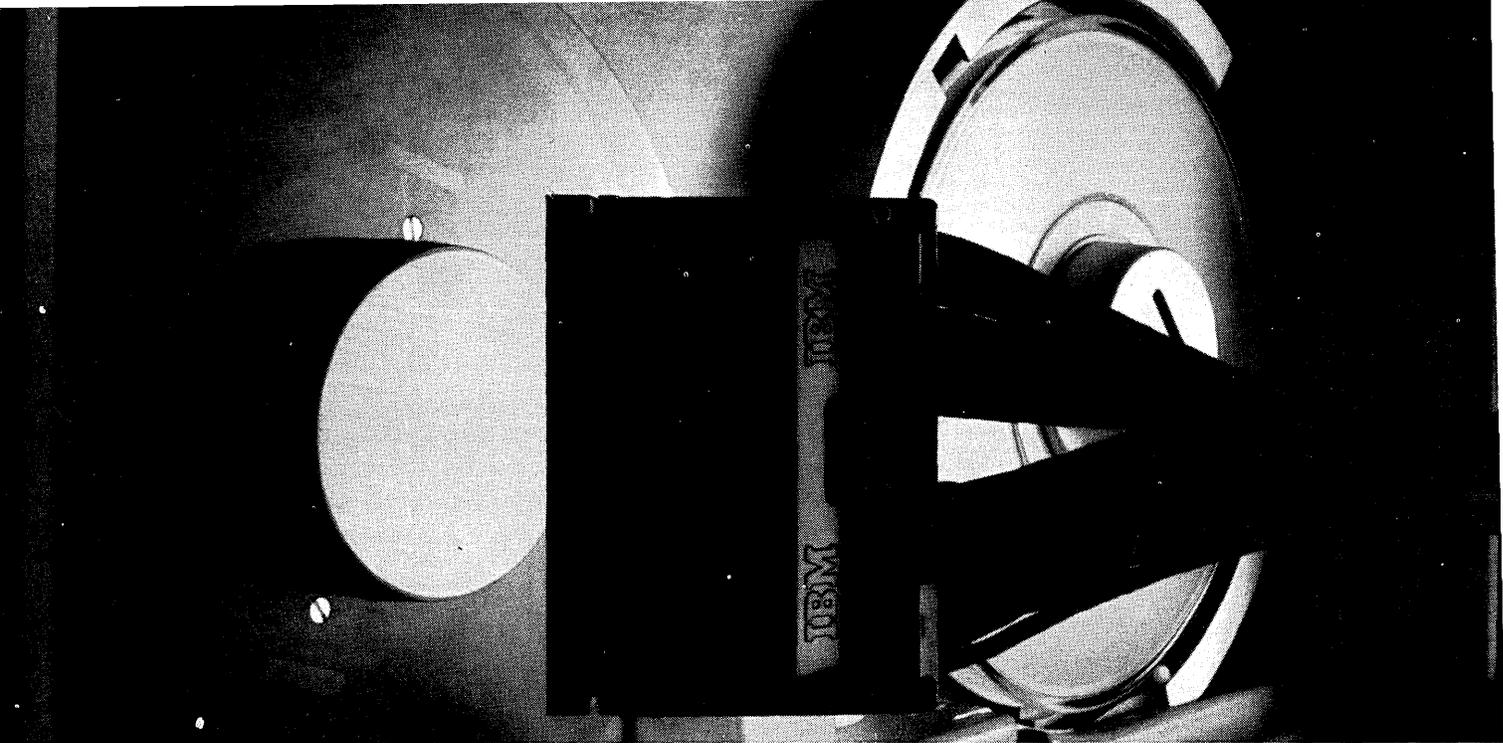
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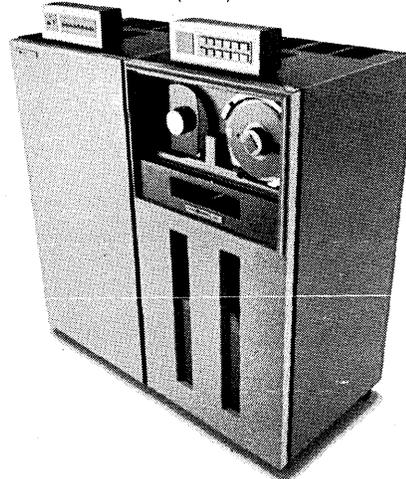
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CALCOMP

Letters

Professional house cleaning

In reference to your article on computer professionals ("In Search of an Identity," March, p. 52):

The desire to acquire professional status for Computermen seems primarily to be driven by the overwhelming (1) egos of the advocates or (2) insecurities of the advocates. After eight years in the field, having worked for both large users and large manufacturers, I have concluded that both of the above traits are inherent in an unfortunately large number of programmer/analyst types.

Academics who guided me to an MS in computer science seemed to display these traits in no less a percentage. The minority of Computermen who indeed fit the classic role of professional might agree with me that our computer-house is in sad need of cleaning, and I don't believe that professional status should, or will, precede that cleaning.

ROGER S. GOURD

Northboro, Massachusetts

P.S. Your article on the demise of RCA computing was a welcome relief after the deluge of misinformation to which we have previously been subjected.

Relocated

This is in reference to the Look Ahead article on p. 7 of your February issue, in which it is stated that "... you can see a 145R (for relocate) at Lincoln Lab ..."

This statement is incorrect, as no such device is now or ever has been installed at the Lincoln Laboratory or at any other MIT facility. We, along with the many others in the computing community, anxiously—but patiently—await announcement of IBM's plans in this area.

ROBERT H. SCOTT

*Massachusetts Institute of Technology
Cambridge, Massachusetts*

The author replies: Mr. Scott is correct. The 145R is at IBM in Cambridge, not at MIT.

On stage

Mr. Gardner's article "Curtain Act at RCA" in the March issue (p. 34) was a superb piece of reporting. If he expands this to a book-length study, I would buy it at once. There is so much in the story: classical Greek tragedy of a man's fall through his hubris and a good example of the ancient saying, "Whom the gods would destroy, they first make mad with power." And everyone in the industry who reads this will have a catharsis of pity and fear,

for everyone is familiar with the syndrome described in the article from his own experience.

MICHAEL W. HAM

Annapolis, Maryland

Hubris is defined as "excessive pride or self-confidence; arrogance."

Plus ça change . . .

I just wanted you to know how much I enjoyed and appreciated the latest issue of DATAMATION. The lengthy article on RCA was a classic of its kind.

It brings to mind just how irrational the whole process of management really is for the most part; how the perplexities of human nature tend to dominate the best that any of us can do in terms of what used to be called "Management Information Science." What it all boils down to is that while we tend to bemuse ourselves with the notion that we are rationalizing management decision-making, managers go on acting the way they always have for the most part.

This may not be as exciting a perspective as convincing oneself that a revolution in practice is imminent, but I think it is a lot more realistic and might even temper some of the arrogance that is so common in our line and causes so much trouble in dealing with senior managers.

GEORGE F. WEINWURM

Los Angeles, California

History lesson

On reading your March issue, I was struck by the perhaps deliberate incongruity of its contents; i.e., the RCA debacle first; then Fred Gruenberger's excellent discussion ("Problems and Priorities"); and third, the computer industry version of the widespread insecurity of various fields today ("In Search of an Identity," by Milt Stone). This is indicated by their simple-minded attempts to herd together in societies, clubs, and other mutually reinforcing situations in the hope of becoming "professions."

The points that struck me were:

1. The RCA story would be not a debacle, but a scandal, in any of the established professions.

2. Fred Gruenberger underlines the lack of a defined field, generally a part of the established professions, and also, quite accurately under problem 9 (Our Image), draws a realistic picture of computing people as society sees them.

3. Milt Stone gives a glimpse of the confusion, not over computing as a profession, but over the meaning of "professional" to various computer people. The quotation from Albert L. Connally of Idaho Falls is worthy of an answer: "The owners of computers

decide to what ends the machines are to be used . . . Any code of how a computer professional is supposed to relate to society must take this reality into account."

The argument here seems to be that one must make allowances for the poor computer man because he is an employee! Most members of the oldest profession on earth are employees. All members of the most generally respected professions, the churches, are employees—yet there is still a fine irony in Hitler's remark: "How many legions has the Pope?" When teaching was a profession, rather than unionized labor, most teachers were employees and generally poorly paid, at that. Aristotle had no control over the uses to which his student Alexander eventually put his knowledge of and admiration for Greek culture. Medicine is in the service of men, yet the Hippocratic oath is one of the older codes of professional ethics; nor does a doctor control the long-range behavior of his patients, many of whom seek and then consistently ignore his professional opinion. Finally, Science has never been a profession in the classical sense, nor have the great scientists worried about it much. They have come to know each other's work, corresponded, collaborated, argued, and made progress despite language barriers, political barriers, ideological barriers.

So, calling it "Computer Science," while perhaps adding dignity, will not make it a profession.

May I, in closing, suggest two viewpoints that may add direction or further purpose to what should be a



serious and consequential debate. The first addresses itself to the problem of Milt Stone's article; the second refers to Fred Gruenberger's problem 9.

1. A quote from H. A. Rickover's book, *Education and Freedom* (E. F. Dutton): "Service ceases to be professional if it has in any way been dictated by the client or employer. The role of the professional in society is to lend his special knowledge, his well-trained intellect, and his dispassionate habit of visualizing problems in terms of fundamental principles to whatever

Letters

task is entrusted to him.

"Professional independence is not a special privilege but rather an inner necessity for the true professional, and a safeguard for his employers and the general public. Without it, he negates everything that makes him a professional, and becomes, at best, a routine technician or hired hand, at worst a hack.

"To maintain his freedom, the pro-

fessional may have to refuse a lucrative case, or relinquish a position with a good salary."

2. A quote from Jacques Barzun, *Teacher in America* (Atlantic, Little Brown, 1944): "The worst danger is the creation of a large, powerful, and complacent class of college-trained uneducated men at the very heart of our industrial and political system. We may be too near to judge, but it strikes me that one of the conditions that made possible the folly in Germany was the split among three groups: the technicians, the citizens, and the ir-

responsible rabble. This becomes persuasively plain if you consider the professional army caste as a group of unthinking technicians. The rabble, together with the technicians, can cow the citizenry; the technicians—wedded solely to their workbench—will work for any group that hires; the rabble, worshipping "science" to the exclusion of less tangible necessities, are perfectly willing to sacrifice the citizen.

"... Hence technicians must not be allowed to hibernate between experiments, but must become conscious, responsible, politically and morally active men... otherwise, they will be paid slaves in the service of some rabble, high or low. Meanwhile, our present stock of citizens must not simply gape at the wonders of science, but must understand enough of its principles to criticize and value the results."

PAT M. BEATTS

Los Altos, California

Ego trip

In the March issue on p. 48, "Problems and Priorities," I quote: "Each person who regards himself as a full-time computer man... should worry about whether his work appears to him as socially acceptable and responsible."

I must take exception to this for two reasons. The first, and most minor, is what is "socially" acceptable and responsible? As defined by whom? On almost every question you will find different opinions. Would you equate majority rule to social acceptance?

This leads to my main objection. I submit that each individual should worry about whether his work appears to *himself* as acceptable and responsible. The use of the term "socially" implies that you should worry more about what others think of your work than what you think about it. Unfortunately, too many people are following this practice, this desire to "conform."

I believe that if Herb Grosch were to reexamine his statement, he would change it. He has certainly not shown by his past actions that he is concerned about what is socially acceptable. On the contrary, he has frequently been in opposition to what was "generally accepted," and I admire him for it.

BENJAMIN R. STRONG

Poughkeepsie, New York □

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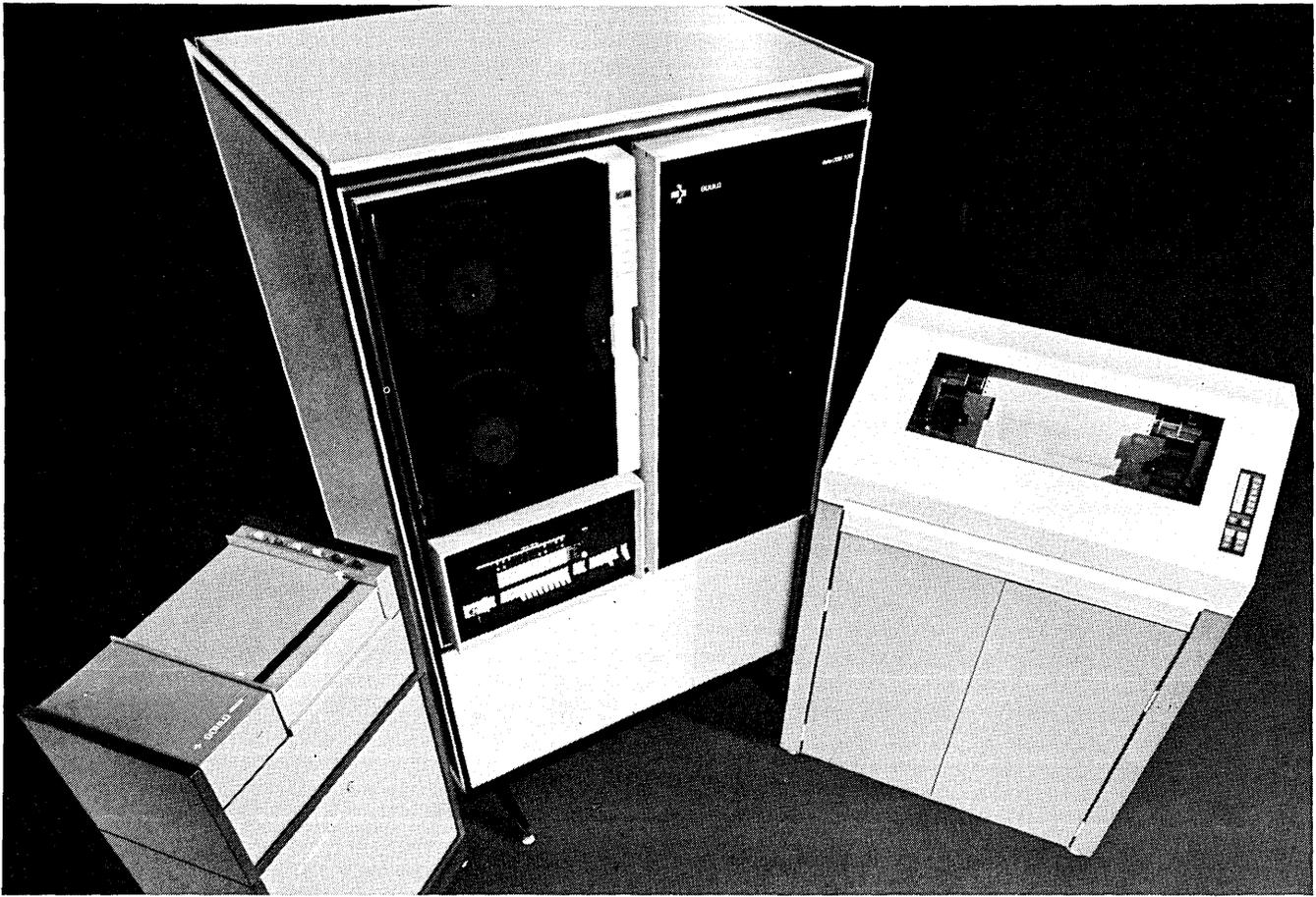
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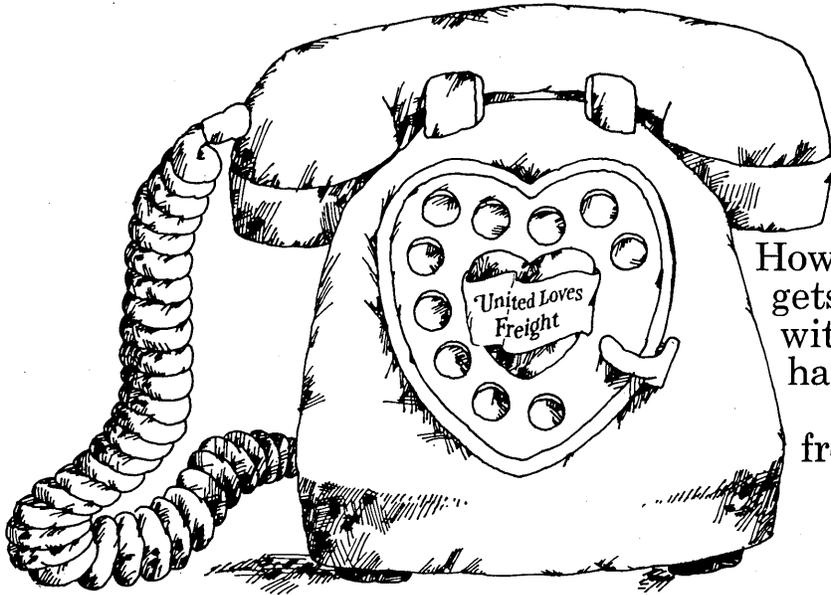
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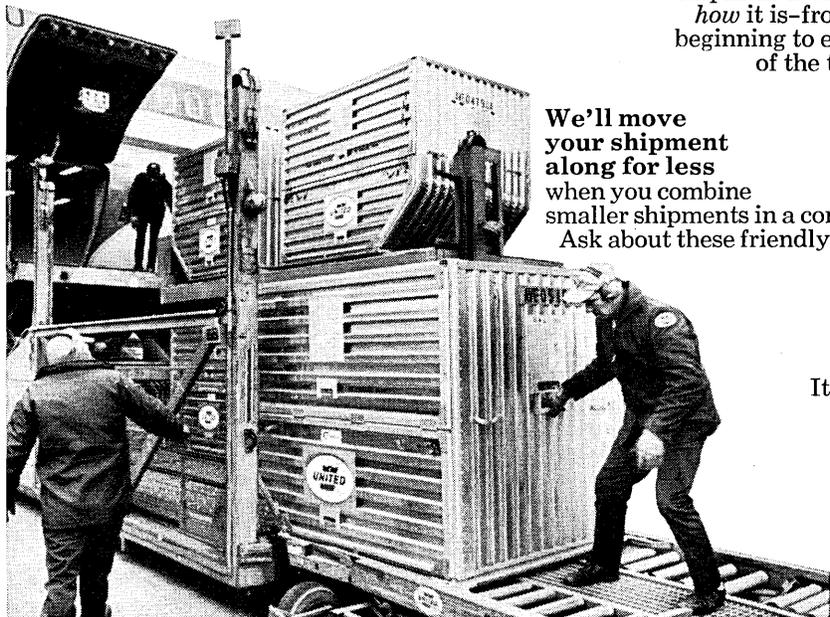
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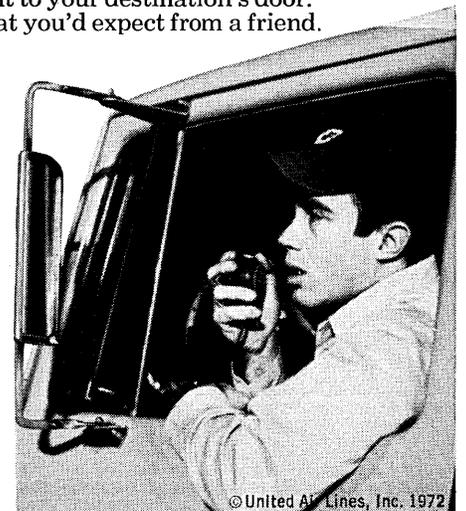
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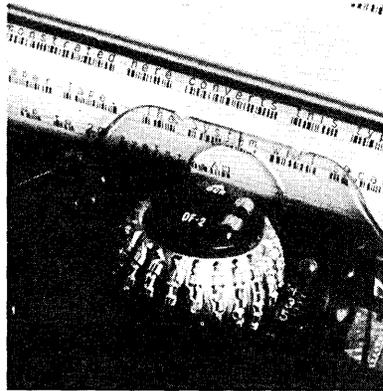
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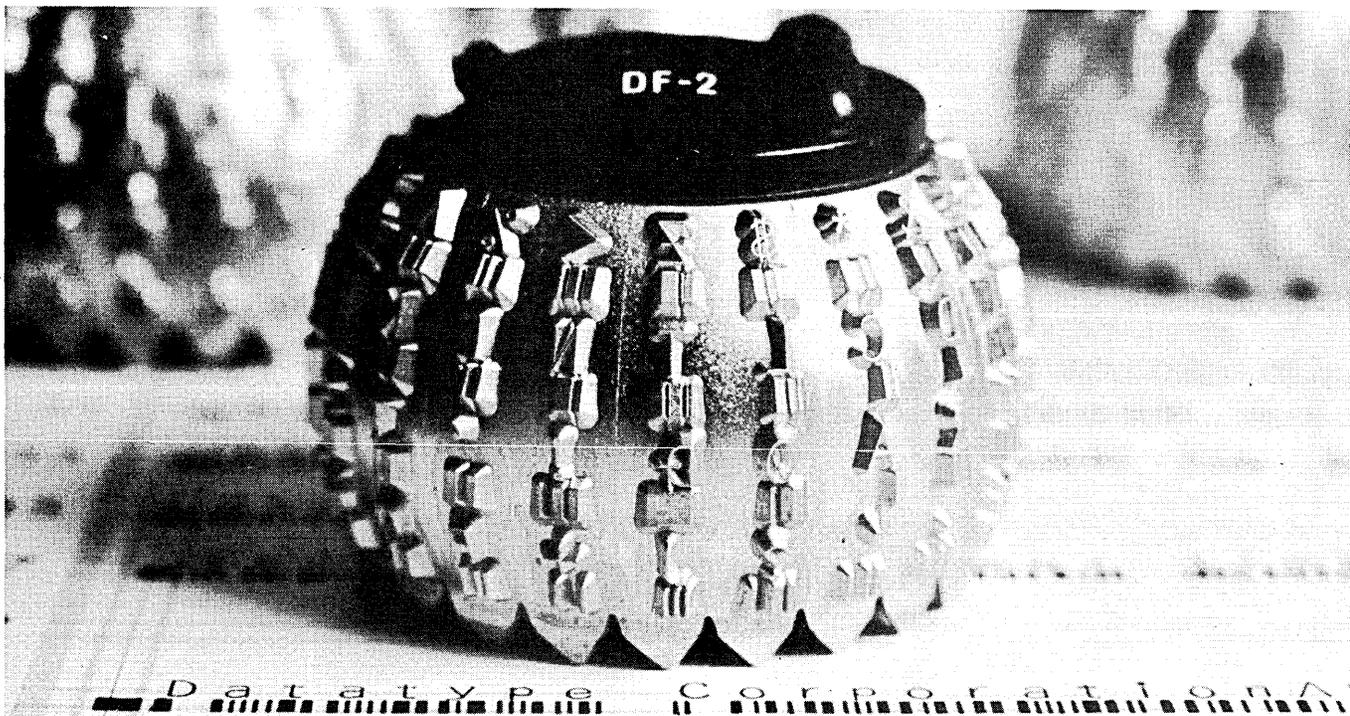
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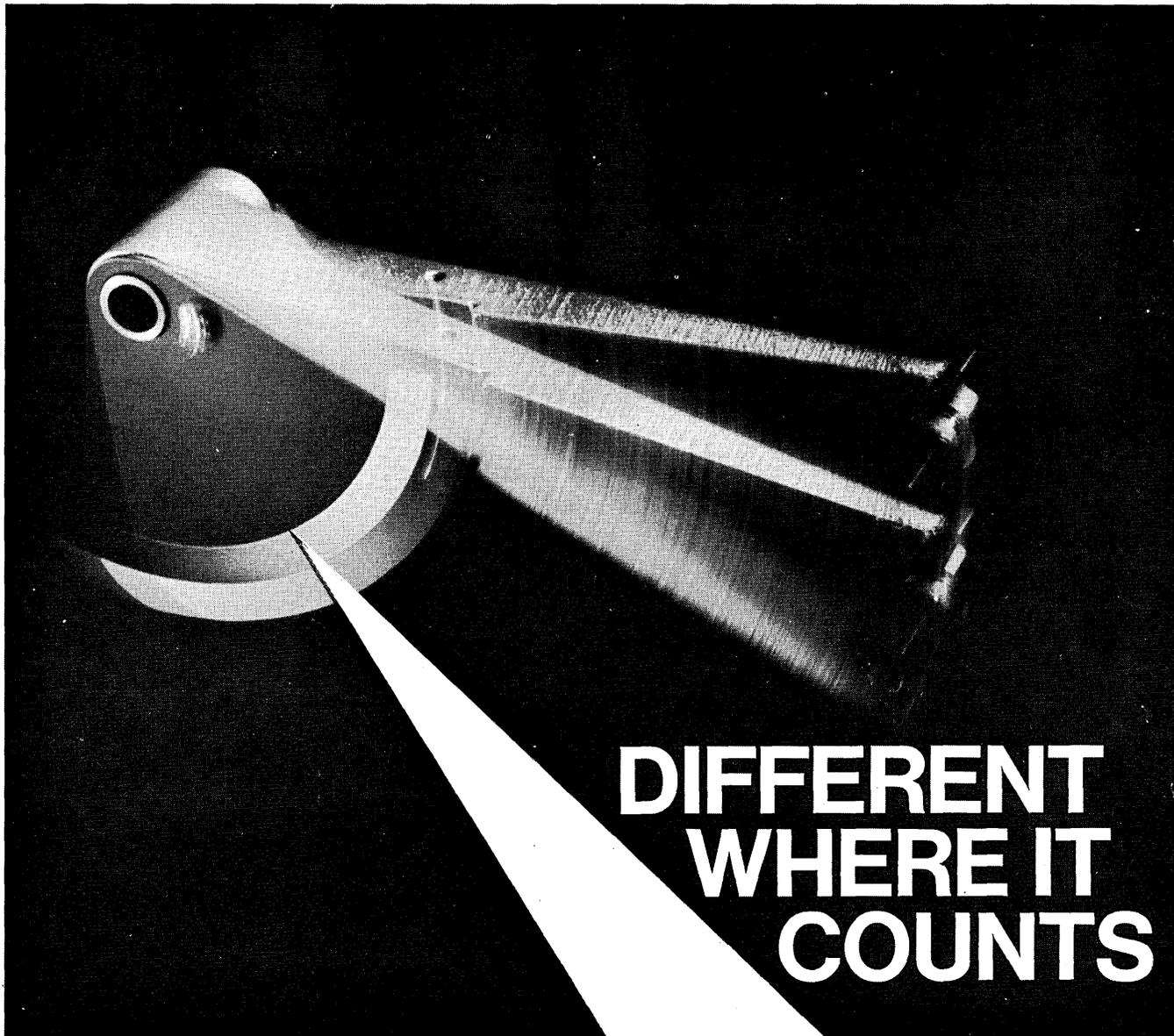
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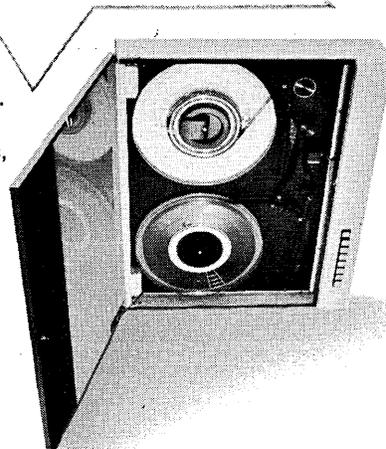
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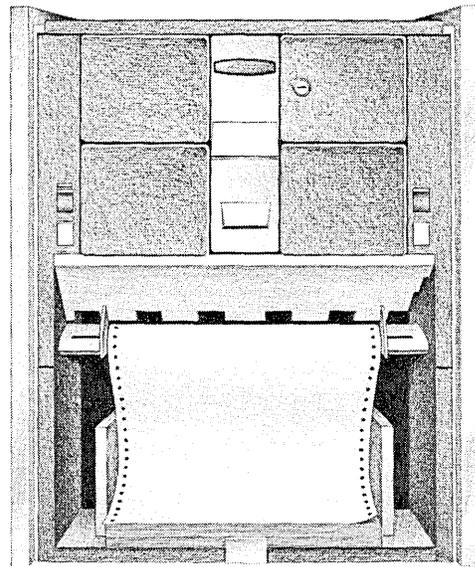
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Before you buy anything, ask to see Bell & Howell.

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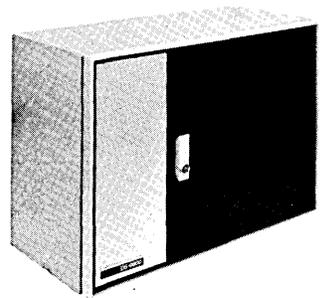
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Systems overloaded?
Need to move data faster?

Consider the Rixon
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It runs at 9600, 7200,
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second; has a continu-
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DS-9600



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CIRCLE 56 ON READER CARD

BREAK THE EDP TRAFFIC JAM

**Goodyear's Staran[®] associative
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It's more than a new generation.**

The Goodyear Staran computer:

A new way of thinking for complex data-handling operations



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GOODYEAR
AEROSPACE



Read how

STARAN can break EDP bottlenecks in

- air traffic control
- ballistic missile defense
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- communications
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**array processor is faster than
several times as much.
It's a new way of thinking.**

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WASHINGTON, D.C.
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OUR 360/CORE IS WINNING ALL THE BIG ONES

Our *compact 360/CORE* replacement or expansion memory for System/360 computers offers you more and saves you more than any other system. That's why our *compact 360/CORE* is winning big government contracts, lessors' contracts, and with individual users as well.

IT'S COMPATIBLE-PLUS.

360/CORE is fully 360-compatible – plus it's upward and downward compatible and model to model compatible, all in the same box. That means fast on-site installation, fewer spare parts and minimum servicing and interruptions.

RECENT 360/CORE WINNERS

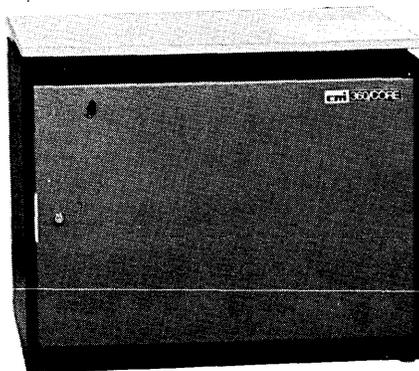
*U.S. Army BASOPS 37 Models 30s (16-128K)
U.S. Navy 8 Models 30, 40, 50
Leasing Companies:
Randolph Multiple Models 30, 40, 50
DPF Multiple Models 30, 40, 50
Diebold Multiple Models 30, 40, 50
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And a growing list of individual 360 users.

*Largest add-on core award in history

IT'S ULTRA-COMPACT.

360/CORE is available in a desk high unit, as well as in a 5-ft. high "tall boy." In one desk high cabinet we store 128K bytes plus "bump" (auxiliary) storage. And our desk-high is available for all models – 22, 30, 40 and 50. That means we take less floor space, provide your operators with precious counter space, and increase the efficiency of your computer room operations.

Compact 360/CORE



360/CORE
from
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360/CORE uses the latest advanced core technology. That means more core in less space, plus maximum reliability. Then we back that with the best, most qualified field maintenance available. Fast. Knowledgeable. Expert coverage. In addition to our own 360/CORE specialists, we also have contracted with *both* Comma Corp. and Honeywell to give the best and broadest national maintenance coverage available.

THE COMPACT 360/CORE LINE

Expand or replace memory on your System/360 whether it's owned, rented or leased:

CMI Model	IBM Model	Expansion to:
CC22	360/22	64K bytes
CC30	360/30	128K bytes
CC40	360/40	448K bytes
CC50	360/50	1024K bytes

IT'S FROM CMI.

360/CORE is a product of Cambridge Memories, Inc., a company young enough to care, but old enough to have over 5,000 memory systems in operation. Our products include add-on memories for minicomputers (we were first), MOS semiconductor memories (again, CMI was first) and a full line of advanced memory systems in wide use by OEM manufacturers. We have a fully staffed R & D department that has developed some of the newest, most advanced technologies available, including a domain tip technology we call DOT. This promises low-cost, high-speed, all-electronic mass memory for future computers.

360/CORE is the winner in the 360-compatible core market. Contact our nearest sales office and let us tell you why. Or jot a note to Dick Baker, director of end-user marketing.

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CIRCLE 86 ON READER CARD

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What kind of data binders are
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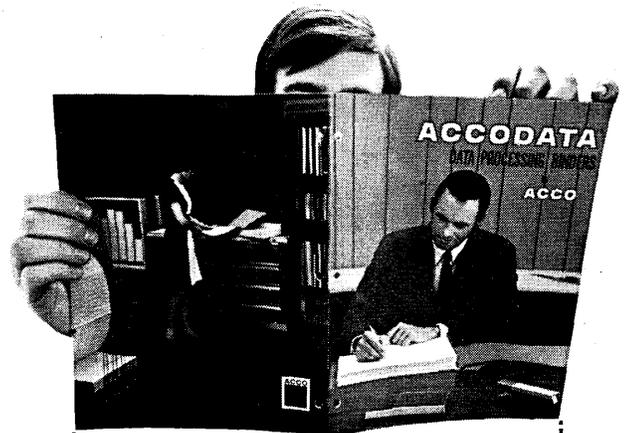
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Problem solving à la carte. It lets you use the power of computers and information services in just the portions you need. To make you money, identify opportunities, cull out waste. And you don't have to have your own computer, or software or people. You can buy complete information dinners, or just one or two entrées. Or we can tailor-make a recipe just for you. Whatever your information diet calls for. We have an à la carte menu for businessmen—general ledger, inventory control, department cost, payroll, payables and receivables. We have an à la carte menu for cities—solid waste management, school bus scheduling, and new programs for law enforcement and housing authorities. And an à la carte menu for computer users and programmers—master dimensioning and numerical control programs, COBOL debugging tools, conversational terminal services, remote job entry, data base services, training and consulting. Problem solving à la carte. If you've ever suffered from computer indigestion, it can be the greatest thing since your favorite antacid. Send for the menu that fits your diet.

Boeing Computer Services, Inc. P.O. Box 708, Dover, N.J. 07801

DM5

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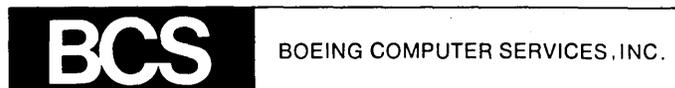
- Menu for Computer Users. Menu for Businessmen.
 Menu for Cities. Menu for Special Needs.

NAME _____ TITLE _____

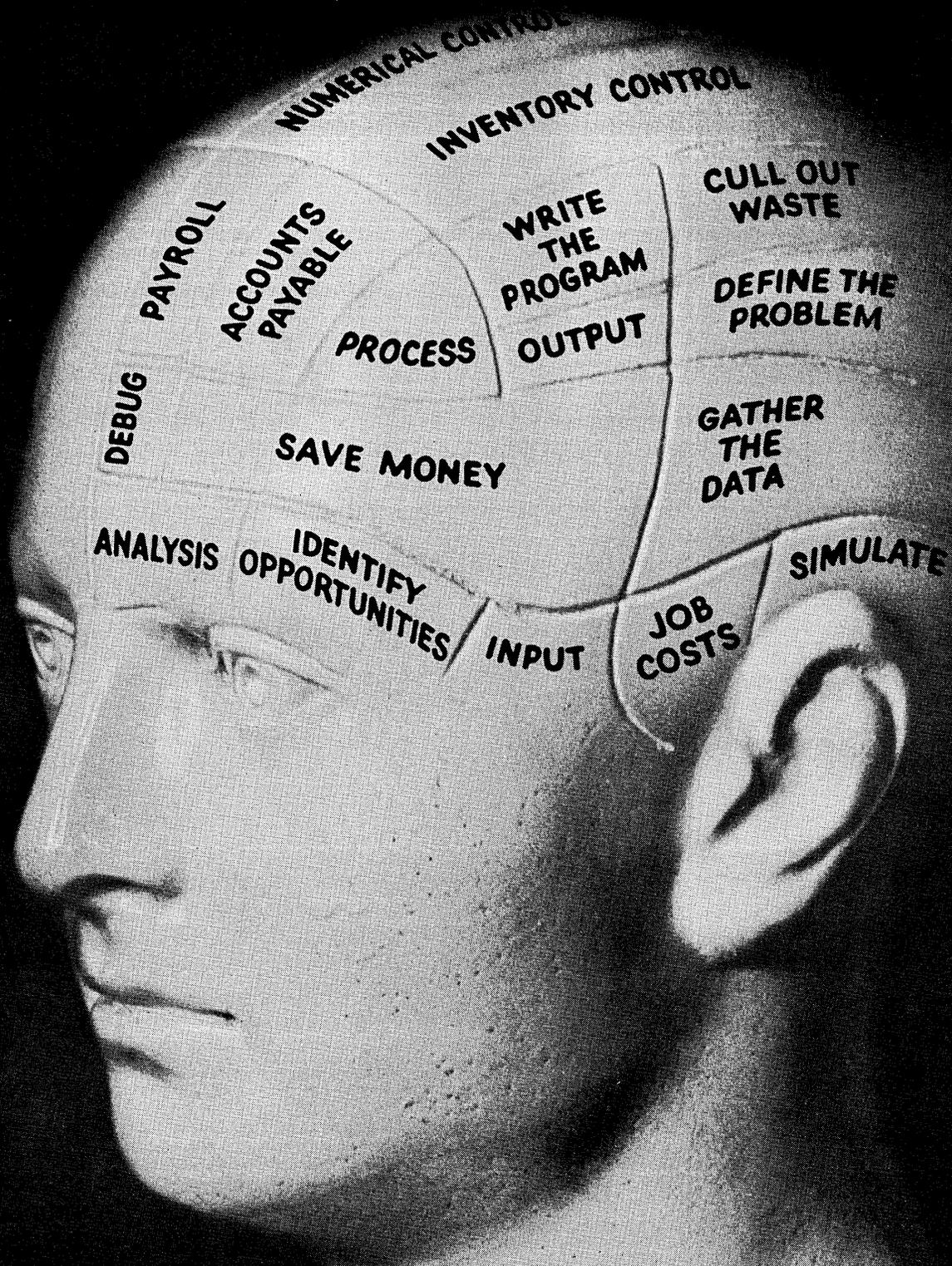
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STREET _____ NO. EMPLOYEES _____

CITY _____ STATE _____ ZIP _____ TEL. NO. _____



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GATHER THE DATA

ANALYSIS

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JOB COSTS

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DUO 360/370 shrinks OS manpower conversion costs up to 90%.

Going from DOS to OS is a battle.

For one thing, programmer man-hours are monstrously inflated by the need to reprogram everything from DOS. With DUO 360/370 you get *OS results* without reprogramming.

For another, OS test time is an obstacle. DUO cuts it by as much as 90%.

And in the conversion, departmental morale suffers heavily. DUO removes the pressure, by removing the need to reprogram everything at once.

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 have someone call to set up my test

Name _____

Title _____ Firm _____

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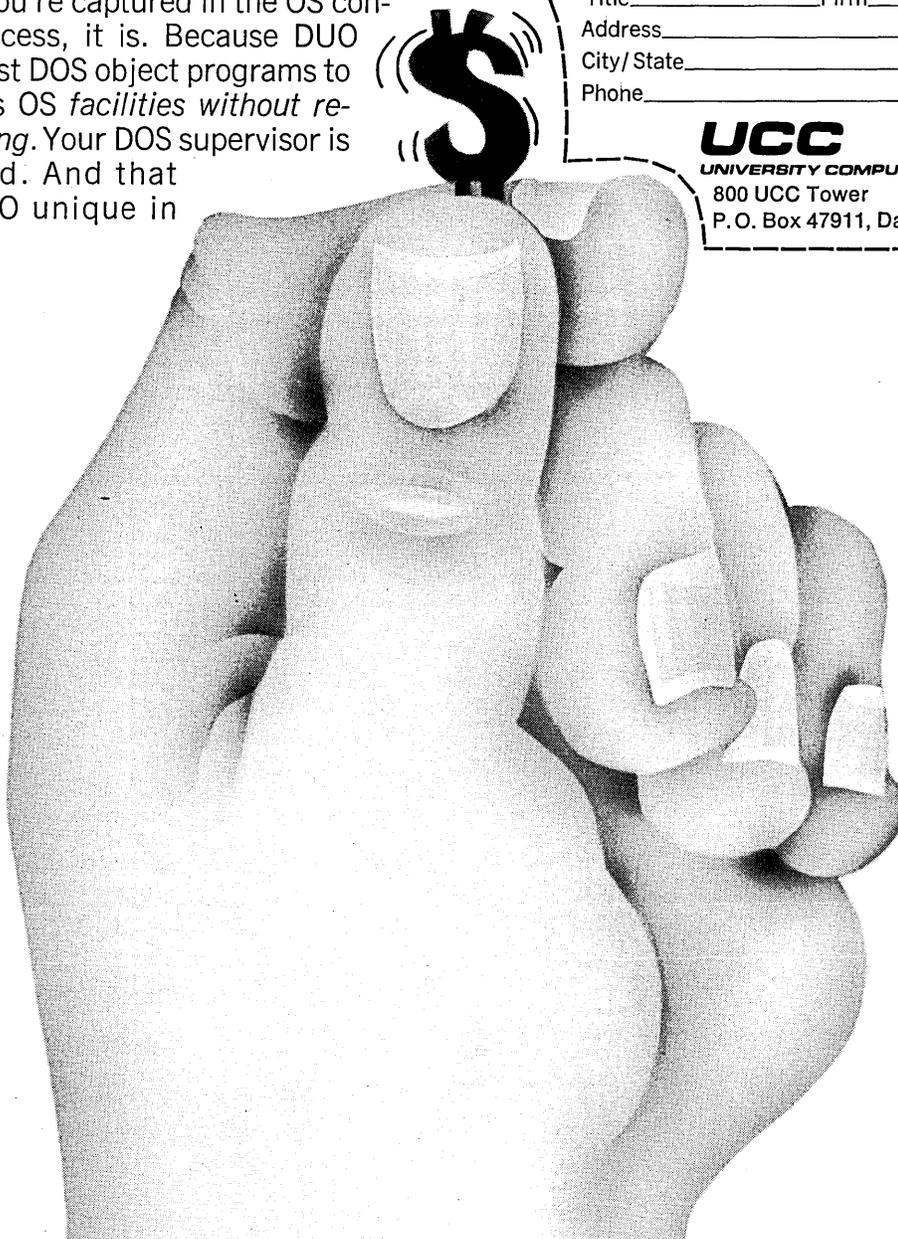
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CIRCLE 39 ON READER CARD

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This is the complete electronic security access control system.

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Instant central lock-out or acceptance or change of authorization of any individual card for any door. With records.

As space-age as your data center.

In the electronic age mechanical locks and keys are obsolete. And gate guards on every critical entrance, inside as well as outside, would cost a fortune.

Rusco's mini-computer R-40 access control security system gives you complete, economical, automatic control, with printed records, 24 hours a day, of every critical access point—into the building, into areas, into computer rooms, into storage. One entrance or scores. Dozens or thousands of people... individually. You can instantly lock out any individual from any entrance, merely by flicking a few switches at the central console... **and you don't have to change the lock or recover the card.**

Or you can change the authorization of any individual from one entrance to different entrances, without changing the locks, or his card. Total control.

You have an automatic record of date, time, entrance, and individual card, for time-recording or other purposes.

The full memory capacity is always available. No loss because cardholders have been eliminated. Any card can be authorized for any door, as specified by central control.

Entrance controls may operate with an authorized card, or may also require a secret, memorized code tapped in on a keyboard by the cardholder.

The R-40 system works with the extraordinary Ruscard. Same size and thickness as a standard credit card, and just as convenient to carry and use. **It can be printed, embossed, and embody an ID photo, and it can be**

used on any standard imprinter, for total compatibility with other requirements of documentation.

But it also can be coded invisibly with a complex variety of information. Secure. So secure an advanced electronic laboratory writes, "...we...were unable to break the code."* No worry about counterfeiting, or duplication, or loss. When the extraordinary Ruscard is inserted into any of the appropriate Ruscontrols, if it is valid for that control at that time it will activate a door opener or other device.

If it is not valid, if the employee terminated yesterday, or if his access has been changed from one entrance to another, or from the first shift to the second shift, or if an attempted entry is made using a lost or stolen card, the Ruscontrol will not be activated.

Entrance denied. (With alarms, if desired!)

And you don't have to change the lock or recover the card.

Write or phone for complete information.

*Complete letter available on request.



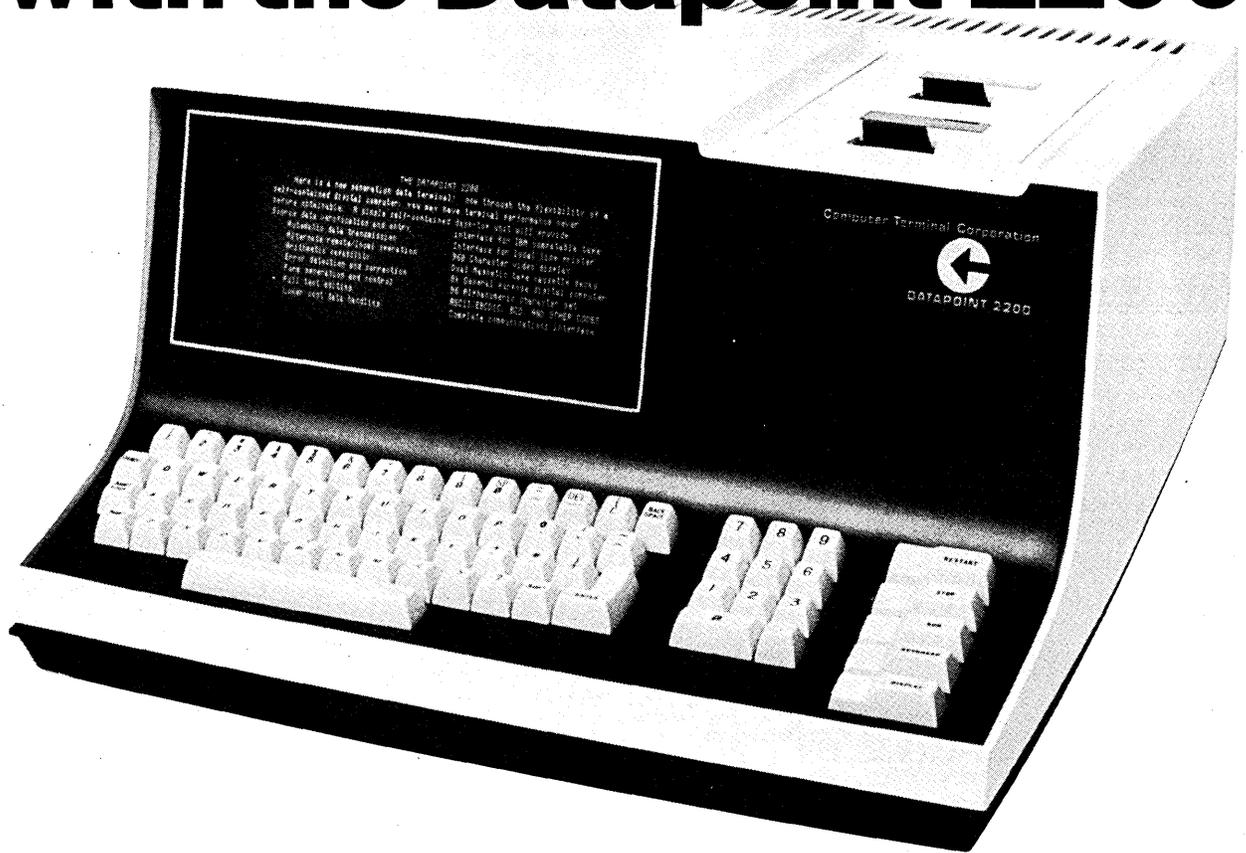
RUSCO ELECTRONIC SYSTEMS

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Streamline your data entry with the Datapoint 2200



With the Datapoint 2200, you can get your data conversion and entry operation into fighting trim in a hurry. The Datapoint 2200, a unique terminal/computer system, provides:

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Every Datapoint user enjoys complete field service and system support, and access to as much training as he needs. Hundreds of Datapoint 2200's are now up and running. For more information on how you can reduce costs and boost productivity in your data entry operation, contact the nearest Datapoint sales office, or write or call:

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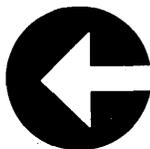
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° PGI Proudly Introduces . . .



THE 844 universal **CONTROLLER*** AND DISC SYSTEM



Peripherals General, Inc.

What's so UNIVERSAL about it?

It interfaces with any computer.
It handles intermixed track densities.
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Media Quality Test Mode Option available
All options are field installable.

And:

*It occupies about 10% of the volume of
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The 844 Universal Controller when used
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Linear actuator provides 29 ms average access time.

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It's available now.

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*Patent Pending

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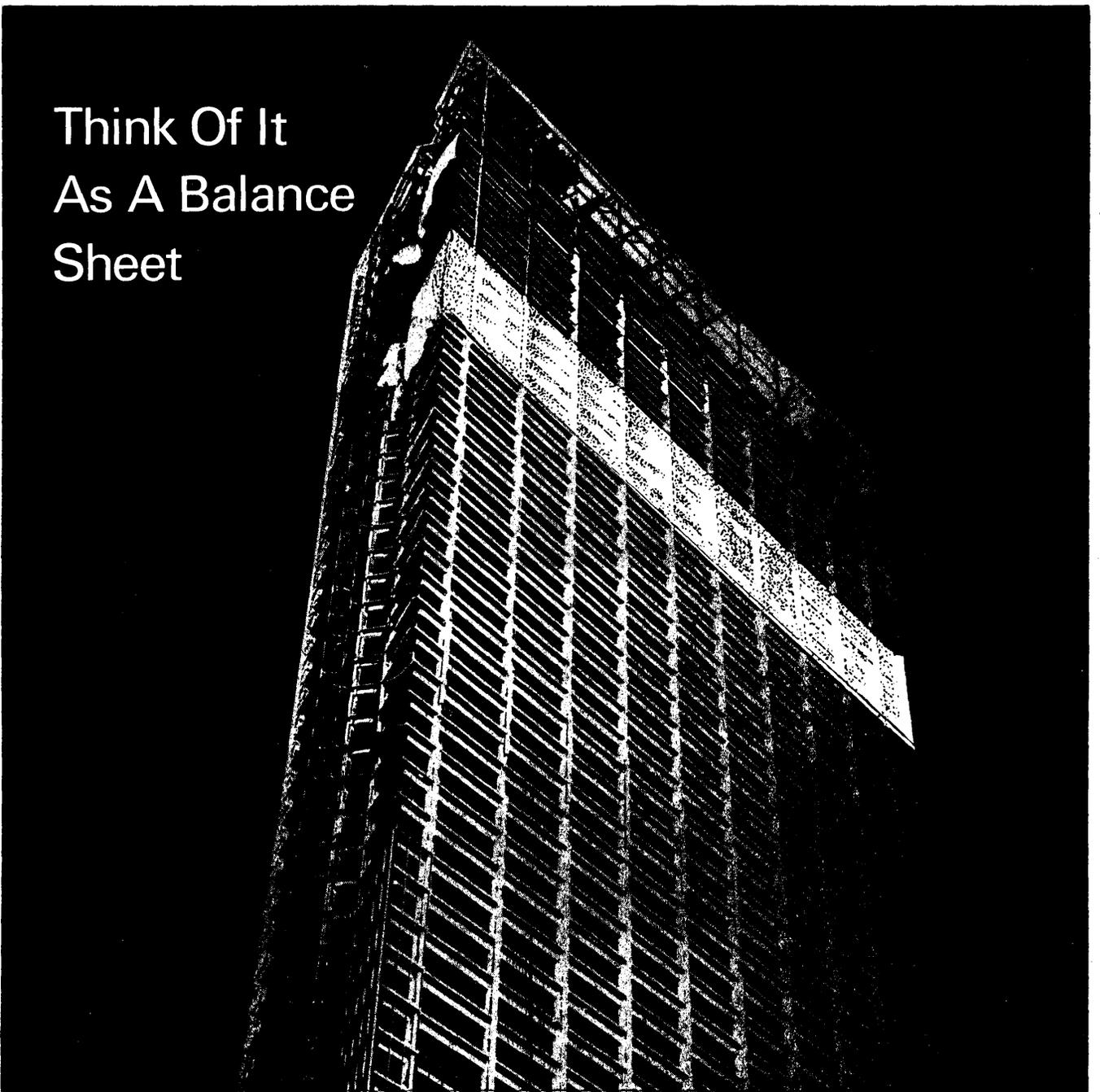
Booth 408-410

° MOSCOW—MAY 23-JUNE 1

° TOKYO—JUNE 8-13

Sumitomo Shoji Kaisha Ltd., Tokyo
Far Eastern Representatives

Think Of It As A Balance Sheet



Look around. You don't need to be told there's an apartment boom. There's also a boom on leased cars, trucks, railway cars, money, medical equipment, office machines, computers, machinery and almost everything else. The leasing and rental industry has grown so fast that its computerized accounting can't keep up. That could be good news for you.

PHI is offering you a key to one of America's largest and fastest growing industries. The key is the Fixed Amount Billing System. FAB was jointly developed by PHI and the Chase Manhattan Bank, one of the nation's largest processors of rental accounts. It provides your customers with detailed information for billing, disbursements, operating statements, and comprehensive reports—all through one multi-level system. The most important FAB feature is flexibility. You can customize your service to the unique environment of each client. Every company that bills a fixed amount on a set-period basis is a potential customer. The marketplace for FAB service is

tremendous—and captive. Since FAB is the only system of its kind, market penetration with other business services is that much easier.

FAB is operational and available—from the same company that produced the most successful business package in banking history—the PHI Payroll System. Contact Dale Jelley for complete information.



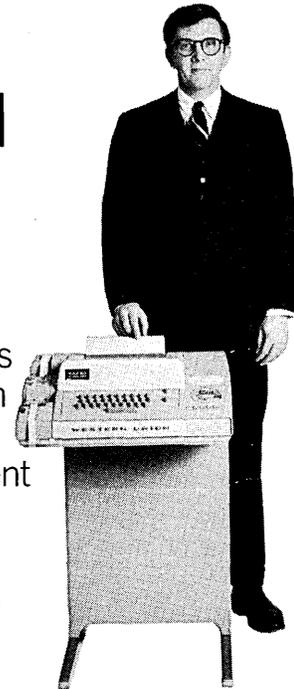
comprehensive data processing services • a computer network offering sophisticated hardware, software and technical assistance • an array of supporting software • consultants for systems applications and development.

Important news for computer

1. Your computer can now reach 100,000 TELEX and TWX subscribers.

Through the combined Telex and TWX networks, your computer or business machine can now communicate directly with over 40,000 TWX and 60,000 Telex subscribers in North America. The list includes every major company on the continent.

The interconnection is possible with interface equipment that Western Union installs in your office. It doesn't matter whether your company uses Telex, TWX or both. We can make the necessary installation to put your data processing equipment on the line.



2. Your computer can now automatically dial, send and receive messages.

Once Western Union has installed the interface equipment, your pre-programmed computer can automatically dial connections, transmit or receive messages. It will also disconnect and reset the circuit. The teleprinter associated with the interface can either be used in conjunction with the computer or separately when you choose to have the computer "blinded."

With the proper interface installation and appropriate programming, your computer can take over a wide variety of different tasks that call for up-dating and access from remote locations.

You can also use your computer to interconnect your own private wire system with Telex or TWX.

owners from Western Union.

3. Your computer can now transmit data and respond to inquiries.

A Western Union interface installation will enable your computer or business machine to automatically transmit and receive data to and from factories, warehouses, field offices, distributors, customers or suppliers and to handle routine inquiries from these and other Telex or TWX equipped locations.

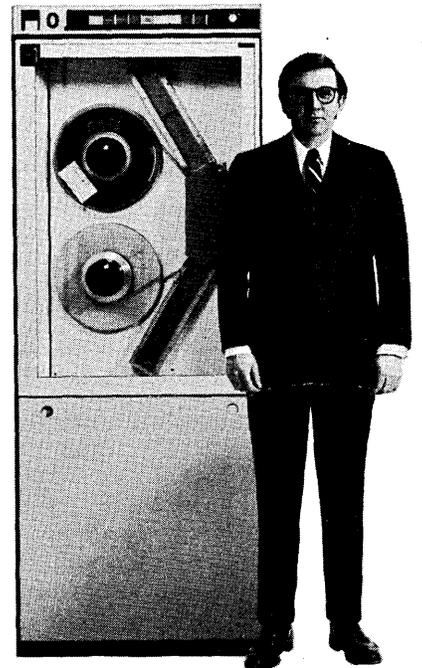
Western Union Interfaces can be used with virtually any general-purpose digital computer that has a "communications" front-end.

4. Your computer can now perform many different on-line activities.

Many companies are already utilizing the Telex/TWX network for automatic data communications. With Western Union interface installations, their data processing systems perform many different functions. A brokerage house uses it to locate lost securities. Railroads use it to locate freight cars across the country. Insurance companies use it to check out risk data on applications. Others use it for handling vendor inventory, processing orders for remote sales offices, and providing time-shared data facilities for many locations.

If you would like to put your computer in touch with the outside world, we'll be happy to tell you more about how it can be done for a modest monthly rental cost.

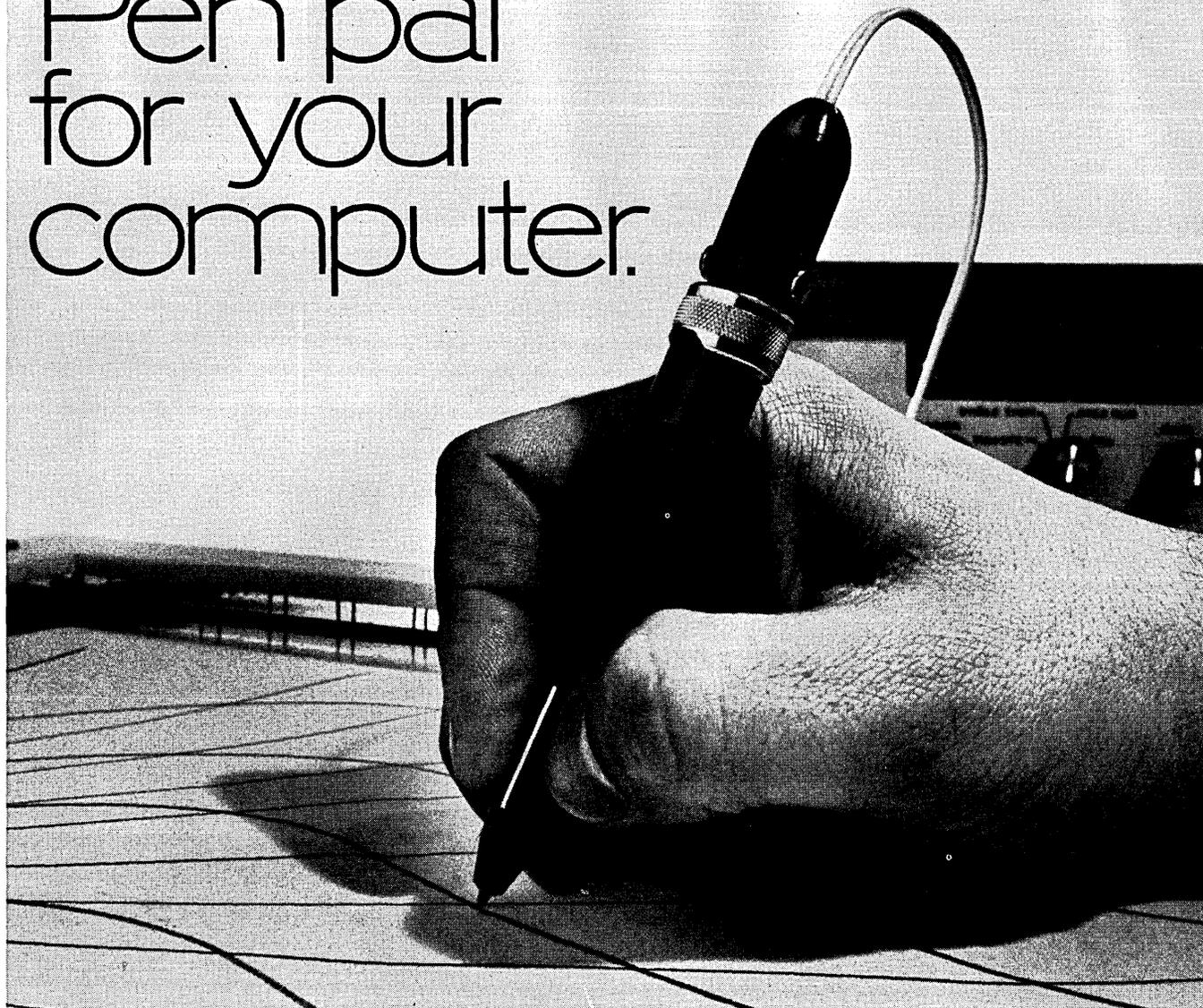
Contact your nearest Western Union office or write, call or wire Kendall J. Mau, Western Union Telegraph Company, 60 Hudson Street, New York, N.Y. 10013. Telex: 127251, TWX: 710-581-2159, Phone: 212-577-3898.



Western Union's TELEX/TWX Network.

Nationwide electronic data communications.

Pen pal for your computer.



graf/penTM sonic digitizer

Here's a pen that's a mighty sword for cutting through your computer data entry problems.

You can use it in any of a thousand ways, whether your computer functions in medicine, commerce, industry, publishing, science or education. And you can use graf/pen with any make or model computer.

The graf/pen is a special ball-point pen which, when touched to the graf/pen tablet, a visual display, a CRT screen or a film viewer, creates both a visual record and an electrical spark. The hypersonic sound of this spark is recorded by microphones at the edges of the display surface without interference from ambient noise. These sounds are then digitized into X and Y (plus Z for three-dimensional graf/pens) coordinates. The coordinates are in binary or BCD coding for storage on mag or paper tape or punched cards, for simultaneous display on a CRT terminal, for entry into the computer, or for remote transmission.

Use the graf/pen to enter graphic data from two- or three-dimensional objects. Use it to speed the entry of data

on formatted pages—either printed or projected, for order entry and processing or for inventory control. Or let it help you enter data for process control programs, systems analysis, page make-up, remote audio-visual presentations, data reduction or any number of applications where data entry is difficult or impossible by classic means.

With graf/pen, you won't have any costly interfacing or startup problems. graf/pen is available with tape, card, or CRT memory and/or display systems. The cost for your graf/pen, complete with a 14" x 14" tablet, a stylus and a control unit is just \$2,800. Now that's something to write home about!

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Everything you always wanted to know about SyncSort

WHAT IS IT?

SyncSort represents a new method for sorting when random access devices are assigned as work units. A patent has been applied for covering approximately 25 new concepts involved.

IS IT REALLY BETTER?

Tests confirm that SyncSort is better than any other sort.

2314	40% faster
3330	30% faster

Verified actual times for various sort sizes and configurations available upon request.

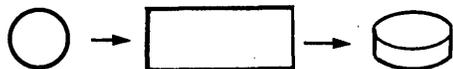
IS IT COMPATIBLE?

SyncSort accepts control statements acceptable to SM1 or SM-023. Conversion is not required.

IS IT SIMPLY INSTALLED?

SyncSort can be executing sorts 15 minutes after delivery (if 10 are wasted).

Delivered	Linkage	SyncSort
System	Editor	System



SyncSort™

A NEW, FASTER, ECONOMICAL
METHOD OF SORTING

IS A MERGE AVAILABLE?

A merge is provided which is also compatible with the merge provided by SM1 and SM-023.

IS THERE A GUARANTEE?

Each License agreement permits a cancellation within the first 30 days. In ADDITION, a contract for SyncSort may be terminated by any user if any sort out-performs when sorting a given data set.

WHERE CAN I GET IT?

Whitlow Computer Systems
1029D Teaneck Road
Teaneck, New Jersey 07666

Please send me information on your guaranteed product: SyncSort.

NAME _____

TITLE _____

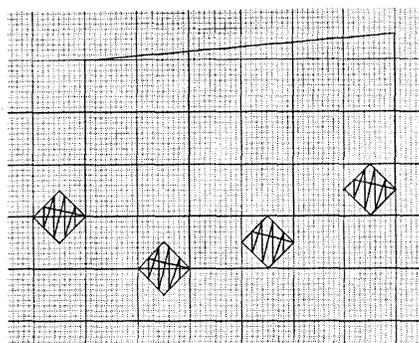
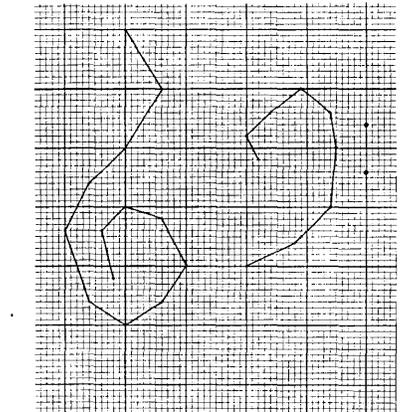
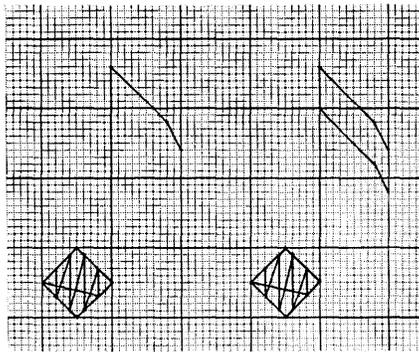
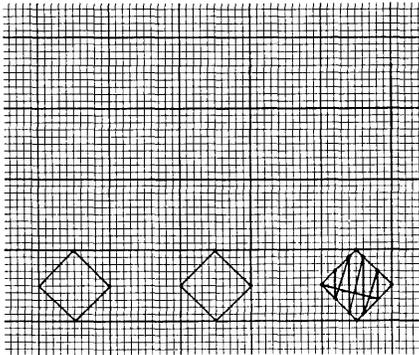
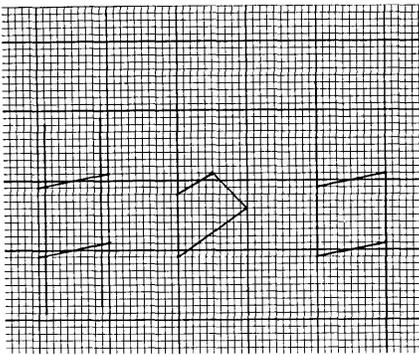
COMPANY _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

TELEPHONE _____

*Whitlow Computer
Systems, Inc.*



Reading from the top down, the first four illustrations at the left show how music symbols are constructed from a small number of lines to minimize flicker on a refreshing display. Because the coordinates are in hundredths of inches, the note heads of quarter, eighth, and sixteenth notes appear to be filled in when drawn to scale.

The last illustration shows the beam for a grouping of eighth notes anchored at one end to the top of a stem 0.3 inches in length on the highest note in the group. The slope of the beam is obtained from the vertical positions of the first and last notes of the group. The stems of the remaining notes are drawn to meet the beam as shown.

One product of a university project combining a computer and peripherals with an organ keyboard is the output of musical notation

Capture and Display

For more than a century various attempts have been made to obtain a written record of music as it is played at the keyboard. This problem has proven to be so difficult that the various inventors have chosen to dispense with traditional music notation and to produce a simplified graphical record. Attempts to produce music notation mechanically have been generally unsuccessful. Even today, music is printed by offset photolithography, with the master copy prepared by hand.

As part of an on-going research project at the Univ. of Utah, a music system has been developed which brings together a DEC PDP-8 computer, a CTC Datapoint 3300 terminal, a Tektronix 611 display, and a Schober electronic organ. As shown in Fig. 1 (photo at far right), the organ, display, and terminal are arranged to permit convenient interaction between the user and the system. Fig. 2 (page 58) illustrates information flow through the system—from printed score via a music description language through a terminal, or from keyboard activity, to printed score via the Tektronix display or hard copy plotter, or to an actual performance of the music via the organ tone generators. Within the computer various transformations upon the music are possible, including key transposition and tempo modification.

In seeking to advance the techniques of keyboard recording originally put forth by the developers of the player piano, an isomorphic internal computer representation of the paper roll

was developed. Fig. 3 (page 58) illustrates a simplified fragment of a piano roll placed in a coordinate system. The times are arranged such that $t_n < t_{n+1}$. The frequencies or pitches are arranged such that $f_n < f_{n+1}$.

In order to obtain this information with the computer, two useful items are continuously available: (1) time, and (2) the state of the keyboard. The



of Keyboard Music

by Prentiss H. Knowlton

state of the keyboard is a sequence of bits, in which 1 indicates that a key is currently depressed, and 0 indicates that a key is currently not depressed. In order to determine when a change takes place, the keyboard is sampled to determine its current state. The EXCLUSIVE-OR of this state with the previous state is performed. If the result is non-zero, the non-zero bits indi-

cate which keys have *changed*. When a change has been detected, it is added to an event table, preceded by how much time had elapsed since the last event had taken place. A typical event table is shown in Fig. 4 (page 58). In order to conserve computer resources, the keyboard is sampled at discrete time intervals. From practical experience, 20 samplings per second suffice to capture

even very complex keyboard activity. This can be verified by closely examining a typical piano roll, which consists, not of continuous slits, but rather of rows of perforations, which serve the additional function of keeping the roll intact horizontally. Each small, perforated hole can be thought of as a "clock tick" for the key it controls. Thus, the rate of the holes past the



Capture and Display of Keyboard Music

player piano's "read head" represents the rate of the "clock." From many observations of player-piano rolls, the rate of 20 ticks per second is a reasonable estimate. Nuances of phrasing, for example, in which progression to the next note implies retarded release of the previous note, can be visually observed on piano rolls, in which two adjacent rows of perforations slightly overlap. In spite of the preference for this sampling rate, it is possible to sample at lesser and greater rates by varying the speed of the clock.

To illustrate an application of the event table, Fig. 5 represents the event table which would result from the keyboard activity represented in Fig. 3.

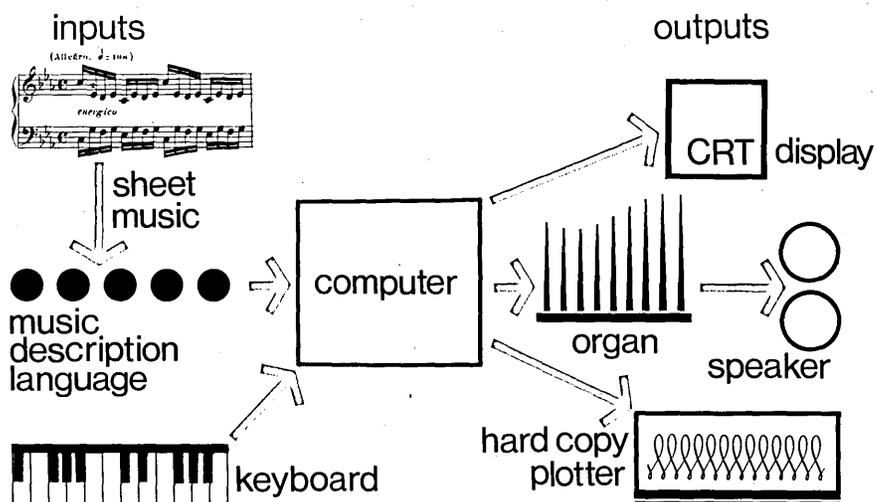


Fig. 2

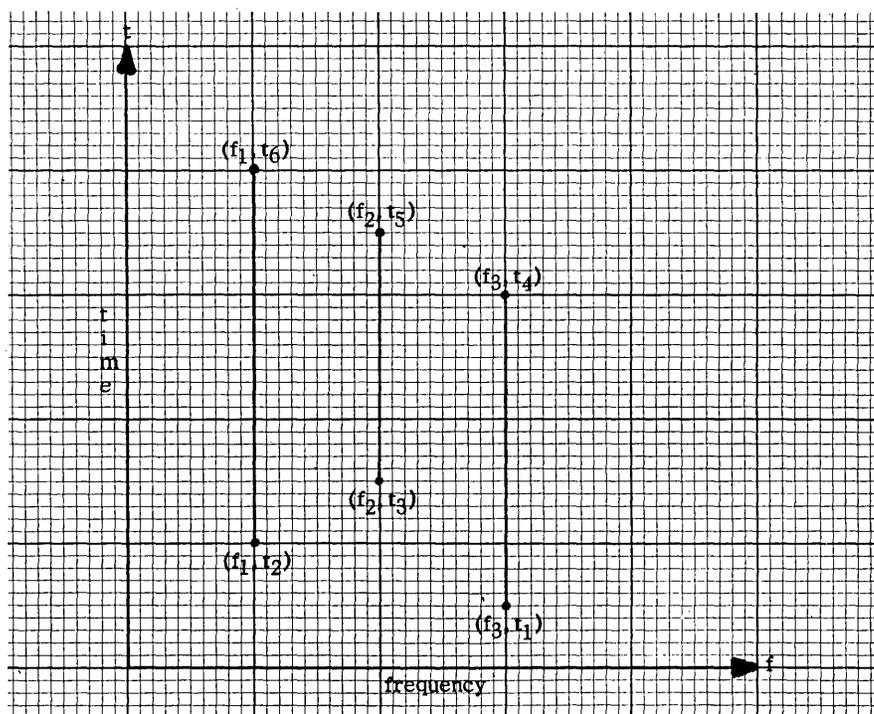


Fig. 3

The symbolism "+f_n" represents the depression of the key which has frequency f_n. Similarly, the symbolism "-f_n" represents the release of the key which has frequency f_n. Regarding Fig. 3 as the keyboard activity for one measure, the transformation of the resulting event table of Fig. 5 into traditional music notation will be considered.

In order to determine the point in a measure when a note of pitch f_n begins, all the Δt's in the event table which precede "+f_n" are added. In order to determine the duration of a note of pitch f_n, all the Δt's in the event table between "+f_n" and "-f_n" are added. From this formalism, f₁ begins at time 5+5=10, having duration 5+15+5+5=30; f₂ begins at time 5+5+5=15, having duration 15+5=20; and f₃ begins at time 5=5, having duration 5+5+15=25. These calculations

can be verified graphically from Fig. 3.

For the purposes of this example, each note shall be considered a separate and independent voice, which means that the rests for each note will be individually indicated. In addition, it shall be assumed that f₁ corresponds to D below middle C, that f₂ corresponds to G above middle C, and that f₃ corresponds to D above middle C plus one octave. Finally, it shall be assumed that 5 units of time correspond to a sixteenth note. This implies that 10 units, 20 units, 40 units, and 80 units of time correspond respectively to eighth, quarter, half, and whole notes. A graphical representation of these time value assignments is shown in Fig. 6. Fig. 6 illustrates that precise timings are not required to obtain the desired note value. The principle is to define all the discrete note values for intended use along with their related "ideal" time value assignments. Subsequent to this definitional procedure, the requirement for obtaining note N_n which corresponds to the ideal time,

$$\begin{matrix} \Delta t_1 \\ E_1 \\ \Delta t_2 \\ E_2 \\ \vdots \\ \Delta t_n \\ E_n \end{matrix}$$

Fig. 4. A typical event table.

$$\begin{aligned} t_0 &= 5 \\ &+ f_3 \\ \Delta t_1 &= (t_2 - t_1) = 5 \\ &+ f_1 \\ \Delta t_2 &= (t_3 - t_2) = 5 \\ &+ f_2 \\ \Delta t_3 &= (t_4 - t_3) = 15 \\ &- f_3 \\ \Delta t_4 &= (t_5 - t_4) = 5 \\ &- f_2 \\ \Delta t_5 &= (t_6 - t_5) = 5 \\ &- f_1 \end{aligned}$$

Fig. 5. Event table from Fig. 3.

T_n, is to produce a note duration, D, which satisfies

$$(T_n - T_{n-1})/2 < D \leq (T_{n+1} - T_n)/2, \\ T_n > T_{n-1}$$

Compare this to Fig. 6. Clearly, the fewer the number of discrete time values, the greater the reliability in achieving the desired note symbols interactively from the organ keyboard. An additional refinement to this note assignment technique involves continual redefinition of ideal time values for note symbols. For example, when note N₃ is satisfied for durations D₁ through D_j (i < j), the ideal time, T₃, is redefined to be the average of D₁ through D_j. Subsequently, when N₃ is

satisfied for duration D_{j+1} , T_3 is re-defined to be the average of D_{i+1} through D_{j+1} . Using this approach, the system is made to adapt to slight changes in tempo.

Going back to the example of Fig. 3 and applying the table of Fig. 6 to the results of the calculations on Fig. 5, it follows that the time preceding f_1 corresponds to an eighth rest; the time preceding f_2 corresponds to an eighth rest plus a sixteenth rest; and the time preceding f_3 corresponds to a sixteenth rest. The time duration of f_1 corresponds to a quarter note plus an eighth note, or a dotted quarter note; the time duration of f_2 corresponds to a quarter note; and the time duration of f_3 corresponds to a quarter note plus a sixteenth note. Assuming a time signature of 2/4, two quarter notes per measure, the time subsequent to f_1 is zero; the time subsequent to f_2 corresponds to a sixteenth rest; and the time subsequent to f_3 corresponds to an eighth rest. Gathering all this information together, the measure of music notation obtained is shown in Fig. 7.

The display of keyboard music

By the time printing technology had advanced the state of the art of music printing and engraving to a point of perfection, the desire began to increase for a means of obtaining musical text of high quality more rapidly. Composers desiring such a facility recognized the advantages of (1) being able to express their musical ideas in notation more rapidly, (2) being able to immediately interact with their ideas once expressed in notation, and (3) being able to provide high enough quality manuscript for immediate reproduction by means of photolithography.

At the Univ. of Utah, three mechanisms for displaying keyboard activity

have been developed. The first mechanism, shown in Fig. 8, represents keyboard activity as a series of horizontal lines emanating from the right edge of the graphic display. Vertical position is based on pitch, and horizontal length indicates note time durations. The moving result is analogous to a player-piano roll moving horizontally. The second mechanism, shown in Fig. 9, represents the state of the organ keyboard at any moment on the musical staff in the key of C. The solid lines represent the musical staves, and the dashed lines represent ledger lines. Squares correspond to naturals or white keys, and diamonds correspond to sharps or black keys. The third mechanism, shown in Fig. 10 (page 60), is computer-generated music notation of "Praeludium II" in C minor from *The Well Tempered-Clavier, Book I* of Johann Sebastian Bach. Fig. 11 (page 60) gives the original sheet music, and Fig. 12 (page 60) illustrates the internal symbolic representation of the score, as entered into the computer through a terminal, or as obtained from an analysis of a keyboard performance of the score.

Conclusions

It has been shown that an interactive keyboard music system using an electronic organ, computer, and display

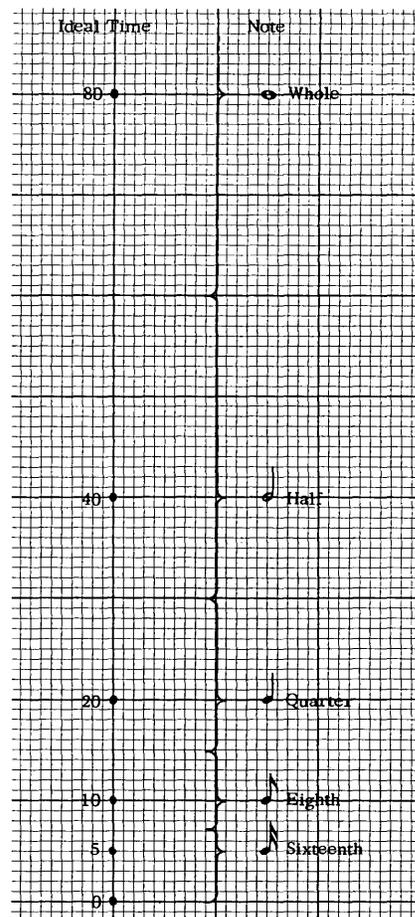


Fig. 6



Fig. 7

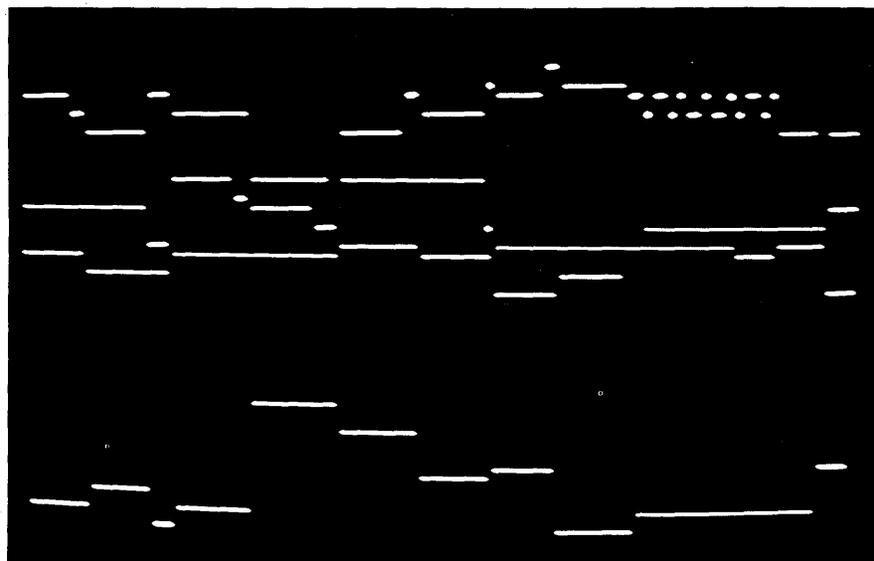


Fig. 8

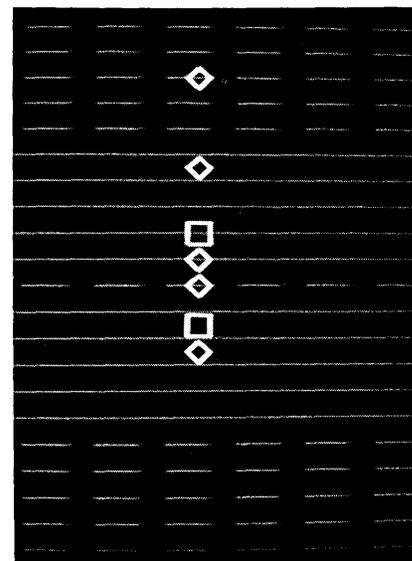


Fig. 9



Fig. 10

PRÆLUDIUM II.



Fig. 11

:J. S. BACH, PRÆLUDIUM II, C MINOR:

K3!\$4-4

```
:1:SC5E4DECEDEC5E4DECEDE;SC3GFGEGFGCGFGEGFG/
:2:SA4F% EFCFEFAFECFEF;SC3AGAFAGACAGAFAGA/
:3:S% B4FEFDFFBFEFDFF;SC3AGAFAGACAGAFAGA/
:4:SC5G4FGEGFGC5G4FGEGFG;SC3EDEGEDECEDEGEDE/
:5:SE5A4GAEAGAE5A4GAEAGA; SC3C4B3C4A3C4B3C4C3C4B3C4A3C4B3C4/
:6:SD5#F4% EFDFFFD5F4EFDFF;SC3% AGA#FAGACAGAFAGA/
:7:SD5G4#FGD5G4FGDGF;SB2B3% ABGBABB2B3ABGBAB/
:8:SC5% E4DECEDEC5E4DECEDE;SB2G3FG% EGFGB2G3FGEGFG/
```

Information enclosed in colons is treated as commentary and ignored by the system. "K3!" denotes that the key signature has three flats. "\$4-4" indicates a time signature of 4/4. ":1:" is commentary that measure number 1 is about to be encoded. "SC5" means a sixteenth note of C in the fifth octave, where C in the fourth octave is middle C. "E4" means a sixteenth note (by default) of E in the fourth octave. Subsequent letters denote subsequent sixteenth notes in the fourth octave by default. Thus, octave and time designators remain in effect until respecified. The semicolon starts the first measure over again for another voice, and the slash defines the end of the measure. In the second measure, "%E" specifies E natural, since in a key signature of three flats E is normally flat. Similarly, "#F" in the sixth measure denotes F sharp. Like time and octave designators, accidentals remain in effect until respecified, or until the beginning of the next measure, in which case the accidentals specified in the key signature go back into effect.

Fig. 12

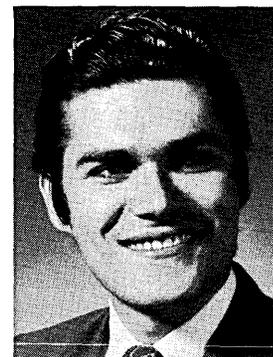
Capture and Display of Keyboard Music

can be realized. In the future, such a system might assist composers in the same way that typewriters assist writers today. Experience indicates that computer preparation of sheet music can provide significant cost savings to the music publishing industry. In addition, individual copies can be obtained from the Tektronix display for less than 8¢ each.

Acknowledgments. I wish to thank Professor William Viavant of the Univ. of Utah, who directed my research in this area. I wish to also thank Professors Robert Barton, Charles Seitz, Vladimir Ussachevsky, and Dale Harris, who served on my committee. Finally, I am indebted to my colleagues: Alan Ashton, who designed the music description language depicted in Fig. 12; David Ashton, whose initial development efforts led to Fig. 8; and to Robert Bennion, who designed, built, and maintained much of the hardware.

For further reading. Two doctoral dissertations and one masters thesis have come out of this work and are given below:

1. Ashton, Alan Conway, "Electronics, Music, and Computers," PhD dissertation, Univ. of Utah, Salt Lake City, August, 1970.
2. Ashton, David, "Teaching Music Fundamentals Using a Computer Controlled Organ and Display Scope," Masters Thesis, Univ. of Utah, Salt Lake City, August, 1971.
3. Knowlton, Prentiss Hadley, "Interactive Communication and Display of Keyboard Music," PhD dissertation, Univ. of Utah, Salt Lake City, August, 1971. □



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If the dp manager learns how to deal with the vendor's representatives, they may turn out to be one of his most valuable resources

How to Live Happily with Vendors

by Cary R. Wilson

Though every data processing professional knows he should spend time keeping up to date with the industry, very few of us are satisfied with the job we do.

One easy way to improve is to take advantage of those opportunities that come literally pounding at the door, the dp salesmen. Yes, the dp salesman, that guy who comes hat in hand, friendly and smiling, half scared, hopeful of selling you something. He is a valuable resource.

Look at it from the vendor's viewpoint. He can't afford to send out someone who isn't intelligent, well

Require every salesman to state his purpose and the time needed to achieve that purpose.

trained, and familiar with your industry. Reputable vendors would rather not cover a territory than send out a man who could do long-term damage to the company's marketing effort.

"All right," you say, "a good salesman may be enjoyable or fun to talk to, but hardly a valuable resource." Not so.

A salesman calls on someone because he believes he can offer a better (or cheaper) way of doing things. Cynical observations aside, the original reason a salesman is hired and sent out is to tell people of a new and better/cheaper way of doing things. Thus he can provide what is often priceless information.

For example, he can be expected to show you how to do your present operation at a lower cost—using his products, obviously, but that's not a problem if you don't have any bias about who supplies you as long as quality is good and prices are lower.

Salesmen can also show you how technological developments can improve your installation. Suppose you are buried in printed reports that are seldom read but take a very large block of expensive cpu time. Would you refuse to see a man who sold computer output microfilm machines, or off-line printers, or nonimpact high speed printers, or on-line data base management systems, or MIS packages? Many dp managers in just that situation do refuse, but a salesman might have just the thing to help.

Be ready to listen. A large computer user I once called on was about to sign a contract for a fairly substantial communications network. The cpu alone was \$10,000 a month. The terminal network was double that. I proposed a cpu that could do the job for \$5,000 a month. The incumbent vendor, scared that someone else might get a foothold, proposed a third manufacturer's communications controller which could multiplex high and low speed messages, thereby halving the line costs, and a new, cheaper terminal, which saved thousands more. The incumbent then proposed utilizing an unused partition of an already installed large cpu. Total savings: a quarter million dollars a year which would never

have been possible if the user hadn't started talking to a new salesman.

Salesmen can also be expected to bring you news of new applications, new uses for equipment or data. He might tell you that a laborious order entry process you use could be done differently for half the total cost . . . that data you now capture can be used to produce a new, useful report. He might have a software package that can double your throughput for a 10% increase in cost. Often a salesman trying to sell a little extra equipment has rescued a company from the huge expense of reinventing some wheel.

You can expect help, but you shouldn't expect him to deliver you indentured servants.

A salesman can also keep you up to date on your own community. Want to know who is hiring or firing? Ask your salesman. Need a good programmer or analyst? Your salesman probably knows one. He probably also knows what you have to pay to get one.

A good dp manager must ask himself whether he has been ignoring this valuable source of potentially important information or services.

A common excuse is that a manager could dissipate much of his time talking to salesmen (not all of whom are very good anyway). A good argument, but one that does not stand up to careful examination.

A man dissipates his time only if he

has not planned a schedule and kept to it. A salesman can easily fit into a schedule if you know: (a) how much time you can spare and (b) how much time he will require. If you can't answer (a) you're in trouble. If you're doing your job well you'll have at least four hours a week to devote to salesmen. Not enough time to fit in all the salesmen who want to see you, but nobody says you must see all of them.

By enforcing the following conditions and prerequisites for all salesmen you will eliminate many worthless sales sessions with worthless salesmen.

1. Require every salesman to be familiar with your business, your company, and the details of your configuration and/or operation.

2. Require every salesman to state his purpose and the time needed to achieve that purpose.

3. Tell every salesman that if he comes you may have a group sitting in who will ask questions.

4. Be ready to listen with an open mind to anyone who meets the criteria.

I can promise you that if these rules are applied uniformly, evenhandedly, without exception you will not dissipate time with salesmen. Salesmen will respect you and your time.

Some of the following suggestions may make execution of the above theory somewhat simpler.

Make sure every salesman can get the information he needs without draining your time. Assume he is familiar with your industry, but give him the data on your company. Among the

things you should supply are a copy of the corporate report, an enumeration of your hardware, a description of your applications and programming languages and any other important information. (I have included a form, Fig. 1, which could be used for this purpose.)

Simply leave a packet of information similar to what is described with

1. List of equipment.
2. Monthly rental. Bundled or unbundled? Use any software packages? How much do they cost?
3. How long have you had the equipment?
4. What is the term of the contract?
5. What are present applications? Languages?
6. Have any plans for new applications or activities? How many programmers? Analysts? Computer operators? Key punch operators?
7. Who is chief evaluator?
8. Who signs contract? Who gives approval?
9. Do you use a consultant? Who is your CPA?
10. Give a statement of your degree of open or closed mindedness (be honest; people respect you for it).

Fig. 1. A checklist of information the vendors need.

your secretary. Have all salesmen pick up the package, study it and then decide whether he deserves your time. If you are somewhat cautious about handing out information on your operation, you might think about arranging short meetings (say 15-20 minutes)

just before lunch or just before quitting time or just before coffee break so your own time will be affected if you talk too long. Twenty minutes should be sufficient to meet the man, inquire about his company, and determine if he should get the information on your company. Alternatively, someone on your staff could dispense this information. Make sure, however, that he is as careful with his time as you are with yours, and be sure he has all the information you will demand a salesman have.

If, after obtaining and studying the facts about your company, a salesman wants a longer meeting, request a statement of his purpose and time requirements. A salesman should have a specific objective to be gained for every call he makes. If he doesn't, he's wasting his own time as well as yours.

Time requirements should be scrutinized carefully. A question like "Can you do it in 45 minutes instead of an hour and a half?" is a good one to ask, because you'll probably get an honest answer. Don't however, be overly stingy with time. Trying to squeeze an hour's presentation into a half hour does not save you time, it only wastes a half hour.

If the meeting produces what you consider good ideas, arrange another meeting during which you will ask questions. But make sure the next meeting occurs at least two days later. That will give you a chance to live with the new ideas, poke holes in them, formulate questions, interrogate other

Vendors

salesmen, and check with those of your own people who will be affected. Of course, you should have a brief question and answer session immediately after the original meeting to clear up misconceptions or misunderstandings.

One key element in the appraisal process we just mentioned is your own people. Tell them—and your salesmen—that they will be expected to participate in evaluating new ideas that affect them. It will help morale. It will keep salesmen on their toes. It will often produce very good expert opinion. If a salesman is trying to get you to revolutionize a particular operation or department, he should answer the questions or objections of the most articulate person in the group most likely to be affected. Facts may come to light which you might never have unearthed. And you will experience a fallout of several other benefits.

Certainly the salesman will come better prepared if he knows he might have to face expert cross-examination. Surely your colleagues will feel more comfortable with your management if you demonstrate that you value their opinions. More than likely you will be making better decisions if you have your colleagues and subordinates truly involved in giving you help.

One important point bears repetition: Listen to any salesman who meets the conditions.

I suggested that the dp salesman is underutilized. What of his comrades in arms, the various forms of marketing representatives? Most dp managers don't get enough useful service from marketing representatives either. Everyone complains that systems men and industry specialists aren't well-utilized. The customer complains they are little or no help. The vendor complains they cost a lot and seem to have little effect in getting new income.

That needn't be the case.

Vendor marketing men are bright, well informed, experienced dp professionals who want to help.

But let's be brutally honest. Just because you buy hardware or software from someone is no reason to suppose he should absorb your work load by providing an extra programmer or analyst or odd job/messenger boy for your exclusive use. You can expect help, but you shouldn't expect him to deliver you indentured servants.

How much help you get from a vendor is largely a function of how good you are at asking for it.

Let's start with your site systems representative. Yes, you have one even if you have an unbundled contract! A vendor will gladly give you some of a systems representative's time if you have a specific task or study to perform which he is better qualified to do than your own people. You can assure that you will get enough of his time to get something done if you:

1. Emphasize the importance of the project.

2. Are willing to commit some of your own people to it (it is important, isn't it?) if necessary.

3. Are ready to accept additional hardware or software if necessary and justifiable.

4. Are ready to ask a competitive vendor for help.

If you meet resistance, ask your salesman for help. He'll provide it, particularly if you establish your intention of asking his competition for help. If your vendor is unbundled, simply offer, quite sincerely, to contract for systems services to perform a particular task if an initial study can prove economic feasibility and desirability. They will be happy to make an initial study, quote a price, and outline the benefits. If it isn't a good deal you are under no obligation to agree. If it is a good deal you ought to take it.

The kicker, of course, is what specific task to designate. Well, you're the manager. You're supposed to know where your problems are. Pick one that is not related to what is clearly

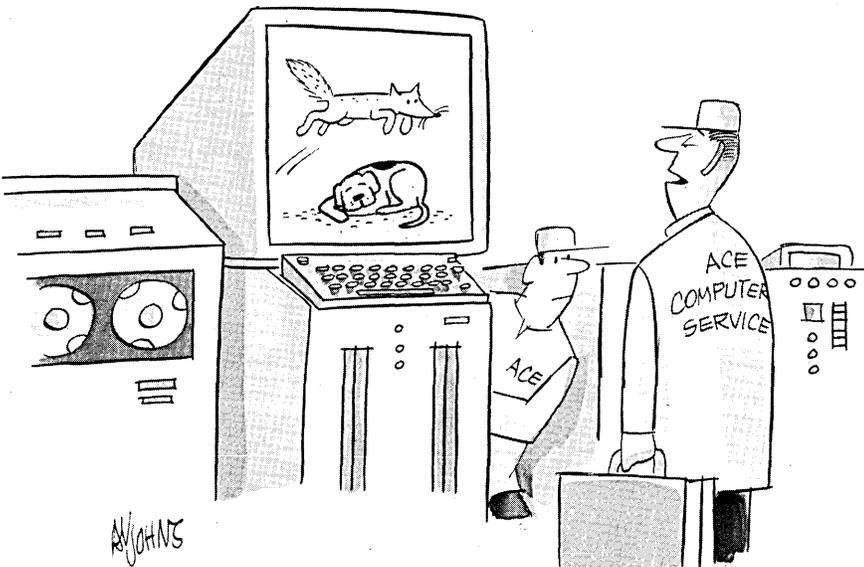
A maintenance engineer, for example, could give you many illustrations of streamlined methods he sees at the sites he services.

your day-to-day responsibility. No program maintenance. No picking up your excess load. Choose something fairly broad and general because that will be the strength of the systems representative. Your own programmers should know your applications far better than he does. But he will know things like how to improve documentation, or streamline operator intervention, or eliminate contention for peripherals or, generally, how to take advantage of his hardware and software.

If you don't have a specific problem but do have a nagging feeling that things could be better, ask your vendor to look over your documentation, your file structures, your equipment utilization, your method of operations or facilities management, your response time or turnaround time—any and everything. You would be surprised how many good suggestions you will get if your vendor knows you want them and will act on them. Ask and you may receive a lot.

And don't feel shy about just asking on an informal basis. A maintenance engineer, for example, could give you many illustrations of streamlined methods he sees at the sites he services. Other vendor representatives could be questioned when they are on site in the same informal fashion.

To ensure you get good suggestions establish two principles:



"O.K., she's checking out fine."

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1. Your vendor will bear responsibility with you for the efficiency of your installation. You and he should have a meeting with the highest possible officer in your company on an annual or semi-annual basis to review what the company is getting for its investment in dp. At that time he should be free either to make suggestions or affirm that things are going the best that can be expected.

2. Get independent verification of those opinions by letting someone else make the same studies—preferably at the same time, to keep disruption of your installation to a minimum.

You can also get help from software specialists, product specialists, and industry specialists.

Each of these gentlemen has important information for you. Your industry marketing specialist can tell you how your installation measures up to the industry in general, what the leading companies are doing, what new applications are available, what directions the industry will be taking—even news about old friends at other companies.

Your software specialist can give you such things as: information on improving multiprogramming performance; suggestions for easing programming loads through new software facilities; shortcuts to random access or overlaying techniques; tips on interfacing to the operating system or a TP monitor. Even if your vendor is unbundled he'll come out and look over your operation and suggest software packages and help you put them in. Just ask for him.

The product specialist can do anything from laying out your TP line network most economically and efficiently to providing assistance with the environmental and people problems of installing crt or other specialized terminals. He has information you couldn't gather in months of study and should be consulted whenever you consider new equipment.

Of course, we mustn't overlook the education specialists. Check your salesman's list of courses. Some might be just what you need. Don't be shy about asking for a specialized course; it can often be worked out.

Just remember that specialists can justify their ample salaries only by giving you the help you need. So take advantage of them. Ask for them and tell them what you need to know. You'd be amazed at what they can provide.

If you use some of my suggested techniques for dealing with your site representative and salesman, you can assume they will already have consulted with the appropriate specialists for your situation, if not actually brought them to your site. If you feel

that their appearance is desirable or that more of their participation is in order you take the following steps:

1. Insist that your industry marketing specialist be included at the annual meeting with your top executive. Impress on him that another industry specialist from another company will also see the top executive. And don't worry about the executive's time. Fifteen minutes is more than sufficient for each vendor to (a) explain what the dp standard is in your industry; (b) describe what the leading companies are doing; (c) pinpoint where you stand; (d) make any suggestions; (e) give or take any praise due you or them. An executive spending anywhere from a hundred thousand to several million dollars a year on dp will devote a half hour once a year to evaluating what he's getting.

2. Establish your readiness to acquire additional hardware or software or systems services if you can see benefits from their implementation that will make an adequate return on the necessary investment.

3. Make it clear that your present vendor has your business because you think you can do the best job with him. Make it equally clear that if someone can demonstrate a clearly better or cheaper way, they will get your business. Mean it!

If you do all these things, your chances of having a model installation are quite good.

If I had to designate the key elements in this scheme, I would single out the accountability to your chief executive, and the parallel studies of the competitive vendor. If you do anything I suggest in this article, make sure it's those two. Most often, successful dp sites are those where top management takes an interest. Give your president a try. He would appreciate an objective, English language appraisal of how his dp effort (that is costing a large bundle) measures up to what is being done around your industry. You might be surprised how readily he will agree to having two independent sources for this appraisal. And 15 or 20 minutes each once a year won't make him think you are taking up too much of his time.

Needless to say, you can use this program to keep the chief executive from being burdened with too many conferences with salesmen. A policy can be established that no one will see the top executive without having studied your company and operation thoroughly. Thus you will keep salesmen out of the president's hair (and the president out of yours, if necessary) and will guarantee that top-level conferences will be productive when they do occur. Enforcement of the policy will be accepted readily if your

organization has a genuinely open attitude toward new ideas, and access to the top executive is granted to those who earn it.

Let's sum up a few rules for efficient implementation of this program.

1. Don't expect free labor.

2. Understand that help will be given to insure the excellence of your installation but more help will be given if it is known that you are willing to

... more help will be given if it is known that you are willing to take action which results in more revenue for the vendor.

take action which results in more revenue for the vendor. Note: You don't have to take such action; just be sincere about being ready.

3. Treat your vendor representatives as partners, not antagonists. They will get promoted if you have a good site so they do have your best interests at heart.

4. Don't be afraid to spend more to get more.

5. Don't be niggardly with praise or gratitude for help given.

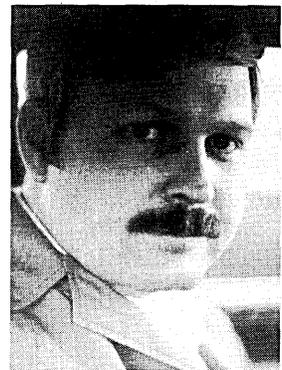
6. Don't be ashamed to ask for help.

7. Don't be too proud to take it.

8. Don't be afraid to have an outside vendor evaluate your shop. Better you hear the criticism with ample time to improve than to fall too far behind to ever catch up.

9. Don't hesitate to involve top management. They want to know if their money is being spent well. They also would prefer criticism or suggestions in time to react accordingly.

10. Believe me when I tell you there are people such as we have discussed. They exist. They want to help you. They are usually good men. Ask for them. □



Mr. Wilson is now an account manager with the Burroughs Corp. Before that he was a computer sales representative for RCA and has also been sales manager for a publishing company. He has a BA in philosophy and an MA in English literature from Arizona State Univ.

A discussion of the several ways of building legal barriers to the unauthorized use of your software package

Legal Protection of EDP Software

by David Goldberg

"The Congress shall have Power . . . To promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries." (U.S. Constitution, Article I, Section 8)

Although the literature is replete with comment on why there should or should not be protection for the proprietary rights in computer programs, and about balancing the conflicting interests involved, that question really is settled. Innovations surely deserve some measure of protection. Our whole concept of patents and copyrights is founded upon it.

The limits of space necessitate merely a summary of the different forms of protection available under present law, dealing to some extent with the advantages and disadvantages of each. Certain pending proposals of significance, both legislative and nonlegislative, will also be touched upon. For whatever it may be worth, I shall conclude with some thoughts on a desirable means of protection.

Patents. Patent protection, which derives from the United States Constitution, is the broadest form of protection available. However, patent protection for computer software presently remains in doubt.

Historically, the Patent Office took the position that software was not patentable, and it issued guidelines to that effect. In a series of cases over the

past few years, the United States Court of Customs and Patent Appeals changed the direction of the law. But the most recent decision of the court, upholding the patentability of an invention directed to a procedure for converting signals from a binary coded decimal form into a binary signal form for operation upon a computer, has been appealed to the United States Supreme Court at the behest of the Commissioner of Patents.¹ The Supreme Court's ruling, which hopefully will clarify the situation, is not expected until at least the end of this year.

Meanwhile, following the recent decisions of the Court of Customs and Patent Appeals, the Patent Office had withdrawn its original guidelines indicating that computer programs were not patentable and began accepting applications for patents. The issuance of software patents appears to have slowed down, and one can only surmise that the Patent Office now is waiting for the Supreme Court's decision on patentability.

Problems of a practical sort nevertheless remain. Patent counsel now are faced with the difficulty of determining what disclosures must be made in the application and what forms they should take. How should the patent claims be drafted and how should the language be framed?

The Patent Office, too, is faced with practical problems. It has been roughly estimated that 10,000 separate pro-

grams are created daily throughout the United States. If patents are sought for but a small percentage of these programs, the flood of applications would surely inundate the Patent Office.

The advantages of patent protection for computer software are obvious. In

. . . one must be prepared for an expenditure of approximately \$1,000 for a relatively simple software patent.

return for the public disclosure of his invention, a patentee is granted a complete monopoly for 17 years from issuance of the patent. Moreover, the invention can remain secret and undisclosed until the patent actually issues.

On the other hand there are also disadvantages to seeking patent protection:

1. The cost of a patent is high. With a minimum filing fee of \$65, a fee for a drawing, legal fees, and an issue fee of \$100 and up, one must be prepared for an expenditure of approximately \$1,000 for a relatively simple software patent.

2. Time is also a factor. A patent normally takes anywhere from two to three years to issue. Until the patent actually issues, one cannot sue for infringement. Although one does have trade secret protection in the interim period, this does not protect against a third party infringer who did not violate any confidentiality, but somehow came upon the invention independently.

This article is an updated version of an address to the ADAPSO Management Conference and Annual Meeting, October 15, 1970.

1. *In re Benson and Tabbot*, 441 F.2d 682 (CCPA 1971), *certiorari granted*, *Gottschalk vs. Benson*, 40 U.S.L. Week 3386 (Feb. 22, 1972).

3. Most programs are relatively short-lived. Of course, if the concept is the key to the program and this concept can be used over and over in many subsequent programs, then this becomes less of a problem. Where the concept is the key, patent protection may be quite useful.

4. When issued, a patent discloses the invention. If foreign markets are significant, the patentee would have to seek patent protection in those foreign markets which are important to him. Otherwise, after a certain period of time prescribed by various international conventions and treaties, those in foreign countries will be free to use the invention.

5. Assuming the Supreme Court upholds the patentability of software, there is no way of knowing how the software patents which are issuing out of the Patent Office in these early years will stand up in litigation when challenges are made to their validity. One should bear in mind that with respect to other kinds of patents, approximately 70% of those which are litigated are declared invalid. Whether software patents will fare as well, no one can say.

Statutory copyright. In days of old, that is prior to 1964, the Copyright Office did not register computer programs. The Register of Copyrights then issued a statement that thereafter computer programs would be acceptable for registration of claims to copyright if the programs complied with certain requirements, assuming that the elements which go into compiling the program are sufficient to constitute original authorship.

There are certain advantages to obtaining statutory copyright:

1. It is simple and inexpensive. The filing fee is \$6, and the only other substantial expense is the cost of two copies of the program which must be filed.

2. If there is an infringement, one can obtain the benefits of the statute, such as the recovery of statutory damages, even if there is no proof of actual damages. Also, the U.S. Marshal can seize and impound infringing copies.

3. If the program is one which must be broadly disseminated to many small customers to be profitable, publication and statutory copyright protection may be a good course to follow.

4. The duration of copyright protection is rather lengthy—28 years, renewable for another 28 years. Of course, this may be academic, for a program may not have any utility for such a long period of time.

On the whole, however, the disadvantages of statutory copyright protection appear to outweigh the advantages:

1. Statutory copyright presupposes

disclosure and a loss of secrecy, because this form of protection does not attach until there is publication or public dissemination with notice of copyright.

2. The scope of the right granted is narrow. Copyright protects only the expression of the ideas in the published work and not the ideas themselves. Copyright will protect against outright copying or dubbing. But it will not protect against a subsequent original work utilizing the same idea or against innocent duplication. Someone who takes the basic idea disclosed by the program and arrives at a different program independently and without copying may do so.

3. Policing one's rights may be very difficult if there has been widespread public dissemination of the program.

4. One further shadow area is whether copyright protects against use of the program in a computer, i.e., the execution of a program, as distinguished from making a copy of the program. There are rather esoteric arguments both for and against, but the question still remains unclear and certainly undecided by any court.

Beginning in 1964, when the Copyright Office began accepting computer programs for registration, the pace of filings was quite slow. In the first six years, less than 200 programs were registered. The situation then changed markedly, and since the middle of

On the whole . . . the disadvantages of statutory copyright protection appear to outweigh the advantages.

1970 over 300 additional programs were registered. This would seem to be a judgment by the industry that statutory copyright, while not the most desirable form of protection, is proving to be of increasing utility.

Common law copyright. Statutory copyright deals with rights in published works deriving from the Constitution and the federal copyright law. Common law copyright, on the other hand, is independent of any act of Congress, and is obtained simply by creating the work. In order to take advantage of this form of protection, the work must remain unpublished.

Common law copyright has some very distinct advantages in the field of software protection:

1. The scope of protection is at least as broad as that of statutory copyright and perhaps even broader. Under the doctrines of common law copyright, actual use of a computer program may be an infringement, for that would violate the author's right to publication and dissemination. Whether use of the

program, as opposed merely to copying it, is an infringement of one's statutory copyright is a question of some doubt.

2. Common law copyright entails no expense by way of filing fees.

3. The term of protection is unlimited so long as the work is kept unpublished.

4. Since common law copyright depends upon very limited dissemination and very tight controls on authorized use, public disclosure is not required and in fact may be detrimental to protection.

5. Policing and administration are relatively easy because of the limited disclosure and dissemination inherent in this form of protection.

6. So long as there is no publication or widespread dissemination of the work, there is no serious question of the validity of this form of protection.

Common law copyright is not, however, without its disadvantages:

1. Care must be exercised to prevent publication, i.e., widespread public dissemination. If the work is deemed to be published and the statutory requirements of publication with notice of copyright are not met, it is in the public domain and without any protection whatsoever.

2. If there is an infringement of a common law copyright, the plaintiff must proceed under state law rather than under a federal statute. He can, of course, obtain an injunction, but in order to obtain monetary recovery, the plaintiff must prove any actual damages he has sustained.

Trade secrets. The most often quoted definition of trade secrets appears in the Restatement of the Law of Torts.

"A trade secret may consist of any formula, pattern, device or compilation of information which is used in one's business and which gives him an opportunity to obtain an advantage over competitors who do not know or use it. It may be a formula for a chemical compound, a process of manufacturing, treating or preserving materials, a pattern for a machine or other device, or a list of customers." (Restatement of Torts, § 757, comment (b) (1939))

There is no question that trade secret law covers computer programs. One who relies upon this form of protection has the right to prevent the unfair taking of his secret. In briefest summary, the elements of a trade secret case are as follows:²

1. The existence of a specific trade secret, and it must be something which is in fact secret.

2. The disclosure to the defendant

2. For a more extensive exposition, see Milton R. Wessel, "Legal Protection of Computer Programs," 43 *Harvard Business Review* 97 (March-April 1965).

Legal Protection

under some form of confidentiality.

3. The unauthorized use by defendant of the plaintiff's secret which causes injury to the plaintiff.

Reliance upon trade secret protection in the area of computer programs appears to be continuing. It is advantageous because it grants broad protection against unauthorized disclosures. It requires no filing fees and maintains the secrecy of the discovery. If disclosures are strictly controlled, adequate policing can be possible. Notwithstanding that trade secrets are governed by state law and not a uniform federal law, there is a sufficiently large body of developed case law so that there is some degree of predictability and uniformity.

The obvious disadvantages are that courts generally do not favor restrictions on the free flow of knowledge or on employee mobility and the use of skills developed over a period of time. There are difficulties in drafting rea-

... courts generally do not favor restrictions on the free flow of knowledge or on employee mobility ...

sonable restrictions and there are difficulties in policing breaches of confidence. Courts also are reluctant to grant protection of unlimited duration. Even if there has been a misappropriation, the wronged person may not be able to reach a subsequent user of the secret who acquired it in good faith and for value. At that point the secret is out.

The more omnipresent problem with trade secrets is the cloud that has been cast upon this form of protection in recent years. In 1964, in what have come to be known as the *Sears* and *Compco* cases,³ the United States Supreme Court dealt with the question of federal preemption which prohibited states from protecting nonpatentable matter under their laws of unfair competition. Intense speculation followed these decisions concerning the effect they would have on trade secret protection.

The cloud grew a bit darker in 1969 when the Supreme Court decided the case of *Lear, Inc. vs. Adkins*.⁴ In one phase of the case, the court was faced with a question concerning the propriety of royalty payments to an inventor pursuant to a trade secret li-

cense for the period prior to the issuance of the patent. The court refrained from deciding the issue, because it had not yet been fully explored by the state court below. However, Mr. Justice Black found himself under no such inhibition. In a dissenting opinion which was joined by Chief Justice Warren and Justice Douglas, he wrote: "*One who makes a discovery may, of course, keep it secret if he wishes, but private arrangements under which self-styled 'inventors' do not keep their discoveries secret, but rather disclose them, in return for contractual payments, run counter to the plan of our patent laws, which tightly regulate the kind of inventions that may be protected and the manner in which they may be protected. The national policy expressed in the patent laws, favoring free competition and narrowly limiting monopoly, cannot be frustrated by private agreements among individuals, with or without the approval of the State.*" (395 U.S. at 677)

The Supreme Court itself has not thus far decided the question. Also, the most direct challenge to the viability of trade secret law was turned back in a recent case in the Federal Court of Appeals for the Second Circuit when it reversed the District Court and held that neither the patent law nor public policy prohibits the enforcement of trade secret agreements, at least where no patent application was filed.⁵

The outlook for trade secret law, while it is beginning to appear more favorable than a year ago, still cannot be predicted with any degree of certainty. If the issue comes squarely before the Supreme Court, as it might within the next few years, the case could go either way. There are sound arguments that this aspect of trade secret law does not conflict with the federal patent policy.⁶ Nevertheless, the Supreme Court may not accept these arguments and may deal a crippling blow to trade secret protection.

However, the courts are after all dealing with a question of federal statutory preemption. What Congress has been deemed to have preempted by legislation, Congress can cure by new legislation. If some of the legislative proposals mentioned below are enacted into law, the problems inherent in continued reliance upon trade secrets will all but disappear.

Even if the *Lear* case is interpreted broadly and trade secret protection generally is circumscribed, it may

5. *Painton & Co. vs. Bourns, Inc.*, 442 F.2d 216 (2nd Cir. 1971).

6. A recent case in the Federal Court of Appeals in California has so held. The court ruled that the Supreme Court cases do not prevent "equitable relief for the misuse of trade secrets by those who are bound by a confidential relationship or by an express or implied agreement to maintain secrecy." *Dekar Industries, Inc. vs. Bissett Berman Corp.*, 434 F.2d 1304 (9th Cir. 1970), cert. den., 402 U.S. 945 (1971).

affect computer programs only slightly. Much will depend upon whether the elements involved in the protection of software are deemed to be within the patent clause of the Constitution, but not within patent statutes as drafted by Congress. If protection of a computer program as a trade secret does not conflict with basic patent policy, there is no reason why it cannot remain as a viable alternative to other forms of protection.

Pending a resolution of the issue, the advantages of continued reliance upon trade secret protection in conjunction with common law copyright appear to outweigh all the other alternatives. Al-

The Copyright Revision Bill makes it perfectly clear that computer programs are unequivocally copyrightable.

though plaintiffs in patent cases appear to succeed in approximately 30% of the situations, plaintiffs in trade secret cases appear to succeed in more than 45% of the cases. If for no other reason, the use of trade secret protection in general seems more advantageous than seeking patent protection.

The difficulties that exist with respect to software protection under existing law should not be minimized. But neither should they be exaggerated and all hope forsaken for effective protection. The law is not standing still, and there are developments in process.

Pending legislative developments. There has been pending in Congress for some time now, a bill to revise and reform the patent laws. As originally introduced in 1967, the Patent Revision Bill excluded computer programs from the scope of patentable subject matter. The present bill (S.643, 92nd Congress) does not contain such a specific prohibition, but it too is not without its ambiguities. Even if the bill is passed in a form which will eliminate the uncertainties about patentability of programs, it still will not resolve many of the administrative problems facing the Patent Office in terms of the scope of disclosures and the framing of claims in patent applications. In view of some basic disputes concerning the patent policy not specifically connected with software, the outlook for passage in the 92nd Congress is bleak.

Copyright revision has a longer history than patent revision. The present Copyright Law dates from 1909, long before computers and computer programs were viable entities. It is approximately 15 years since the current efforts at copyright revision were begun by the Copyright Office. The pending Copyright Revision Bill (S.644,

92nd Congress) is stalled in Congress in large part because of the inability to resolve the vexing problems of cable television.

In 1967, the House of Representatives passed a revision bill, but the Senate failed to act and the bill died at the end of the 90th Congress. The pending bill in the Senate is the House bill, which has been revised by the Subcommittee on Patents, Trademarks and Copyrights of the Senate Judiciary Committee.

The Copyright Revision Bill makes it perfectly clear that computer programs are unequivocally copyrightable. The scope of protection, however, remains unclear.

Many open questions remain about the effect upon the law of copyright of the rapidly escalating technological revolution. This led to a proposal which now is contained in Title II of the Copyright Revision Bill establishing a National Commission on New Technological Uses of Copyrighted Works. The original version of this bill was passed by the Senate only, in 1967. As presently constituted in the bill, however, there is some doubt that the commission would adequately cover

the question of software protection. That it should do so certainly cannot be disputed. Software producers are not presently contemplated as being members of the President's Commission, but there is not the slightest doubt that they should be included.

The federal Unfair Competition Bill (S.647), also pending in Congress, has a history equally as long as that of copyright revision. This bill has had its ups and downs in Congress for some years now, with the major opposition to it presently coming from the Anti-trust Div. of the Dept. of Justice.

The bill would amend the United States Trademark Act by including therein a federal law of unfair competition. One section would create a federal law of trade secrets. The bill provides that any person who engages in an act which results or is likely to result in the wrongful disclosure or misappropriation of a trade secret or confidential information shall be liable in a civil action. Passage of the Unfair Competition Bill would sanction the protection of computer programs under federal trade secret law and would clear the air of much of the uncertainty hanging over the continued efficacy

of trade secret protection.

A National Coordinating Committee, established by the United States Trademark Association and made up of attorneys from several bar groups, is presently working with the Justice department in an attempt to resolve the problems Justice has with the bill.

Non-legislative developments. Various suggestions have been made from time to time for a system of protection for software which is neither patent, copyright, nor trade secret.

Our present patent system is an examination system, where letters patent do not issue until the invention is examined and approved by a governmental body. A grant of exclusivity is then made for the disclosure of the invention. Standards of validity are high, but the scope of protection is very broad.

Statutory copyright is basically a registration system, and the protection granted is limited. The governmental grant generally issues upon registration. Statutory copyright does not have the exacting standards of the patent system, and the level of protection is lower.

Many of the new suggestions and proposals being made for software protection, except for those which urge merely a strengthening of the status quo, all seem to be based on the realization that a level of protection less than patents and greater than statutory copyright is needed. What will eventually emerge from the ferment one cannot know. Two proposals in current consideration merit further attention.

At the American Bar Association's annual meeting in 1969, the Commissioner of Patents proposed that consideration be given to "innovations" which he characterized as inventions of lesser importance, not rising to the level of clear patentability under present law. He called computer software a "glaring example" of this type of innovation. The commissioner invited suggestions and a study of the problems by all concerned, including the patent and copyright bars, the Patent Office and Copyright Office, and hardware and software producers.

Studies are in fact going forward on various fronts. For example, committees of the American Bar Association are investigating various aspects of software protection. The PTC Research Institute of George Washington Univ. has conducted clinics and courses on the legal problems besetting computer software. Also, a Committee on Software Protection has been established by the National Council of Patent Law Associations. Industry and the bar await the proposals one can expect to emerge from all of these studies.

In response to a request from the



"You are springtime, my child, while I am winter, but winter with 2½ million dollars in tax free municipal bonds."

Legal Protection

Commissioner of Patents for suggestions, IBM submitted a proposal to the United States Patent Office in 1968.

The IBM proposal is premised on the fact that most programs do not contain unobvious concepts and patent protection will not encompass innovations not rising to the level of invention. Yet there is a heavy investment in software, much of which goes into making the program work rather than in developing the concept itself.

In brief, the proposal is for a registration system. One seeking to avail himself of the protection would be required to disclose a description of the concept at the time of registration, which will be made public. The applicant would also deposit a copy of the

The IBM proposal borrows something from copyright and something from patents and tries to establish a hybrid system.

program which will be kept secret during the term of protection, set at 10 years.

Liability would be incurred for copying and unauthorized duplication, for the use of the protected program in preparing another program, for unauthorized transfer and for the executing or translating of the program. There would be no liability for independent creation. There would be liability only for knowing acts and not for inadvertent ones.

The proposal contemplates an election of remedies, but the new system would not supersede patent or copyright protection. One choosing to use either patents or copyrights could still avail himself of the protection afforded by those statutes. One choosing to use the new registration system would forego patent and copyright protection.

The IBM proposal borrows something from copyright and something from patents and tries to establish a hybrid system. It provides for a lower level of protection than one obtains from a patent but a greater scope of protection than is presently available from copyright.

The outlook. With each innovation in computer technology, protection has been sought from existing legal forms. No court cases have yet proven that this is the wrong approach. Our common law tradition of case by case development feeds the hope that we can mold existing formats and proce-

dures to fit the new technology while not stifling its development.

I am not optimistic that the existing legal systems of patent, copyright, and trade secret law can be made to accommodate the needs of the growing software industry. While a specific form of protection may be ideal in any one particular situation for any one specialized program, we must at this time look at the situation generally.

Patent protection, though broad in scope, is of questionable validity. Software innovations simply do not seem to me to rise to the high level of invention required by our patent system. Even if the Supreme Court sustains software patentability, I foresee little success for those patentees seeking to sustain the validity of their software patents in the court cases surely to come in the next few years.

Statutory copyright offers a simple and inexpensive form of protection, but you get what you pay for. Given the drawback of required public disclosure, the scope of protection is too narrow to be meaningful except in very limited situations.

As a general proposition, the combination of common law copyright and of trade secret protection still appears to offer the best alternative under present law. But this avenue too has its pitfalls. The difficulties of administration and policing are obvious. Also, the hesitancy of courts to enforce a system of protection which is of unlimited duration must be taken into consideration. The dangers to the continued effectiveness of trade secret law which are lurking in recent court cases are not to be completely ignored, although they may have been somewhat overstated by the commentators. One hopes that the United States Supreme Court will not lightly overturn trade secret law as Justice Black would have had it do. A careful analysis of the recent cases leads to the conclusion that there is a place for trade secret law within our patent system and with respect to software, that there is no real conflict with the patent system. The mobilization of the patent bar against the apparent recent trend to destroy the efficacy of trade secret law may be a meaningful counterweight which will eventually lead to legislation.

Computer software surely is different from other forms of intellectual and industrial property, and a new legal mechanism must be devised to protect it. The most desirable form of protection is one of relatively short duration which limits the need for extensive disclosure, which defines the scope of coverage with precision, and which can be enforced effectively.

The kind of registration system proposed by IBM seems to meet that stan-

dard. While not every detail of the proposal is good, it is surely a giant step in the right direction.

One might also view the new system as a partial disclosure patent. The public disclosure of practical know-how is postponed until the expiration of the patent or other grant of protection, while a description of the conceptual design and object of the program is made at the time of registration or issuance of the protectible grant.

The disclosure of the concept is necessary so that development of other programs is not stifled. On the other hand, the secrecy covering the detailed descriptive material protects the financial investment of the creator and also serves the needs of licensed users. The protection afforded is inexpensive, easy to obtain, and easy to administer. The short duration of protection encourages dissemination of knowledge, yet still provides a reward for innovation. Such a system also has the advantage of providing a more particular definition of the scope of the right protected.

There is ample precedent in our law for treating computer programs specially and not forcing software to bend and twist to fit the mold of legal mechanisms designed for other purposes. For example, phonograph records are treated somewhat differently under the copyright law than are other forms of intellectual property. Asexually produced plants are treated specially under the patent law. The pending design legislation combines elements of both patent and copyright in a new form of registration.

Computer programs also deserve separate treatment if that will serve society and the industry best. I submit that it will. □



Mr. Goldberg is a partner in the New York law firm of Kaye, Scholer, Fierman, Hays & Handler. A graduate of the Yale Law School, he practices in the fields of copyright, trademark, and unfair competition law. He is active in various bar groups in this field and presently is serving as chairman of the Committee on State Trademarks of the American Bar Association section of Patent, Trademark and Copyright Law.

A forecast of the characteristics of computer systems, peripherals, and software during the latter half of the 1970s

The Next (and Last?) Generation

by Frederic G. Withington

The pace of technological evolution in the computer field is as fast as ever. Indeed, it may be accelerating: probably more new computers and computer-related products appeared during 1970 and 1971 than in any comparable previous period. Apparently new generations of computers will continue to appear. The technical staff of Arthur D. Little, Inc., is frequently called upon to forecast technological developments in the various component sectors relevant to computer systems and to advise system manufacturers' product planners. This article contains a distillation of our current thinking, and a view of what the result will be as realized in the computer systems of 1975 or so.

Fig. 1 forecasts the cost of computers (central processors and memories only) during the 1970s. Three bands are shown: large computers (which today cost about \$1 million), small but complete business computers (today costing about \$15,000), and the least expensive minicomputers (today costing about \$4,000). The large computers of 1980 should cost no more than one tenth as much as comparable machines today, because of the extreme drop expected in the manufacturing cost of electronics for both logic and memory. Larger machines than these will exist, costing more, but their power will be so great that few users can be expected to need them. The smaller computers can also be expected to decline in cost, though less sharply; a factor of approximately five can be expected. Late in the decade low manufacturing costs for monolithic circuits will make possible memories cheaper than any today (two cents per bit) with high performance by today's standards, while the highest performance memories will offer cycle times well under 100 nanoseconds.

Fig. 2 (page 73) forecasts the trend of random-access mass storage devices, probably as important as the computer trend for most users. It shows cost per

bit as a function of time; average access times are assumed to remain tens of milliseconds (though the more exotic devices may—late in the decade—be much faster).

Rotating magnetic devices today dominate the field, and we believe they still have considerable improvement potential (perhaps another fourfold increase in packing density). A host of new technologies are in development, however, including magneto- and electro-optical technologies, lasers, magnetic bubble and holographic approaches. Each of these has its problems, and in each case after cost-effective devices have been produced new software and system approaches will be required to exploit them. We therefore doubt that they will seriously challenge magnetic devices for another five years, but in the latter part of the 1970s the tremendous performance

may at best cost one half as much as comparable devices today (in constant dollars). The devices containing a higher proportion of electronics are likely to show greater improvement, however: these include nonimpact printers, cathode ray tube terminals and optical character readers. We believe each of the latter will decline in cost to such a degree that they will be considered inexpensive options for modular terminals. Some manufacturers' announcements already foreshadow the result: a terminal subsystem based on a versatile minicomputer; incorporating small discs, cassettes (eventually monolithic stores) for data retention; employing a crt display and keyboard either for regular use or for system control; several levels of printer; and optical reading modules for data entry and also for facsimile transmission and even office copy. Such ter-

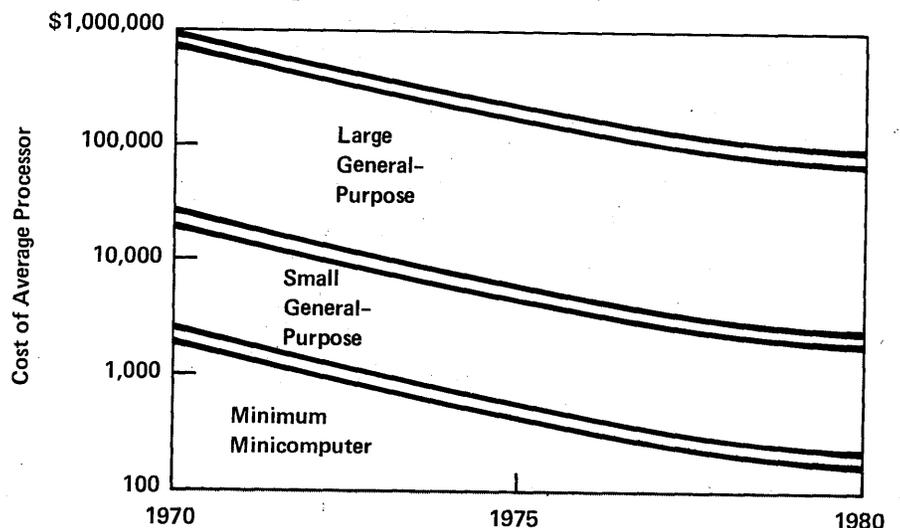


Fig. 1. Cost of Central Processors

improvements they promise should be realized in one or more of the competing technologies.

Highly mechanical input-output devices (impact printers, tape drives) are already quite mature and are unlikely to improve a great deal: in 1980 they

minimal subsystems will combine in surprising ways the functions of data processing with those of today's office machines, and will probably cause considerable change in today's office routines.

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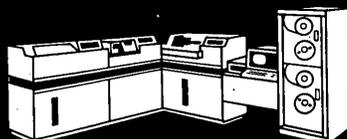
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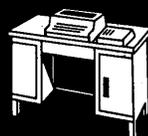
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Next Generation

technology will be of only limited value if they are not matched by improvements in software and system design. Indeed, most users' problems with advanced information systems arise more from inadequate software than from any shortcoming in the cost-effectiveness of the hardware. It is therefore of at least equal importance to review the improvements to be expected in software and computer system design.

Perhaps most important, machine independence of programming and operations seems likely. Procedure-oriented languages are already nearly at the point where any program can be compiled and executed on a wide variety of machines. Data management languages have not reached this state but are advancing fast; they seem likely to reach maturity within five years. Command languages (by which computer systems are directed in the operation of completed programs) are still in a primitive state, but the manufacturers have become aware of command languages' importance and are working hard on improving them. Command languages can become machine-independent when the system is capable of automatically scheduling itself and allocating its resources to meet the commands given it; a standard command language can then be applied to any system. A few computer systems already approach this capability, and all may be expected to.

Among their operating system functions, the new machines are likely to offer completely automatic tools for file, communication and input-output management. Completely general methods of performing these functions are already known, but they are rarely used unmodified because of their extreme inefficiency. The general methods are likely to become more sophisticated and efficient. More important, perhaps, the cost-performance improvement in the machines will render the inefficiencies more tolerable. It should be possible for the user of the late 1970s to employ computer systems without ever "lifting the hood"; without knowing (for example) how his files are structured or indexed, or what the machine is doing at any given moment. Of course, those who want to optimize their systems' performance will continue free to do so.

On-line information systems demand a higher level of equipment availability than was needed for batch processing systems; in the worst case, the organization must stop functioning when its machine is down. It seems that the best ways of attaining the re-

quired reliability will be found in improved system designs rather than just in component reliability improvement. IBM's 370s and Burroughs' 6700 incorporate diagnostic programs which intermix with the normal job stream. When these are combined with multiprocessing and an automatic self-scheduling capability, we have systems that can truly "fail soft": diagnose, cut out and schedule around any failed module without interrupting operations and continue to function, though

be eliminated. The self-scheduled system can accommodate the necessary interrupts: in fact, the data entry and inquiry functions merge (as they already do in an airline reservation system). Lower data entry cost and improved responsiveness appear to be arriving together.

How will these technological and systems improvements be combined into the next generation of computer systems? We think the more advanced systems of today point the way clearly,

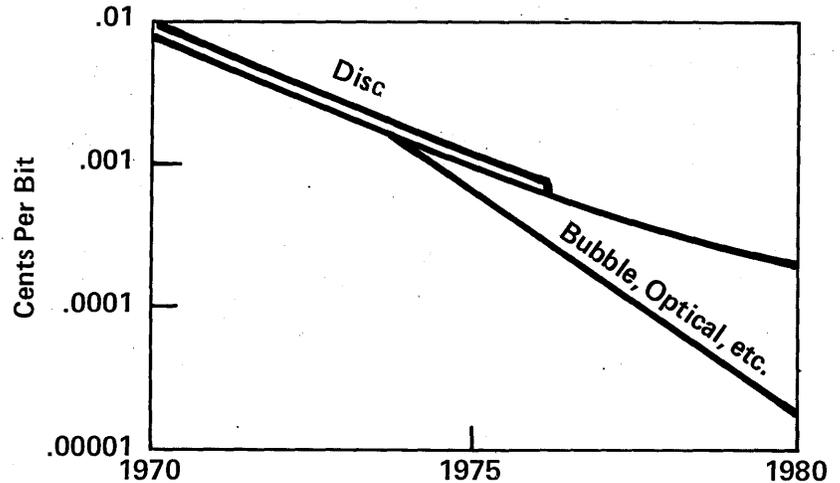


Fig. 2. Cost of Mass Storage

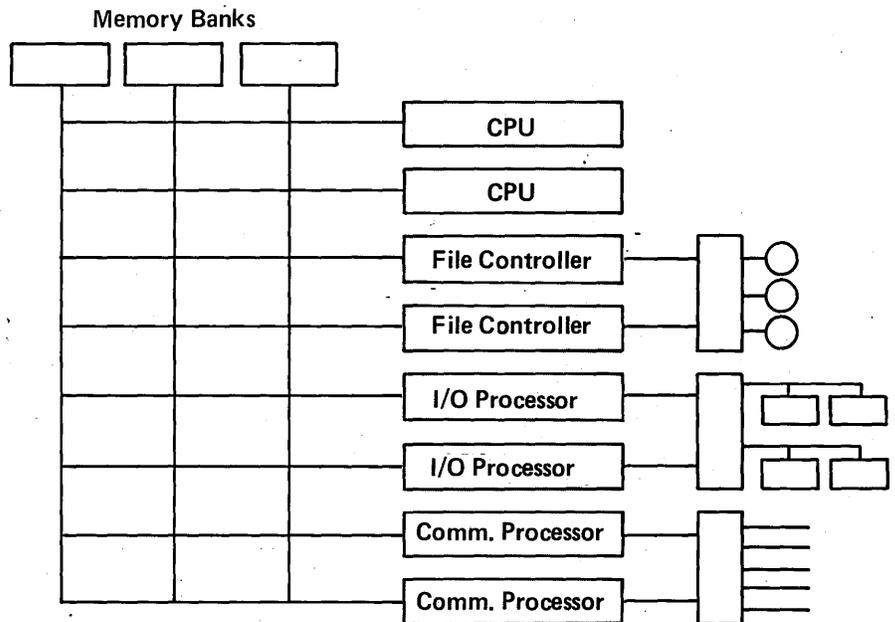


Fig. 3. Components of Network System

at a reduced performance level.

Finally, there is a ferment of new ideas in data capture and data entry. In many cases error control can be assured if the original entry of a transaction is immediately compared to the record to be updated, to a catalog of items and prices, to range and reasonableness guidelines, or to a combination of these. Where this can be done, the costly key verifying operation can

and that the next generation will have the following characteristics.

Fig. 3 depicts the system (called a "network system" for convenience) as it appears to the user. It operates entirely in higher level languages, and is entirely self-scheduling and self-organizing in the sense of memory, file and communication management. All stimuli presented to the system (run requests, inquiries, transactions for

Next Generation

posting, program compilations, report requests) will be received by a conversational scheduler, which verifies the acceptability of the stimulus and schedules the required operation. The conversation with users will be conducted primarily in an improved command language, simpler and closer to English than the present primitive command languages. New programs, report specifications, etc., will be stated by the users in improved versions of present programming languages.

File organization, memory allocation, linking and all other internal system management functions will be conducted by automatic, universal methods; the user will have no knowledge of the location of data or the detailed status of the system except through monitor programs. This will be inefficient, but the use of hardware assists such as virtual addressing and stacks will improve the efficiency, and improvements in the price-performance of memories and processor electronics will help. The ambitious and skilled user will, of course, have the opportunity to optimize the system's internal operation.

The system will be configured so that it cannot be incapacitated by any single element's failure, and diagnostics will be run automatically to detect failures. Detection of a failure will cause automatic rescheduling so that operations on high priority jobs can continue without pause at a reduced rate.

Stored logic will be used extensively to perform these automatic functions without intolerable loss of efficiency, and will also make possible versatile emulation of past generations of software and hardware—conversion pains should have dwindled to mere twinges.

The peripheral equipment used will (through 1975) consist mainly of improved versions of present devices. The bulk of them will be at remote locations, because fast-response processing will be the primary justification for such systems. In addition to conversational and remote batch terminals we believe there will be widespread use of satellite systems: small (under \$5,000 per month) but fully equipped modular systems used most of the time for local processing but connected to the central complex and serving when necessary as terminals.

Fig. 4 depicts the kind of equipment we believe will be employed in the central complex of such a system. Interleaved, separately powered memory banks (for both speed and reliability) will be connected via a network of busses to numerous processing mod-

ules. Two or more identical computers will be used, each relatively inexpensive. Any one can arbitrarily be designated to run the scheduler, which will function whenever a new stimulus enters the system to generate queues of interlinked task descriptions that the various processors call upon asynchronously for instructions. Two or more independently programmed input-output controllers will handle local peripherals; communications processors will deal with remote ones; and file

tion cycles" we have become familiar with should end, and orderly evolution should become the rule.

The user's personnel problems will also be eased. If he is willing to use the methods built into the system he will no longer need system software specialists (though they may often pay their way by achieving higher efficiencies through optimization). Programming will also become easier; programmers will have less to think about in the way of machine constraints, and their indi-

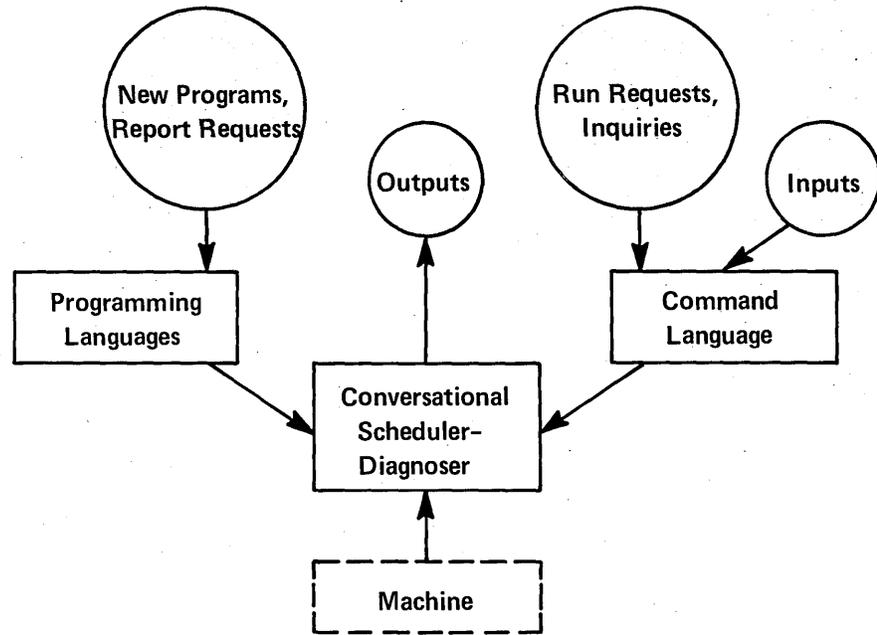
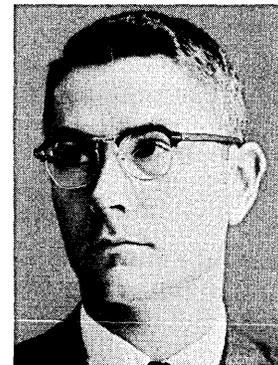


Fig. 4. User Interaction with Network System

controllers will handle file building and reference (the functions of these controllers will probably be combined into multipurpose units of lower speed for less expensive systems). In general, the emphasis will be on the use of multiple relatively low cost units distributing a large workload in parallel fashion, rather than on single fast, sequential units. However, batch applications with lower reliability requirements can still be served adequately by single modules.

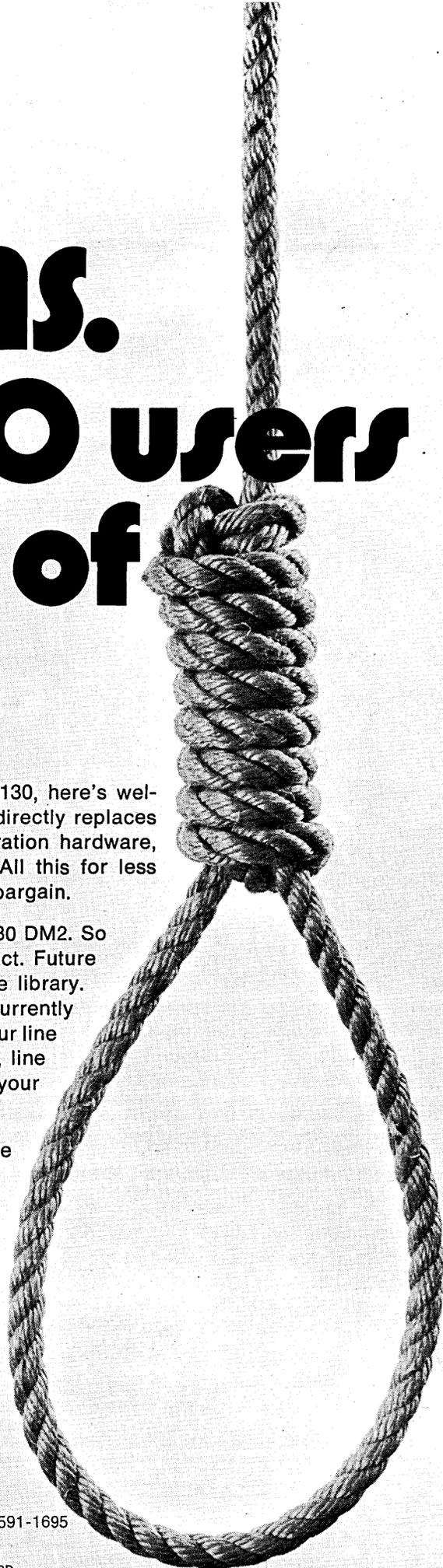
The user will probably pay as much for such systems as he does today for systems with comparable throughput; the brute force automatic methods used will offset the lower component costs. However, implementation of advanced information systems should become much easier. Independence of program modules from one another, from files, and from equipment configurations should be complete; evolution of the information system will be facilitated. The same should be true of the equipment. The operating system will permit the network of processing modules to be widely varied; the user will be able to add, subtract, and upgrade them individually, without undergoing the pain of a conversion. The "genera-

vidual programs will be more independent. Even system analysis will become a little easier. The systems will accommodate evolutionary change easily, and the costs of adding a forgotten function or superseding an old method will be much lower than they are today. The man-machine interface will have shifted a little closer to the man. □



Mr. Withington has been with Arthur D. Little for over 11 years as a data processing consultant. He was previously with Burroughs Corp. and the National Security Agency. He is a Datamation contributing editor and has published two books on the use of computers in business; a third is nearing completion.

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CIRCLE 52 ON READER CARD

An introduction to the strategies, gambits, and countergambits that make buying and selling software such an interesting game

Buyer Vs. Seller: Software Packages

by Larry Welke

Anyone who is a regular reader of this magazine has, by that virtue, read more than half of all the published material on purchasable software.

That makes you a sophisticated audience and therein lies the challenge of writing the following. Your interests, no longer being mundane, are directed to a higher level of concern. Consequently, I have the privilege of not doing something that I've wanted to not do for two years, namely, to not present a Checklist for Buying and Selling Packages.

To date, thirteen (13) separate (but non-distinct) checklists have been published in the trade journals; thousands more undoubtedly lie somewhere deep in the troubled hearts of every systems analyst.

Rather than a checklist, let's talk about some typical situations that arise. Because of my company's day-to-day involvement in software marketplace activity as a third party, we have been able to categorize and classify the more commonly occurring practices. First, several typical situations or problems of the buyer; then several of the same from the seller's viewpoint.

Let me start, then, with the case

where your friendly software salesman's package pitch is "reference sell." When he enters this phase, please note the dilation of pupils and the frantic manipulation of limbs as he relates how the three largest banks in the world plus one in North Dakota have

Management hysteria has established an impossible schedule for a new application . . .

all bought his program. If he is a good salesman he will imply, indirectly, that they are the largest because they use his program—or that they would all be in North Dakota if they didn't use it.

Your reaction to his frenetic expositions must be either total belief or absolute disdain. Anything in between and he has won the point. Regardless of who wins the point, however, your position will be awkward until you can counter his claim. One way is to tell him anyone can install a good package, no one can install a poor package, but some can tolerate a mediocre package. Then ask for the names of two bad installations of his package. Odds are

you will have caught him with his commission plan showing and the names will tumble out without protest.

On the other hand he might deny ever having had a bad installation. In this case, ask him the price of his product. This is a simple maneuver that gives the appearance of your having dropped your guard. In actuality you have lulled the salesman into a false sense of security.

A good software salesman has been taught to not reveal his price until his sales arguments have been completely presented. A bad salesman has been taught the finch method of pricing. Neither of them likes to talk about money if they can avoid it.

The finch method, by way of explanation, goes something like this:

The salesman finishes his most salient sales point, usually with flourish and flip-chart, completely hypnotized by his own magnificence. The prospect glances casually at the salesman and asks the price of the package. The salesman's eyes narrow as he looks about nervously, checks the room for electronic bugs, quietly closes the door and says, "Uh, \$10,000?" (The key word here is "?")

The prospect now has two alternatives: if a student of Machiavelli, he would say: "\$10,000! That's outrageous! Why a junior programmer on out staff could do that job in 60 days-" Whereupon the salesman adds: "But if you buy my package, you'll also get seven systems people for life, I'll take you to lunch the second Thursday of every month and you can use my false beard while attending the Spring Joint Computer Conference."

On the other hand, the prospect could have responded with: "\$10,000? That's not bad at all; it sounds like something we need." Whereupon the salesman says: "That's for Phase I."

What can be said of the seller's problems? Possibly a few examples will balance the scales.

One typical situation occurs when, no matter what the seller offers, the prospect wants more. The seller has offered object deck, complete documentation, and a one-year warranty. The prospect suggests source code and a two-year warranty. The seller finally agrees, whereupon the prospect allows that the system is no good anyhow because it isn't on-line.

Another case occurs when the prospect is up against the wall. Management hysteria has established an impossible schedule for a new application, six programmers have quit to form a commune in New Mexico, and the new systems analyst he just hired has been apprehended for child molesting. Under the circumstances, the prospect will accept anything and the salesman appears to be a knight in shining armor.

This situation will end in disaster. The prospect is not saying "Give me anything you want to"; he's really saying, "Help." He's not laughing; he's gasping for air. Failure of the seller to recognize the truth of this situation will cause all kinds of problems later. While the frequency of crisis sales is decreasing, too many of them still occur.

By far the most common occurrence in the software marketplace probably will someday find its way into the Harvard "B" school curriculum. The situation is simply one of the computer user not being interested in purchasable software. Some users can validly excuse themselves from the software table; the ones I'm referring to, however, have all the problems of high operating costs, late project schedules, a shortage of qualified staff, and a tight budget.

Their approach to purchasable software assumes the posture of seriousness—but in reality they are tire-kickers in prospects' clothing. And they have in some instances become professional in their efforts, with support staff,

rank and title.

Please don't misinterpret; I am not faulting evaluation of software products, per se. I am faulting evaluation, however, when its objective is to prove in-house programming to be superior.

There's a way to avoid this case. Separate your programming and systems staff into two groups. Make one responsible for maintenance programming and the other responsible for new application development. Then put package evaluation under the control of the maintenance group. Now, every time a new project comes up, have

... a substantial difference between reducing the risk of purchasing and determining the value ...

both groups bid on it—and hold each accountable in the future for their bids and their performance.

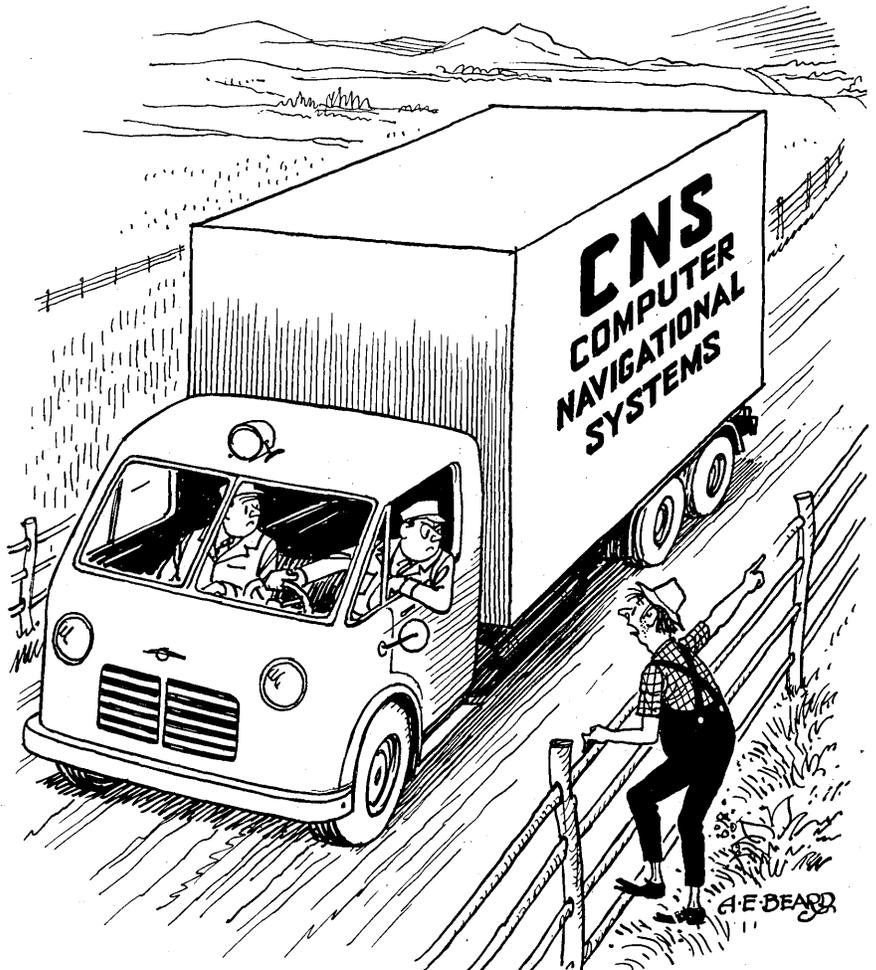
If you can successfully structure this organization, you will have introduced competition into your data processing department. That's a missing—and important—factor in most dp situations. Management then no longer needs to worry about the make-or-buy decision on software; it then takes care of itself.

After all, buying software is like buying anything else: the buyer is taking a risk whether he's buying a car, a house, two pounds of Roquefort, a raffle ticket at the Rotary Club picnic, or a payroll package.

Whether consciously or not, as buyers, we've devised a complex system of hedging against any of these risks. The actions we take—or in some cases, the motions we make to give others the impression we are taking action—are designed to reduce the risks inherent in making a purchase.

Regardless of the technique or approach, the important thing is that there are prescribed methods, accepted by most, which are exercised to reduce the risks of buying. Not all of them work; not all are valid; some are totally unscientific and most have little if anything to do with determining the value of the thing we are buying.

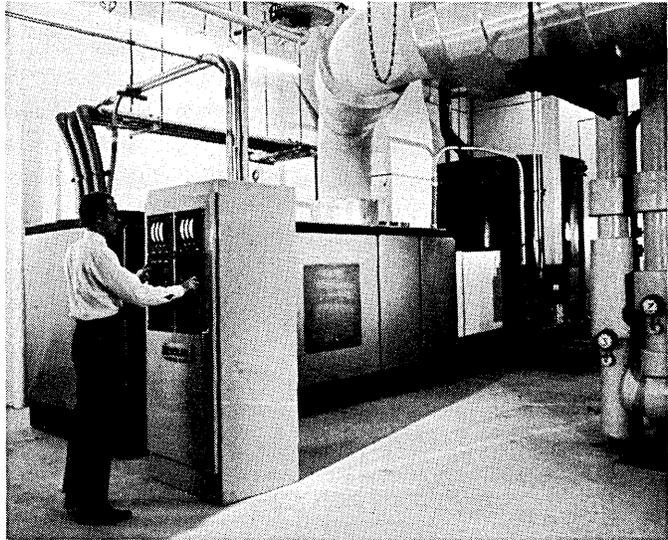
It's important to realize here that there can be a substantial difference between reducing the risk of purchasing and determining the value of an intended purchase. When there is an established marketplace, as there is for cars, value can be measured on the basis of what someone else will pay for the same item. But for software, value



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	TYPICAL COMPUTER REQUIREMENTS	TYPICAL SOLAR PERFORMANCE	
		STEADY STATE	SUDDEN APPLICATION OF ¼ LOAD
VOLTAGE DEVIATION	±8%	±1%	-5%
FREQUENCY DEVIATION	±.5 Hz	±.15 Hz	-.5 Hz

used successfully in a wide variety of computer installations. Steady state performance is free of dips and spikes. Sudden application of up to ¼ rated load can be absorbed without exceeding the ±.5 Hertz *steady* state frequency tolerance required by many computers. There is no bumping of equipment off line.

Result: information from your computers is never plagued by extreme power fluctuations that can mean re-work or breakdowns in schedules.

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Buyer vs. Seller

is measurable only by the potential buyer, independent of what any other user might pay. Value depends on one user's needs and situation, not on his neighbor's opinion. On the other hand, a software buyer might well seek another's opinion in an effort to reduce the risk of purchasing.

Buyers face any of four possible losses when they buy a software package—and it is these possible losses that they must hedge against.

1. There is a potential loss of time. Maybe the package cannot be installed according to the predetermined schedule; possibly additional staff time is necessary to convert or control an unanticipated function or event; or training could be unexpectedly complex.

2. There is a potential loss of money. A package that doesn't fit a need; unanticipated modification, etc. The list, as most know, can be endless.

3. Loss of ego. Sooner or later, a bad purchase has to be explained to someone, often to your superior. No one likes to admit having made a mistake. The importance of ego loss should not be understated nor misunderstood.

4. Hazard loss. Certainly this is not applicable to all software packages, but it is possible to "blow the system," or at least a file or two, under some conditions.

The question is, then, what can software buyers do to reduce the risk of encountering any or all of these losses? His actions must cover both sides of the coin. On the one hand, the buyer must prepare his own shop, inform his employees, identify his needs, and all those other things that put him into the position of being an aware buyer. Of non-successful software purchases, more than 40% still involve problems that could be laid at the feet of the buyer.

Then, to cover himself in his dealings with the seller, the software buyer has several alternatives. Again, some are valid methods of hedging and others are just so much arm waving. The following are "risk reducers" that can be used.

Endorsements can be had from friends, industry leaders, consultants and other sources of information. Whomever it comes from, an endorsement accomplishes the all important task of widening the responsibility of decision.

Reputation of the seller in any buying activity is important. In software, the difficulty the buyer faces is in knowing who the brand name belongs to. We asked a group of 10 people—all software purchasers—to identify and

sequence by total sales csc, MSA, Computeristics, Computerwares and C³. Not only did everyone fail, six of the respondents could not identify three or more of the named firms.

Free trial periods, for other than application programs, have proven to be an excellent means of reducing risk. That's like test driving a car, or getting the first bottle free. The prospect can examine the product firsthand and maintains his right of refusal. (However, one man we talked to is no longer willing to accept a software product on a free trial basis. He feels he is devoting his time and money to proving something the seller should be able to prove.)

Money-back guarantees are not applicable to many programs because the implementation is the bottom of the iceberg, and the package only the top. Even where they are applicable, they are seldom used. People seem to take a dim view of this gambit, as if software were a product a cut above such mundane commercialism.

Selecting the most expensive product is a possible hedge in software pur-

Selecting the most expensive product is a possible hedge . . .

chasing, as is avoiding the least expensive product.

The number of other users of a software product is a useful hedge. It's a variation on getting endorsements and sometimes used as an excuse for creating a program in-house where the prospective buyer is chary of playing pioneer.

Documentation quality is becoming a recognized method of reducing risk—more so than one might expect. There still are no standards for documentation but the user today has a better idea of what he needs than he did two years ago.

Comparative shopping will at least allow the prospect to feel he has reviewed the field. It's a comfortable feeling—and can be done inexpensively, with great reward.

There undoubtedly are more methods of reducing risks in buying software than those listed above. What they are and when they are used will depend on the strategy being used by the buyer when he perceives a risk in his activity. Again, several strategies are available:

1. Probably the least sophisticated—or the most desperate—is to merely take the risk and absorb the loss if it occurs. No one likes to do this and it will probably occur only under crisis conditions—that is, when a package must be purchased due to deadline, schedule, lack of manpower, etc., and

when the seller has not offered a hedge.

2. The most likely alternative is to hedge the risk being undertaken by using what we've termed risk reducers above. The purpose is to either substitute one type of loss for another that is more palatable, or to actually reduce the risk by lessening the probability of failure when the product is put to use. In the first instance, the prospective buyer might foresee an ego and money loss but offset them by having the seller commit to a support and maintenance clause that would eliminate the ego loss and minimize the money loss. In the second instance, the buyer might ask for a free trial period or a demonstration, which, assuming successful completion, would reduce the chance of failure.

3. The last alternative—the one occurring quite frequently in the case of software—is to merely postpone the purchase. To not buy is a viable strategy under certain circumstances—like retreat during war or not bidding in a card game. There are times when it is the right thing to do and times when it is the only thing to do. There are also times when it is the easy way out. But it is also the seller's responsibility to make purchasing his product the easy way out.

All of the above should be of interest to both buyer and seller. If you have been hesitant in buying software, it's to your advantage to examine your status and available strategies. Every purchase action should have a purchase strategy—that makes it fun and intelligent. Not all sellers offer opportunities of hedging on the risk of purchasing their software but maybe you can convince them to do so; a potential sale usually has a powerful influence on a seller's behavior pattern. □



Mr. Welke is the president of International Computer Programs, Inc., publishers of the ICP Quarterly, a catalog of program products. The company also offers seminars, consulting and market research on the same subject. He was previously vice president of data services for Merchants National Bank & Trust Co., Indianapolis. He has an MA in economics from Marquette Univ.

They don't talk about it, so no one knows for sure how many Computermen want to get out of the business. For those who do, escape requires planning and tactics

Getting Out

There are at least two reasons Computerman looks for a way to get out of the business—besides the obvious one of declining opportunity during the business recession. Computers no longer interest him. Or he begins to brood about an arbitrary limit which he feels has been set on his advancement.

In the first case (see the Doug Gaidry story), Computerman drifts out of the industry in much the same way that he may have drifted in. What was once exciting—more exciting than whatever else he was working at—is no longer exciting. It's not fun; it has become routine.

The second reason (see the Midwestern Director quote) is a bit more complex. One of the best explanations of it, brutally unflattering, is Antony Jay's in his book *Corporation Man*. Jay develops the idea that modern corporation man is a hunter who goes out each day to face the perils of the hunt. He stalks his prey, kills his game and brings it back to the camp. To do so he forms "ten-groups," similar in size and purpose to the ancient tribal hunting bands. Jay says that man's primitive instincts as a hunter really run modern business.

Then Jay says something that is hard for Computerman to live with, in some instances. "Every modern cor-

poration has its camp in addition to its hunting bands. It contains all those who are not actually devising, making, and selling the product that brings in the money . . . However devoted their efforts, however valuable their contribution, the members of the hunting bands look on them as the 'women and children' of the corporation." Some Computermen do not want to be with the women and children.

Once having established residence in Computer City, however, it is not all that easy to move out. But if you decide that you want to, there are certain things to learn, ways to act, tactics to use. From our conversations with those intending to move on, here are some of the attitudes we uncovered:

1. The potential escapee must learn to allocate his time and his interests carefully. Frankly, he must learn to get the data processing/computing done with a minimum of effort. That brings in the immediate bread. But the important effort he makes, the major use of his time, the real focus of his attention must be in a direction away from computermanship. If it's business that attracts him, he must learn all there is to learn about some business—girders, girdles, garbage, whatever.

2. If there's one strategy that's a

loser, it's the attempt to put a computer twist into every project, every problem, every discussion. Once having made up his mind to split, Computerman must keep his expertise to himself.

Take the case of Dr. Robert G. Brown, for example. This New Jersey consultant started in computing (circa 1950) by writing a simulation in binary for the SEAC at the Bureau of Standards. In the 50's he wrote SOAP and FORTRAN programs. He's managed a data processing shop—at Arthur D. Little, Inc. Today he has a terminal in his home and uses any one of a half dozen computers scattered around the continent for research on advanced decision systems. You would have to say that he knows computers, that he's logged a lot of hands-on time.

But his clients know him as the man who's written three books about inventory management, the former industry consultant from IBM, the former vice president for operations for Curtiss Wright, the inventory management pro. Bob Brown uses computers, at home, but he talks about his clients' interests—which have little to do with computers.

3. If you hope to change jobs—but stay with the same organization—remember that you are always on display. Make sure that you're seen by the

people who can give you a shot at a new career. The idea is to spend as much time as possible—all the social time—with the guys who do the thing you want to do. If it's marketing, eat lunch with the marketeers. Become one of their gang.

4. Don't jump into a situation unless you're sure it's going to be interesting. If the new arena isn't fun, then there isn't any point in jumping. That doesn't mean that the new arena will be trouble-free. But if it's fun, the trouble won't matter. Chi Cheng, the world's fastest woman sprinter, was able to say, "I love the running, just the running, nothing else, not the records or the medals or the winning. I want these things, but it is the running itself I want most."

The change, itself, may hurt. As one vice president in insurance put it, "Sure, there's a lot of room for those bright guys in computers to move into the rest of the business. They'd do well, have great careers. But they're so darn expensive. They've priced themselves out of consideration." You may have to make short-term sacrifices for long-term gain.

5. At all costs the potential escapee must avoid having a label attached to him. Computerman, without even trying to, manages to attract the label "technician" or "mechanic." He does it by the way he talks, true, but mainly he does it by not talking about the things that interest non-computer people. As one vice president put it, "We must remove the information systems man from the language and mechanical shell he has put himself into."

Remember that airframe designers

and builders think that airframes are important, supermarket operators think that stores and customers are important, insurance men think that policies and premiums are important. They all think that computers are tools—and you just don't pay that much attention to tools.

6. We thought Bob Brown presented a good career plan—although it must be modified according to your present career stage.

"My uncle once suggested three phases after college, which I have used and found to be good. For the first 10 years, you are young, mobile, with minimum encumbrances, and no real education. Take on every possible job, move from field to field, get experience as broadly as possible—to find out what you can do well, and what you enjoy. The second 10 years, get depth and competence in the one or two fields that are your bag. Keep learning whatever is necessary to become better

at 'your thing' than anyone else is. During the third 10 years, get a reputation for being good at your thing—develop staff and organization to follow on and build on it. Finally, you can sit back and take credit and the income and the glory from success, until you retire."

7. If you are now a well-paid dp manager, the chances of making a useful change may be small. The men about you are willing to believe that a manager is a manager when it comes to moving someone in from the outside to do your job. But the interchangeable nature of managers seems to disappear when the head man asks to be considered for something outside the dp department.

As one highly paid manager says, "I have an MBA and 12 years of experience in finance and accounting. But I switched to data processing in 1959, I've worked in that field since then, and that does it. I'm a computernik." □

With the women and children . . .

"I know there are important arguments that correctly support the idea that computer technicians should not try to run the company—but I want to be counted among those who feel that the managers and users have failed the computer far more than the computer has failed them.

"I know of no dp manager yet who has become president.* When it happens, I want to study closely the general theory under which that company operated. It is not going to happen in

any of those I am acquainted with.

"I once thought data processing—the information manager—was the road to the top position. I think now it is an isolated road, perhaps a favorable route to a reasonably high corporate level, but strangely dead-ended."

—MIDWESTERN DIRECTOR OF
MANAGEMENT INFORMATION SYSTEMS
(50, an MBA, earning \$25K)

*Some have—but they have been either transient managers who came to Computer City from some other activity, stayed briefly and moved on, or experienced marketeers whose forte was salesmanship and not computermanship. □

It used to be more fun . . .

Douglas W. Gaidry learned about COBOL, FORTRAN, 7090 Assembly Language and heuristics at MIT—before he graduated in 1962 with a BS in industrial management. He started his career as a Computerman with TRW Systems as an \$8K programmer/analyst working on management systems.

Within a year, he was in the Army—but that wasn't all bad. By day he worked at the Computer Systems Directorate, across the street from the Pentagon. At night he worked at contract programming for, among others, Woodward and Lothrop, the department store.

When he went back to TRW Systems in 1965, he was an \$11K Computerman. He moved to Ft. Lauderdale, Fla., in 1968, leaving behind a record of accomplishment in programming—and relinquishing an \$18K income.

In Florida, Doug, his brother-in-law (also ex-MIT) and his father set up

Enterprise Systems Programming Co. The company's particular bag was the automation of real estate title searches, a highly specialized and fiercely competitive field. In 1970, having failed to secure adequate sponsorship from a large title insurance company, ESP bombed out.

Doug Gaidry is now a full-time law student, a part-time real estate salesman.

How does he feel about leaving the dp field? He hasn't missed it at all. It really isn't very exciting any more. "The way we used to do things wasn't efficient—but it was more fun."

Was being a Computerman a waste of time? Not at all. "I'll have some background that will keep me from being taken—as a citizen and a consumer. Another thing, you can do the same damn thing with the law that you can with computers. You have to analyze problems in law the same way

you'd attack a systems problem. You consider all of the possibilities and you follow each one to some kind of logical limit. You try to optimize the solution."

Looked at this way, those of you who want to leave need not feel that your experience is so much time wasted.

Why did he go into business for himself? For one thing, he expected that eventually there would be financial rewards. More important, it was satisfying. *He* had control of the strings. Finally, he didn't have to deal with dead wood. "The dp types I've run into (other than a few who had interesting backgrounds and had done more than just computing) are pretty dull. They're guys who wear white socks, are very dull and unimaginative, and do a lot of work, but they're certainly not very interesting to talk to." □

APL is most at home where I/O is modest and user interaction and feedback are among the most important requirements

APL for Business Applications

by Peter H. S. Redwood

APL is commonly thought of as a "scientific language" and one which, for a variety of reasons, has tended to be regarded more as an intellectual curiosity than as a viable production tool. More recently, however, the introduction of enhancements to the language—notably proprietary file-handling systems and fast formatting routines—has led to an increasing awareness of its potential for a broad class of management information problems. This introductory article examines the new role of APL and identifies some of the features which make it an ideal vehicle for many business applications. The original paper was presented at the 17th annual International Meeting of the XDS Users' Group in Las Vegas, November 1971.

The beginnings of APL are amply chronicled, and the story of its growth from a tutorial device into a full-fledged language is well documented. What is of more interest here is that APL has remained dormant and relatively unused for business application—or, for that matter, for scientific work—for a surprising length of time.

The reasons for this are varied. Perhaps the largest single contributing factor—at least in the initial stages—was APL's total dependence upon a solitary manufacturer. But this is not the whole explanation; for in spite of the demonstrated power of the notation in nontrivial situations, the language failed to gain early popularity. Many professionals were openly antagonistic towards it, and this attitude persists even today.

There have been other, more tangible, criticisms justifiably leveled against APL. For one, the notion of workspace imposed severe constraints upon the size and often the complexity of the work that APL could cope with: bulk input and output was not available in the basic language. Early implementations were terminal systems, which disqualified APL for large-scale data entry or extensive report generation.

And, importantly, adoption of APL—or any other time-sharing system for that matter—represented for many corporations a radical change in direction and perhaps a significant financial investment.

Today, the climate is much more favorable. A number of computer companies now market—or intend to market—APL as part of their software repertoire. Several time-sharing houses and at least one manufacturer offer extended versions of the language which include file systems and bulk I/O, and there is a wide choice of terminal devices. In short, APL has reached the stage where it should receive serious consideration for a large number of scientific and business applications formerly reserved for FORTRAN, COBOL, and other languages.

Where can APL be used?

Not surprisingly, much of the use to which APL has been put has been of an academic or scientific nature. The whole thrust of the language is mathematical, and an immediate association between it and scientific work is natural. With the proper approach, however, the properties of APL can profitably be brought to bear upon business problems.

Of course, applications must be chosen with care. In general, APL is not advocated for a large class of applications where routine operations involving massive volumes of input and output are the rule, and where on-line requirements are a minimum. These applications are best handled in a batch environment.

On the other hand, APL is much more at home in a less-structured setting where I/O is modest and where user interaction and feedback are among the most important requirements. Such applications might include business simulation, financial planning, performance analysis, as well as many types of management information systems.

Another class of problems where

APL can be used effectively is in business analysis, characterized by wearisome and laborious manual calculations, often numbering in the hundreds. These applications may lack structure or they may be one-time efforts, which usually precludes computerization in the conventional way. APL, in the hands of an analyst, lends itself admirably to this type of problem.

Real-world applications

Academic interest in APL is lively, and articles debating its merits abound; yet most of the literature contains little account of serious productive applications of the language. While this is almost certainly due to the relative novelty of the language and its still-limited use rather than to any reluctance to publish, the fact remains that real-life implementations are scarce. We may look forward to an improvement in the situation as APL becomes better established and a body of experience is built up.

The business applications in which APL has found immediate use and where it is most effectively applied have been alluded to. In these uses, once the domain of FORTRAN, BASIC, and other languages, the impact of APL can be significant. This is especially true in the design and coding phases of a systems project, even when only a part of APL's full potential is tapped. To reap these benefits, of course, APL must be properly used. This means taking advantage of its unique features if the implementation is to be truly effective.

For example, one of the major strengths of APL lies in its ability to manipulate vectors and multidimensional arrays as easily and as simply as it does scalars. This can be turned to advantage in business applications that can be restated (as most can) in matrix terms. Consider a simple illustration involving a report of car sales for each of three cities and six models.¹

1. Schengili, J. J., *Introduction to APL*, Xerox Corp. (internal course), Oct. 1971.

B is the 3×6 matrix containing the raw data in units sold:

$$B = \begin{matrix} 8 & 24 & 44 & 17 & 27 & 14 \\ 4 & 11 & 31 & 40 & 43 & 46 \\ 45 & 10 & 1 & 23 & 26 & 36 \end{matrix}$$

(In APL, typing the name of a variable causes its value to be printed.)

Row and column totals are obtained by the process of "plus reduction." The reduction operator "/" applies the function to its left—in this case the "plus" sign—across the specified dimension of the matrix upon which it operates, in this case the sales matrix, B. Thus total sales by city are given by:

$$+/[2]B$$

$$\begin{matrix} 134 & 175 & 141 \end{matrix}$$

(The summation is across the columns, i.e., the second dimension, of B.)

Total sales by model are obtained by summing down through the rows (i.e., the first dimension) of B:

$$+/[1]B$$

$$\begin{matrix} 57 & 45 & 76 & 80 & 96 & 96 \end{matrix}$$

These two operations may be combined in a single expression and the results tacked on to the original matrix B to produce a cross-footed table:

$$X,[1]+/[1]X \leftarrow X, [2]+/[2]X \leftarrow B$$

$$\begin{matrix} 8 & 24 & 44 & 17 & 27 & 14 & 134 \\ 4 & 11 & 31 & 40 & 43 & 46 & 175 \\ 45 & 10 & 1 & 23 & 26 & 36 & 141 \\ 57 & 45 & 76 & 80 & 96 & 96 & 450 \end{matrix}$$

To carry the example further, we introduce a unit selling price vector A (\$-000s):

$$A = \begin{matrix} 3 & 6 & 7 & 4 & 2 & 8 \end{matrix}$$

The shaping operator " ρ " lets us create from this a matrix of the same dimensions as B:

$$A \leftarrow 3 \rho A$$

$$A = \begin{matrix} 3 & 6 & 7 & 4 & 2 & 8 \\ 3 & 6 & 7 & 4 & 2 & 8 \\ 3 & 6 & 7 & 4 & 2 & 8 \end{matrix}$$

Element-by-element multiplication of the matrixes A and B, coupled with the row and column totaling logic used above, produces a sales revenue report in one operation:

$$X,[1]+/[1]X \leftarrow X, [2]+/[2]X \leftarrow A \times B$$

$$\begin{matrix} 24 & 144 & 308 & 68 & 54 & 112 & 710 \\ 12 & 66 & 217 & 160 & 86 & 368 & 909 \\ 135 & 60 & 7 & 92 & 52 & 288 & 634 \\ 171 & 270 & 532 & 320 & 192 & 768 & 2253 \end{matrix}$$

This simple example places no great demands on the capabilities of APL and is intended only to give some flavor of the language in a business environment. Admittedly trivial at first, the illustration could form the core of a useful inquiry system for, say, the national sales manager of an automobile company: Add a third dimension to matrix B to represent time periods and a fourth to depict regions within the U.S.; embellish reports with line and

column headings; include historical and forecast data, perhaps on file; embed the whole package in a nationwide time-sharing system . . . and so on.

Applications of this type are quickly and easily constructed. They involve a minimal amount of coding and represent a negligible investment. For bigger systems, however, the ease with which APL can be applied should not be allowed to disguise the fact that, as in all large systems, careful planning and design are still needed. A modular approach to expansion of a basic system often works best; among other things, it minimizes functional overlap, reduces the risk of full workspaces, and helps ensure that the chosen file structure is able to meet all anticipated needs. The full-scale application described below will serve to illustrate some of these points.

A full-scale application

The application described here was designed to meet the planning needs of an organization with several decentralized operating units located across the United States. User specifications called for estimation of sales activities for each unit and detailed projections of associated revenue, manpower, and expense levels. The end product was to be the basis for the organization's operating plan for the coming year.

The approach taken was to subdivide the problem into five distinct computational stages: physical (sales)

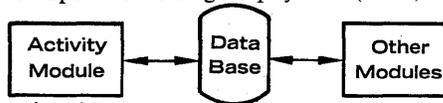


Fig. 1

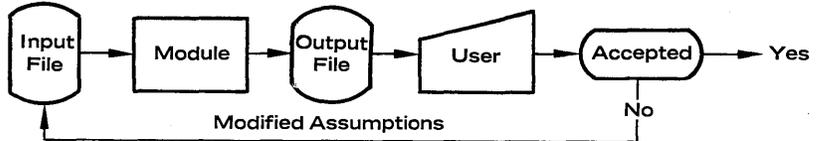


Fig. 2

activity, revenue, service manpower and expense, sales manpower and expense, and distribution freight expense.

Each of these stages is represented by a separate APL module, linked through a random access file system to a common planning data base. The activity module drives the system; with this proviso, each module can be activated independently of the others (Fig. 1).

The system is operated on-line in simulation mode. Each module acts upon a set of initial factors and assumptions held in an input file; calculated results are returned to a second file for subsequent retrieval and examination by the user. For this, data is displayed either through the system's own report packages or through direct

APL commands. If results are acceptable, the user moves on; if not, input assumptions are modified on-line and the process repeated. (See Fig. 2.)

The logic is predominantly array-oriented to make best use of APL—files are structured as a series of multi-dimensional components. This results in tight code which is efficient in execution and easy to maintain. Arrays are generally two-dimensional—often three or more—to represent product-line, time period, line-item, variable, etc.; and for flexibility, array dimensions are allowed to float. Thus, the number of product-lines in a matrix, for instance, is immaterial to the logic because it can be determined dynamically with the "shape" operator (ρ).

Some other APL features frequently used in this and other applications include:

(1) Reduction (+/) of matrices to provide cross-footing material for reports.

(2) Rotation, for simple derivation of time averages. For example, a vector A contains 12 months of data measured at the beginning of the month . . .

$$A = \begin{matrix} 34 & 44 & 41 & 38 & 39 & 42 & 40 & 38 & 37 & 31 & 28 & 23 \end{matrix}$$

The rotation operator " Φ " allows us to rotate or shift this vector cyclically by as many positions as we specify, in this case one position counterclockwise:

$$1\Phi A = \begin{matrix} 44 & 41 & 38 & 39 & 42 & 40 & 38 & 37 & 31 & 28 & 23 & 34 \end{matrix}$$

The elements in this shifted vector now represent data values at the end of the month. In one operation, we can perform the shift, add the resultant

vector element-by-element to the original vector, and obtain interpolated mid-month values by taking the mean. We can also round the answer by adding 0.5 and by finding the next lowest integer with the "floor" operator, "L":

$$L\ 0.5 + 0.5 \times A + 1\Phi A$$

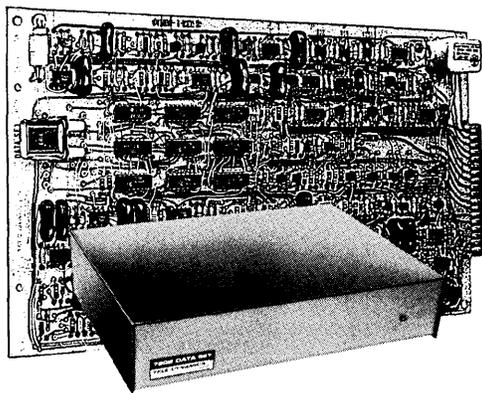
$$\begin{matrix} 39 & 43 & 40 & 39 & 41 & 41 & 39 & 38 & 34 & 30 & 26 & 29 \end{matrix}$$

(3) Inner products: Sales of accessories common to several product lines, for example, are estimated by taking a 2×12 machine sales . . .

$$A = \begin{matrix} 34 & 23 & 25 & 33 & 28 & 40 & 41 & 35 & 39 & 29 & 31 & 33 \\ 34 & 37 & 35 & 44 & 33 & 38 & 37 & 38 & 28 & 28 & 30 & 37 \end{matrix}$$

and a $12 \times 2 \times 4$ market penetration matrix B, dimensioned by time period (planes), product line (rows), and accessory type (columns)—for com-

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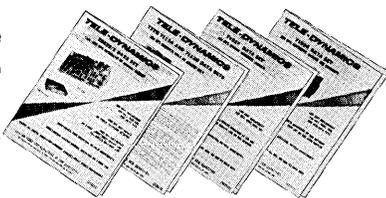


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factness, only one time period's values are shown . . .

$$\begin{matrix} & B[1;:] \\ 0.5 & 0.4 & 0.4 & 0.2 \\ 0 & 0.1 & 0.2 & 0.6 \end{matrix}$$

and forming the inner product—a combination of multiplication and summation, represented by the group of operators "×.+"—for any desired time period T . . .

$$A[T;]+. \times B[T;:]$$

Thus total projected sales by accessory type for time period 1, rounded by using the technique described above, are given by:

$$\begin{matrix} \text{L} & 0.5 & + & A[;1] & + & . \times & B[1;:] \\ 17 & 17 & 20 & 27 \end{matrix}$$

The use of APL for this project showed time and resource savings over conventional programming in the order of five to one. The time-sharing approach was especially attractive to remote users in terms of their ability to respond rapidly to management direction, while central file storage provided for headquarters what was, essentially, a national planning data base.

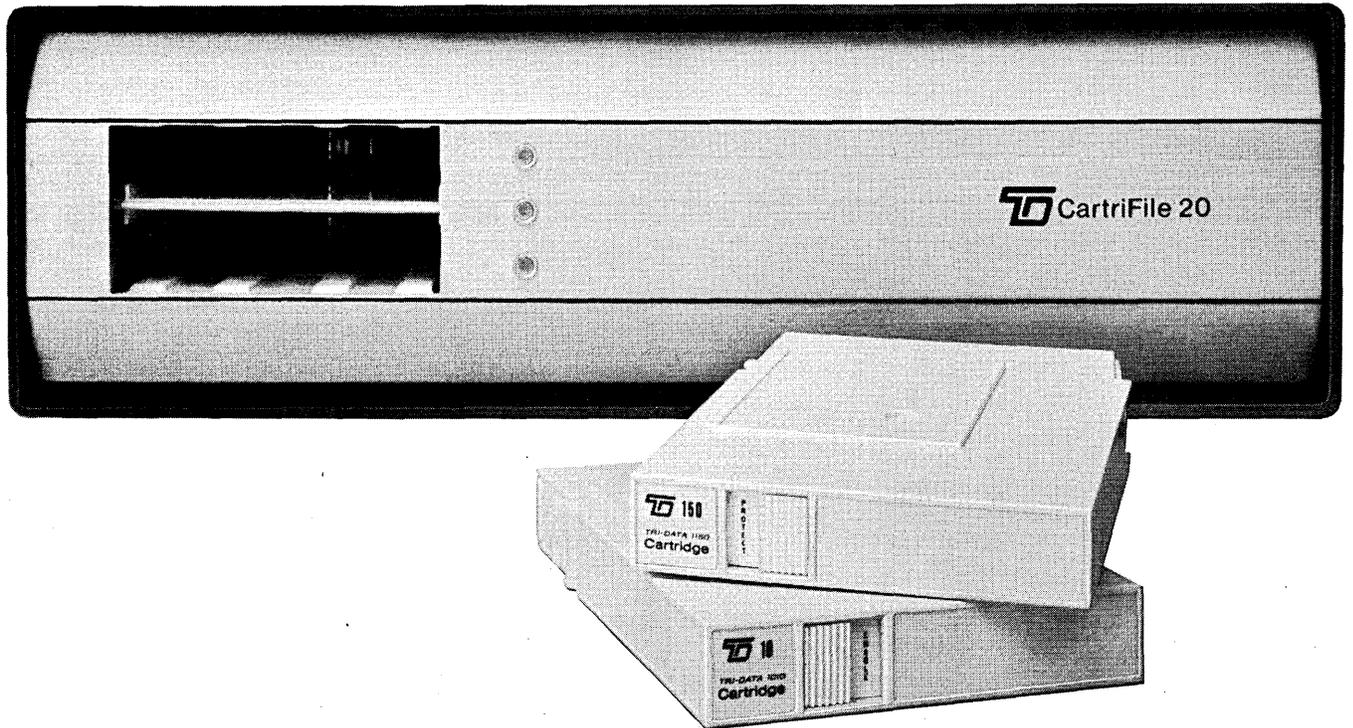
Summary

APL possesses unique features that take it out of the realm of a purely scientific language. These features make it extremely attractive for business applications where user interaction and rapid feedback are key issues. This kind of usage is only in its infancy, but the feasibility and effectiveness of this approach have been proven and demonstrated. We may expect to see increasing numbers of applications of this nature as APL becomes better known and established. □



Mr. Redwood has been with Xerox Corp. for the past five years and currently is management sciences consultant in the Information Services Div., Rochester. Prior to joining Xerox, Mr. Redwood held posts with the Scott Paper Co. and the government of Northern Nigeria. He has an MBA from the Wharton School of the Univ. of Pennsylvania and undergraduate degrees from the Univ. of London and the Univ. of Bristol, England.

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Few service bureau clients receive the advantages of edp, and some may not need a computer at all

Service Bureaus: User Appraisal

by Michael J. Cerullo

Many small- and medium-sized companies do not install in-house computers, but use the computers of service bureaus. A study conducted by the Research Institute of America disclosed that 25% of all companies (except for service organizations) with sales from less than \$1 million to \$10 million use service bureaus exclusively for processing their data.¹ If these companies properly utilize service bureaus, they should receive most of the advantages of edp without owning or leasing computer equipment and without employing a full staff of computer specialists.

However, most service bureau clients are not effectively using service bureaus, and as a result are receiving few, if any, of the advantages of edp. Specifically, most service bureau clients surveyed by the author are:

1. Receiving routine services which do not save them money.
2. Not planning to expand into more sophisticated, higher payoff applications.
3. Not receiving indirect benefits and savings, such as improved information for decision making.
4. Not satisfied with current services.

These conclusions were based on the results of a mail questionnaire sent to a sample of New England service bureau clients.² The population of the questionnaire was limited to medium-sized companies with sales of \$3-10 million³ that were listed in the *Dun and Bradstreet Million Dollar Directory 1969*⁴ and to companies located in the major

metropolitan areas of the New England region.⁵ Valid statistical techniques were used to determine sample size and sample selection.⁶ The population excluded service organizations such as banks, insurance companies, real estate agents, brokerage firms, consultants, and the like.

Questionnaire replies reveal that the overwhelming majority (80%) of responding service bureau clients receive strictly routine accounting and book-keeping services from service bureaus. Of the 11 routine services listed in Table 1, responding clients receive an

Type of Service	Per Cent of Respondents
Payroll	30
Sales Analysis	30
Accounts Receivable/ Payable	23
Labor and Cost Distributions	20
Billing and Invoicing	15
Accounting—General Ledger, Financial Statements	13
Marketing—Order Entry	10
Production Scheduling	10
Expenses—Analysis and Reports	8
Purchase Order Writing	5
Other (mailing lists mentioned most often)	8

Table 1. Routine services received by responding New England service bureau clients.

average of 1.7 services.

In addition to routine services received, about 20% of responding clients receive some type of more sophisticated nonroutine services. A list of these nonroutine services is pre-

sented in Table 2. Total routine and nonroutine services used by the respondents averaged 2.5; 0.8 were nonroutine.

Planned expansion

The approximately 20% of responding clients receiving nonroutine services will increase only slightly in the immediate future. In fact, approximately 22% of the clients plan to receive nonroutine services (see Table 3). However, 16% out of the 22% represent respondents currently receiving

Type of Service	Per Cent of Respondents
Inventory Control	15
Production—Cost Control	10
Production—Output Reporting System	8
Accounting—Cash/Budget Control	8
Marketing—Customer Service System	6
Transportation—Routing	5
Purchasing—Replenishment Orders	5
Purchasing—Vendor Selection	3
Distribution—Carrier Selection	3
Economic Forecasts	3
Preparation of Budgets	3
Capital Budgeting	0
Cash Management	0
Other	2

Table 2. Nonroutine services received by responding New England service bureau clients.

ing nonroutine services. This means that only 6% represent respondents actually expanding into nonroutine services for the first time. Added to the approximately 20% now receiving nonroutine services, this results in a total

1. *Computers in Business*, Research Institute of America Survey Report (New York: Research Institute of America; April 14, 1969), pp. 4 and 62.
 2. Service bureau clients in Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont were surveyed and results tabulated in 1971.
 3. Although this paper is primarily concerned with responding service bureau clients having sales of \$3-10 million and who are located in the New England states, much of the discussion

should be relevant to all service bureau clients, regardless of size or geographical location. Information collected from interviews with service bureau personnel, from questionnaires received from service bureau clients having sales less than \$3 million or greater than \$10 million, and from other sources indicates that all service bureau clients possess similar characteristics and receive similar services.
 4. *Dun and Bradstreet Million Dollar Directory 1969* (New York: Dun and Bradstreet, Inc., 1969).

5. The following New England companies were reviewed: Total companies in region, 2,000; companies reviewed in selected metropolitan areas, 1,240; per cent reviewed, 62%.
 6. A 53% response was achieved for the 164 questionnaires sent to New England service bureau clients. The analysis of questionnaire responses was not subjected to statistical tests. For this reason, conclusions drawn from the data may require qualification.

of about 26% of responding clients who will be receiving nonroutine services in the future.

Direct cost savings

Service bureau clients who have automated routine applications should be receiving the advantages of direct cost savings, increased accuracy, and increased speeds in processing data, and perhaps to a limited extent, improved information for decision making. The advantage of direct cost savings should result from automating applications which reduce accounting and clerical costs, such as accounts receivable, accounts payable, billing and invoicing, sales analysis, and the like.

Most responding clients who have automated routine applications are not

Type of Service	Per Cent of Respondents
Routine:	
Accounts Payable	17
Accounts Receivable	17
Invoicing	17
Payroll	17
Production Scheduling	17
Inventory Level	15
Accounting Applications	8
Labor and Cost Distribution	8
Sales Analysis	8
Nonroutine:	
Budget Control	17
Inventory Control	15
Production Control	8
Sales Forecasting	8

Table 3. Areas in which responding New England clients plan to expand services received from service bureaus.

Type of industry represented	
Manufacturèr	47%
Wholesale or retail	24%
Mining, oil, production	24%
Transportation, communications, public utilities	5%
Average number of applications automated	5.6
Average number of applications designed to reduce cost of goods sold	2.0
Range of yearly costs of using the service bureau	\$1,500-100K
Average yearly cost of using the service bureau	\$31,400
Average annual cost per application	\$5,607

Table 4. Characteristics of New England respondents using service bureaus to automate applications that reduce the cost of goods sold.

receiving direct cost savings. In fact, some respondents commented that by using a service bureau they had actually increased clerical costs and were not receiving improved management information. Only 12% of the respondents are saving money from using service bureaus; 28% are not; and 60% simply don't know. For the 12%, the average savings is \$7,600 per year over previous methods.

Many respondents who do not know if they are saving money commented

that they had not used a service bureau long enough to calculate direct cost savings. This is a weak argument for two reasons. First, respondents have used service bureaus an average of 4.1 years; and second, direct cost savings could have been easily computed prior to using a service bureau. Direct cost savings should be computed by every prospective service bureau client because these savings are the major benefit which result from the automation of routine accounting and bookkeeping services.

The fact that only 12% of responding clients report direct savings implies that most service bureau clients failed to investigate the feasibility of edp; in fact, many may not need automated systems. Their pre-service bureau systems may have been as efficient as the current service bureau system and may have cost less.

Reducing cost of goods sold

Practically all service bureau clients responding to this survey derive their revenues from sales of goods or merchandise and, accordingly, should consider automating applications that reduce cost of goods sold. These would include: inventory control; purchase order writing; purchasing—material selection, replenishment orders, vendor selection; production—cost control, planning and scheduling; transportation—scheduling and routing; and distribution—carrier selection. The purpose of automating these and similar types of applications is to provide a service bureau client with indirect ben-

their budgets.

Appraisal of satisfaction

In summary, the routine services received by 80% of all responding service bureau clients indicate that service bureaus are used strictly for help in routine administrative and financial functions; in fact, few respondents plan to receive more sophisticated, higher payoff services. An examination of the number of different service bureaus used, the per cent of service bureaus unable to provide clients with requested services, and the per cent of clients planning to discontinue using service bureaus leads to the conclusion that many clients are dissatisfied with the services which they currently receive from service bureaus.

Returned questionnaires disclose that 51% of responding clients have used only one service bureau, while a surprising one out of four have used three or more different ones. The number of different service bureaus used becomes more significant when one realizes that 47% of all respondents have used service bureaus for two years or less and 68% for four years or less. In an attempt to increase satisfaction, many service bureau clients have changed service bureaus, looking for one capable of providing satisfactory services. However, many respondents have discovered that it is difficult to find a service bureau that can provide requested services.

Of the responding clients that have requested an expansion of services, 50% were unable to receive the re-

Types of Services Compared	Service Bureaus Offering Systems Analysis	Service Bureaus Not Offering Systems Analysis
Per cent of responding service bureaus offering:		
Computer programming	95%	71%
Computer consulting	78%	21%
Nonroutine services	85%	57%
Average number of routine services offered	8.0	6.0
Average number of nonroutine services offered	4.0	2.0

Table 5. A comparison of New England responding service bureaus offering systems design and analysis to those not offering systems design and analysis.

efits and savings which are subject to accurate measurement.⁷ Yet, only 14% of the respondents automate any of these applications (see Table 4).

There is no reason why all service bureau clients should not consider automating cost-of-goods-sold applications. All service bureau clients included in this study could benefit from the proper mechanization of these applications—all for costs well within

requested services. Apparently, many respondents are requesting to expand into nonroutine services which many service bureaus cannot provide.

Many service bureaus cannot provide their clients with requested services because they rely extensively on programming packages or canned programs. Of 120 New England service bureaus surveyed by the author, 63% offered systems design and analysis. The remaining 37% must provide clients exclusively with routine accounting applications through the use of programming packages. Table 5 discloses that service bureaus which do

7. For an excellent article on criteria used to analyze indirect benefits and cost savings resulting from automating applications designed to reduce cost of goods sold, see John Diebold, "Bad Decisions on Computer Use," *The Harvard Business Review*, XLVII, Jan.-Feb. 1969, pp. 14-16, 21-28, 176.

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Errors have always been a nemesis to data communication users, but for some reason nobody wants to talk about them. We do. Errors, down-time, finger pointing. Let's clear the air. Now, with Antekna high quality, error detecting equipment, you'll find your problem fast, automatically. As a starter, why not call or write us. Our salesman in your area has the answers. You'll be pleasantly surprised. We guarantee it.

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CIRCLE 96 ON READER CARD

Service Bureaus:

not offer systems design and analysis services are considerably weaker in their offerings of computer programming, consulting, routine services, and nonroutine services.

As a result of not being able to receive requested services, 30% of all responding service bureau clients plan to discontinue using service bureaus. For the most part, these respondents plan to purchase or lease computers. However, many of those respondents planning an in-house computer installation may not actually need a computer. But they may have no choice except to continue using an electronic computer because a return to a book-keeping machine, unit record equipment, or a manual system would be as "unthinkable as giving up the typewriter for a quill pen."⁸

Summary

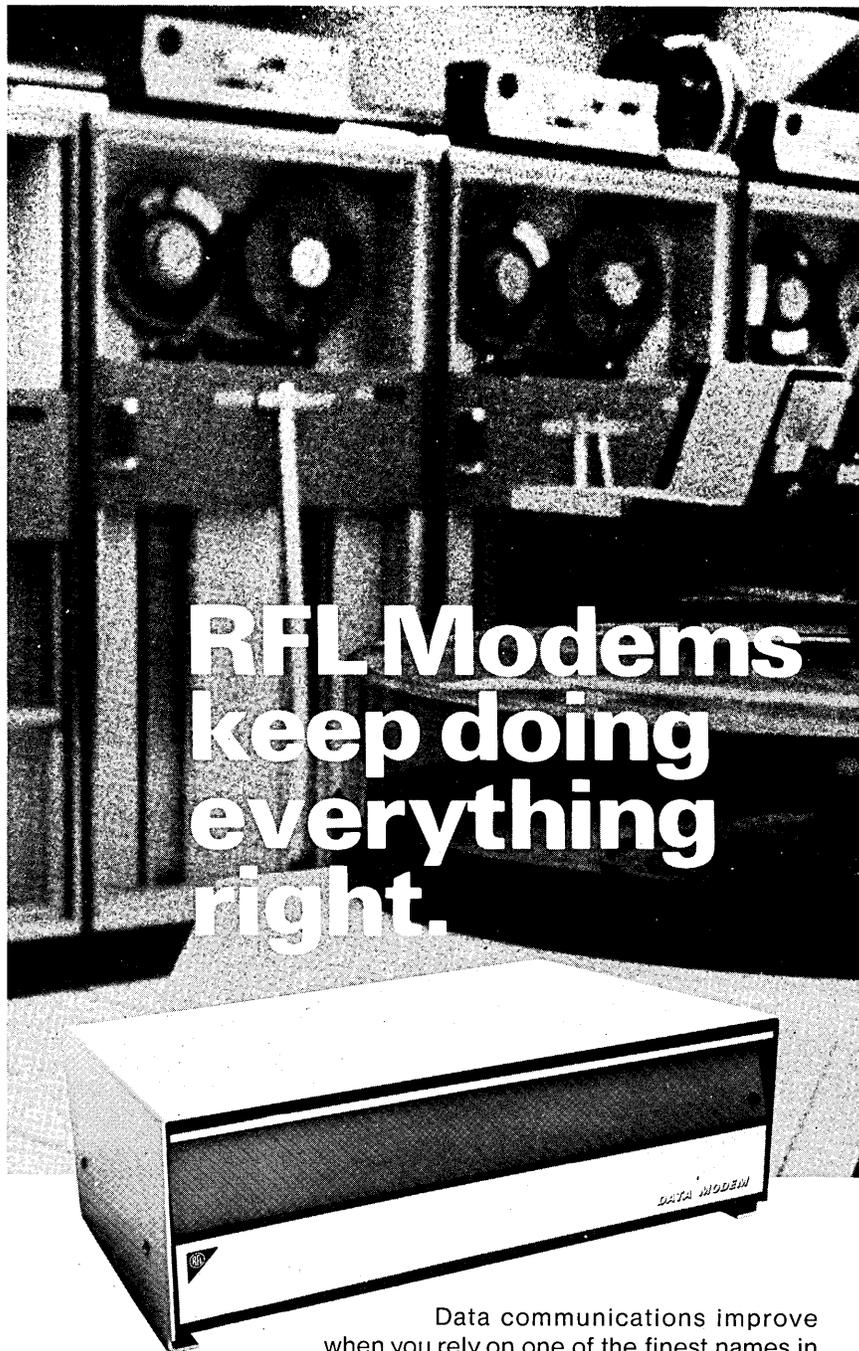
If properly used, service bureaus operating throughout the country should provide almost any size client with the advantages of electronic data processing. Most responding service bureau clients receive few, if any, of the major advantages of edp by using service bureaus. In fact, most responding clients receive only routine services, plan to receive only more routine services, and receive no direct or indirect cost savings or benefits resulting from the automation of routine or nonroutine services.

Also, an appraisal of satisfaction with current services leads to the conclusion that many clients in varying degrees are not satisfied with the services they receive from service bureaus. □



Dr. Cerullo is an assistant professor of accounting at the State Univ. of New York at Albany and formerly held the same position at Southern Illinois Univ., Carbondale. He has a PhD in accounting from Louisiana State Univ. and is a Certified Data Educator.

8. *Unlocking The Computer's Profit Potential*, A Research Report to Management (New York: McKinsey and Co., Inc., 1968), pp. 2-3.



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"See us at Spring Joint Booths 1716, 1718."

CIRCLE 105 ON READER CARD

Users Prescribe a Cure for the Joints

by Edward K. Yasaki
Western Editor

Computer conferences, once the in places to be, have fallen from favor. And the Joint Computer Conferences, sponsored twice annually by the American Federation of Information Processing Societies (AFIPS), have been prominently affected. This month, the Spring Joint Computer Conference (SJCC) takes place in Atlantic City, so it may be time to hear from computer users, who comprise the bulk of the industry, and to learn of their sentiments.

Users are unanimous in their criticism, which isn't surprising; they can probably find fault with just about anything you can point to. But what's significant is that many of them also have specific suggestions to improve the technical program. One of them is to slant the program more to users' interests.

Keith Uncapher, AFIPS president, is in agreement with this. "I think there's fairly common agreement that although there's still significant growth in the pure technology areas, the real thrust is in the applications area," he told *Datamation*. "That's where the growth is for the field. And if we want to be a part of it, we've got to consider that portion more seriously. It has to be reflected in the kinds of exhibits and the technical program."

Let's be more specific. Paul Wierk is manager of data processing for Northrop Corp. When he goes to a conference, he looks for papers that are end-

user-oriented and those for people engaged in the management of centers. What can be done to increase utilization of equipment? What management and applications problems have others encountered and what did they do to overcome them? How can the manager of a center increase interest among his users? Answers to these and similar questions are what he seeks, but in vain.

"At the last FJCC," he says, "I was going to stay for the whole thing, but left after a day and a half. I viewed the exhibits, talked to a number of people, and checked out. There was very little that applied to me . . . a couple of sessions I attended turned out to have a motherhood-and-sin sort of approach; I found a lack of depth and meat in the things."

An information systems manager for a savings and loan institution says he once went to hear a presentation on the security of data banks and was disappointed because it was so technical.

You win some; you lose some.

Papers on the real world

Others are also in agreement with Wierk's point about the need for papers with applicability to the real world. They're fed up, they say, with esoteric, theoretical topics. What, then, do they want?

"I see us going off in a lot of different directions that the Joint Conferences don't seem to be picking up," comments

the manager of a large installation. "In the minicomputer area, we're putting process control computers into chem labs and using minis with large interactive surface digitizer boards. We're merging text and illustrations on COM (computer output microfilm) devices to produce our manuals. There seems to be no interest in these topics at the conferences. They're still on the same old thing of time-sharing, remote job entry, syntax checking, and hybrid computers, and they don't seem to be swinging as the industry is swinging. They don't seem to want to recognize minicomputers."

With his increased involvement in COM applications, this user has become active in a COM users group, one not allied to a single vendor. But his interests remain broad. Coming up with another topic, he adds, "I think they'll have to get into software presentations. We would be very interested in languages above the level of Cobol or Fortran. We're working on these now and would be interested in learning what others are doing. We call them Discipline-Oriented Languages. It enables an engineer to write in his own discipline. The programs are then compiled into 'Fortran.'" He adds that he'd like to see a greater emphasis placed on new languages and software generally for the next few years, "just to see what comes of it."

Implicit in some of the comments

heard, and cited strongly by many of the respondents, is the prime benefit from attending conferences: the opportunity to make new contacts, to talk to people engaged in similar projects, and to stay in touch with them to see how they're doing. "We have equipment that came in as a result of a seed we picked up at a conference," says an aerospace dp manager. "We thought about it for a year or so, and finally got around to getting it."

"If I'm interested in going to a conference, I'm interested in picking up ideas," adds Sol Chooljian of Arcata Data Management in Los Angeles. Chooljian says he once presented a paper before a large JCC gathering. When the session wound up, it became apparent that perhaps 10% of those in attendance wanted to continue their discussion with the speakers. So, they scrambled around to line up a separate room, ended up in one that accommodated 150, and some 250 showed up.

Conference organizers, he concludes, "should plan for and announce ahead of time a room where attendees can gain closer access to the speakers, where bull sessions can be held with them. You might end up with two people in one room, perhaps none at another, and 300 in the third. But when I attend a conference, I want to get together and trade notes with people who have the same problems, and they're not too accessible."

It should be noted that a few JCCs in the past have done this. Or, at least, separate and smaller rooms were made available nearby for those who wanted to continue discussions and to meet the speakers. The idea, however, didn't seem to move Keith Uncapher, who noted the so-called "birds of a feather" sessions started several years ago by an AFIPS constituent society, the Assn. for Computing Machinery. The JCC group also tried it. "People could write on a sign the topics they wanted to discuss. On one occasion, we preassigned rooms and on another we let someone list the subjects he wanted discussed, and made rooms available."

Some people prefer totally nontechnical subjects, something also seen at past conferences. Ian Ebel of Lockheed Electronics says, "There is a need to get responsibilities assigned in the computer industry the way it is, say, among architects, where the builder's responsibility is spelled out, the architect's responsibility is spelled out, and so is the buyer's." In this context, he cites specifically the contracts in this industry, and adds, "Give the dp manager who has never dealt with anybody other than IBM an understanding of how business is done in the non-IBM world." The sessions on social implications at the Fall Joint in Houston (the so-called Broad Perspective series), he says, were a step in the right direction — "a sign that the

industry is trying to find its role, to look beyond the pure technical side to where it fits in society."

Consider the users' problems

Relatively few people cited the mechanical aspects of conference sessions. A few took the bother to say they thought the Fall joint, held in the West, tended to be better than the Spring Joint, and one even referred to the rehearsing of presentations as a definite improvement. But David Ferguson, software company executive, says, "More attention should be given to screening papers on their value to the computer community than to their technical accuracy. They are not being screened for technical innovation or for their applicability to current problems facing users."

Nor does Ferguson believe that panel discussions help much. "Panels may have some value for an audience that isn't quite so technical," he explains, but he insists the subjects are far more important than how they are presented.

Ian Ebel, as well as others interviewed, values active dialogs between speakers or panelists and members of the audience. In fact, rather than a panel discussion, he thinks there's more value to a good presentation and good questions from the floor. "Panelists tend to

dig heels into their positions, rather than contributing to a productive discussion," he adds. "They get further and further into their shells, defending their position, and the discussion becomes a debate."

For the user, then, what are the alternatives? Sol Chooljian says he avoids the JCCs. "I go to small special-interest conferences and seminars, and get what I want out of the periodicals and journals. You get a much more efficient transfer of information, in fact, from magazines that have been professionally edited."

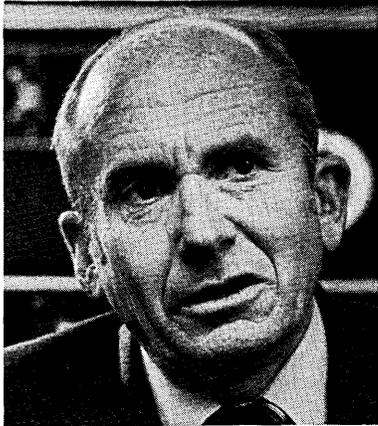
With this prevalent attitude in mind, AFIPS announced at the last Fall Joint its plans to invite the participation of other industry groups — like bankers and retailers, for example — in the technical session presentations and exhibits. Uncapher believes the technical sessions should always have a good horizontal technology base, and should build on that base a series of presentations on vertical applications topics. A third category would be in between these — such topics as security of files, installation management, and social implications. "The real issue is: what should the balance be?" He adds, "I see a much greater emphasis on the applications area" in the future.

One such vertical applications topic might be banking, with one or more sessions on this topic accompanied by a section of the exhibits floor that features hardware (and software, perhaps) being marketed to that industry.

But the dp manager at one of the nation's largest banks who, like so many others, prefers anonymity, doesn't think this will help. "As a banker, I attend the ABA (American Bankers Assn.) automation conference and get all the banking dp technical information I'll ever need. When I go to the ABA, I go as a banker, and when I go to the JCCs, I go as a computer professional and expect to take in sessions that are general in nature."

Within the last six years, he adds, he has attended from six to eight JCCs, and says he has found that too many sessions are aimed at the scientific programmer. "Let's face it," he says, "the trend is to business computing and the program should reflect that."

Nevertheless, if sentiments such as these are to have any beneficial effect, they really should be expressed to the AFIPS officials. That organization is currently mailing questionnaires to learn what members want. But those who don't get one should make their views known. As Dick Canning said in a recent issue of his famous *EDP Analyzer*, "There is surprisingly little feedback on today's conferences, which is one reason that many technical programs continue to be poor. If attendees will take the initiative to give feedback, there is hope for better conferences." □



The theme of this year's Spring Joint Computer Conference, which will be held May 16-18 in Atlantic City, is "Developing Technology ... the Last 5 Years, the Next 10 Years." The keynote speaker is T. Vincent Learson, board chairman of IBM, and the luncheon speaker is Dr. Andrei Ershov of the Soviet Union. But in addition, a unique "State of the Computer Industry" address will be delivered by Keith Uncapher, president of AFIPS.



Product Preview

**CENTRONICS DATA
COMPUTER CORP.**
Hudson, N.H.

Booth 422

The model 401 crt is a compact unit capable of displaying up to four lines of 33 5x7 dot matrix characters for a total of 132. A 63-character ASCII character set is standard, as is a 132-character buffer. The unit can be interfaced to 4800 baud



serial lines or 75 KB/second parallel lines. There are six special functions: bell, line feed, return, delete, tabbing, and a configuration flow chart. The 401 is priced at \$1495 in single quantity, and delivery is 60 days ARO. The 401 can be used with the manufacturer's model 101 line printer. For information:

CIRCLE 300 ON READER CARD

COMPUTER DESIGN CORP.
Santa Monica, Calif. **Booth 209,11**

The manufacturer of the 400 series prefers to call them computers rather than calculators because of the memory size — up to 4K program steps in increments of 512. But the units are equipped with dedicated function keyboards for doing such operations as log, antilog, a^x for the scientific model 425; and single and group summation, standard deviation and mean, paired-data summations, linear regression and normal probability functions on the model 445 statistical version. Keyboard arithmetic is fully algebraic, allowing most equations to be entered in natural order. Prices for the 400 series start at \$3750. For information:

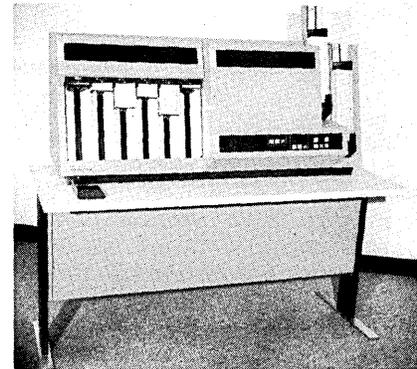
CIRCLE 301 ON READER CARD

**DECISION DATA
COMPUTER CORP.**
Horsham, Pa.

Booth 409

The 9650 multifunction card unit is a consolidation of a number of common peripherals and eam equipment into a single unit. It is offered to oem designers of S/3 equipment, and as such is set up for 96-column cards. The 9650 can read 1,000 cards/minute, punch and print at 120-240 cpm, depending on number of

columns, and perform such eam functions as collating, reproducing, interpreting, columnar and merge sorting, and gang-punching. Including power supply, cabinet, operator panel, basic electronics,



data buffers, and data interface, the 9650 sells for \$11,600 in unit quantity. Delivery is scheduled for six months ARO. For information:

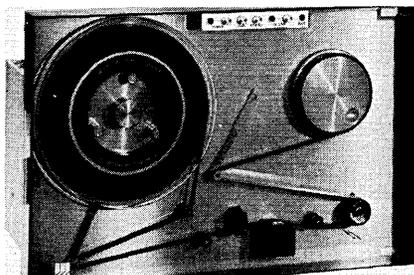
CIRCLE 302 ON READER CARD

DIGI-DATA CORP.
Bladensburg, Md.

Booth 1

Two series of oem tape drives will be introduced at the show. The 1600 "Midideck" transports are single-capstan drives available in 12.5-, 18.75-, and 25-ips standard versions, with 6.25-

and 37.5-ips units optionally available. The IBM-compatible series can be ordered with 200, 556, 800, or 1600 bpi recording density electronics, and are offered in read-only, read/write, and



write-only forms. Prices per unit start under \$2K for oem-size orders. For information:

CIRCLE 303 ON READER CARD

The 1700 series is called the "Maxidata" drive. Features available include seven- or nine-track recording heads; read/write, read-after-write, write-only, and read-only models; and speeds ranging from 6.25 to 45 ips. Standard are dynamic electrical braking, editing electronics, forward and reverse read, and a tape cleaner. Unattended restart is optional. Both series will be available next month. For information:

CIRCLE 304 ON READER CARD

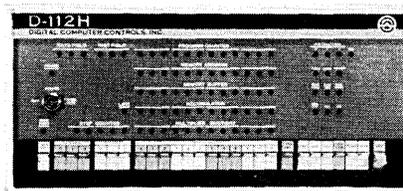
May, 1972

DIGITAL COMPUTER CONTROLS, INC.

Fairfield, N.J.

Booth 400,402

The D-112H/SC is the most powerful minicomputer this manufacturer has ever produced. It's a 12-bit machine based on the original D-112 that was successfully marketed as a plug-to-plug replacement for the Digital Equipment PDP-8. But the latest model is quite a bit different from the original. A 200-nsec semiconductor memory and a 1- μ sec core memory can be incorporated in the machine, with each 256 words of the semiconductor memory replacing 4K of core, which goes up to 32K. The processor can operate with both types of memories in the same system by running in two different timing modes. For all these differences, care has been taken to



make sure that the machine is architecturally compatible with all of Digital's PDP-8s. A 4K core, 1K semiconductor

memory system with a tty interface is priced at \$9400 in single orders, with delivery in 45 days. For information:

CIRCLE 305 ON READER CARD

DIGITAL COMPUTER SYSTEMS CORP.

Danbury, Conn.

Booth 61

The specifications for this company's first product are very impressive. It's a 32-bit general-purpose computer called the System/32, intended for real-time multiprogramming applications. Some features: 500-nsec semiconductor memory; hardware single- and double-precision floating-point arithmetic; hardware program relocation, protection, re-entrancy, and subroutine entry argument transfer; 21 32-bit registers. There are instructions for block data moves, table searches, and byte string operations.

Up to eight I/O processors can be appended, accommodating up to 256 devices or external interrupts. To help support this channel activity, there are features for automatic hardware trap and register save, hardware program initiation for interrupt return, and an interval timer.

Deliveries are slated to begin in August, with an 8K system priced at \$59,500. For information:

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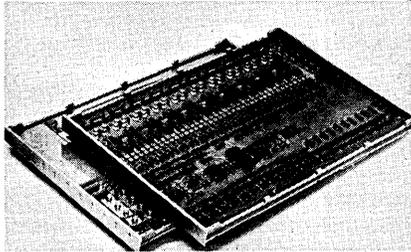


Product Preview

FABRI-TEK, INC.
Minneapolis, Minn.

Booth 1210

The model 688 core memory system is a 3D, 3-wire type complete with drivers, timing, and sensing electronics. It has a cycle time of 1.2 usec and an access time of 500 nsec. A 15 x 21½-inch board can contain either 32K 20-bit words, or 64K 10-bit words, and the system is field ex-



pandable to 512K operating from a single timing and control assembly. The pricing is in the neighborhood of .6c/bit for small quantity orders. The 688 will be available in four or five months. For information:

CIRCLE 307 ON READER CARD

IMSL
Houston, Texas

Booth 1123

A year ago this vendor introduced an evolving collection of mathematical and statistical subroutines for IBM computers (see May 15, p. 113). Since then a version oriented to Univac machines has been offered, and at SJCC the IMSL Library 3 will be announced for CDC 6000 and 7000 series computers. Fortran source code is supplied the user together with periodic additions, upgrades, a newsletter, a mechanism for discussing the modules with their designers, and a petition mechanism for adding abilities to the programs. The rental is \$720/year, and subscribers can return the package within 30 days without charge. For information:

CIRCLE 308 ON READER CARD

3M COMPANY

St. Paul, Minn. **Booth 2107, 09,11**

The 8133 digital cassette contains 300 feet or quarter-inch tape and can be used on all Philips-type cassette drives. Internal friction is said to be reduced through the use of a special lubricant incorporated in the fiberglass case material. Lock-out tabs prevent accidental recording over existing data. The 8133 tape can be used for recording densities up to 3200 bpi. Pricing was being established at

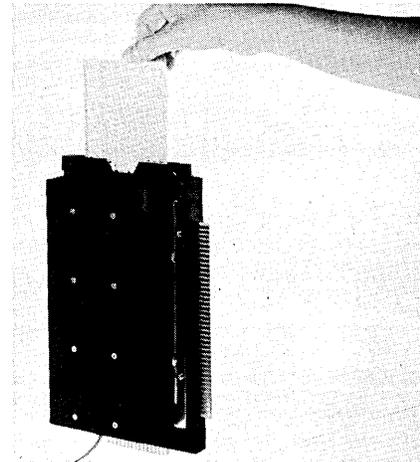
writing, but the 8133 probably will sell in the range of \$7-8 in small quantities, available now. For information:

CIRCLE 309 ON READER CARD

PANASONIC
New York, N.Y.

Booth 2316

The optical static card reader reads standard 80-column cards in a stationary condition. Cards are inserted into the slot for matrix sensors to test and are popped back out when the read is completed. The interfacing is standard TTL for either parallel or serial methods. The unit, officially called the ZU960HC-311, is aimed at oem's building source data



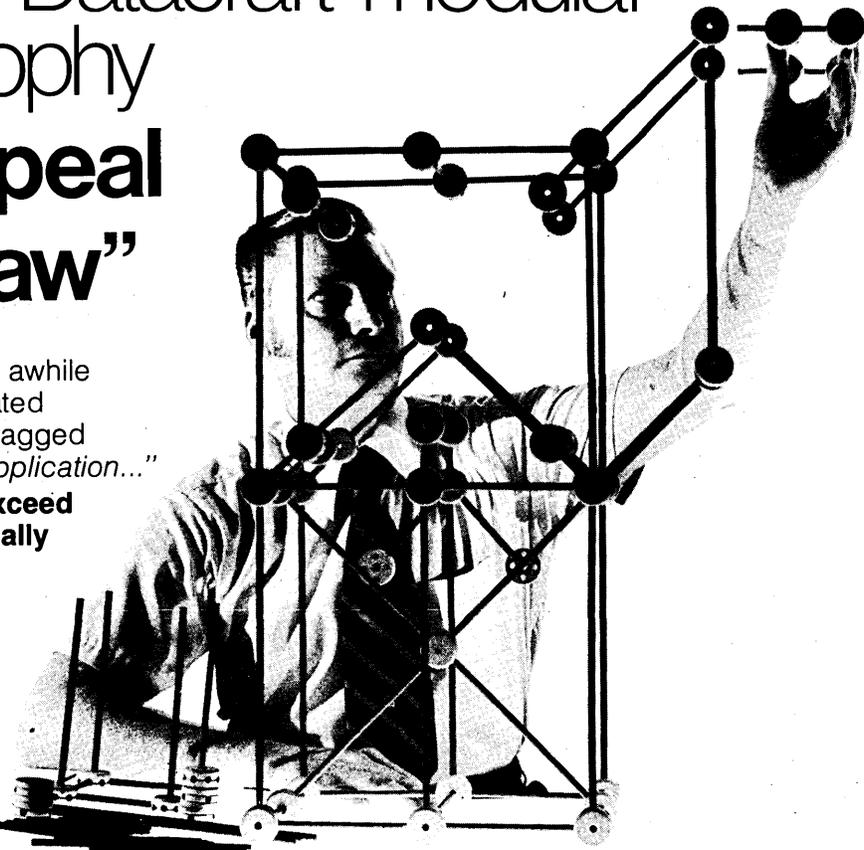
Now with the Datacraft modular design philosophy You Can Repeal "Murphy's Law"

If you've been around computers for awhile then you know the problems associated with field expansion that some wag tagged "*Murphy's Third Law of Computer Application...*"

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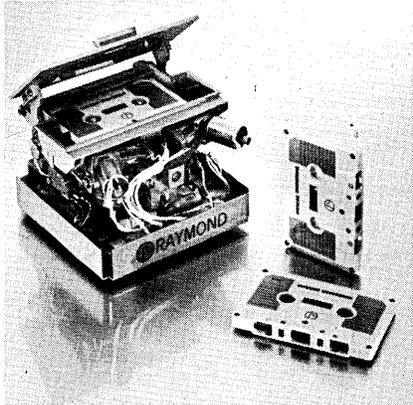


entry or process control systems. Deliveries are five weeks ARO for the \$1500 reader. For information:

CIRCLE 310 ON READER CARD

RAYMOND ENGINEERING, INC.
Middletown, Conn. Booth 1717

The Raycorder model 6406 is a capstan-driven cassette drive that can be ordered by oem's in several different versions.

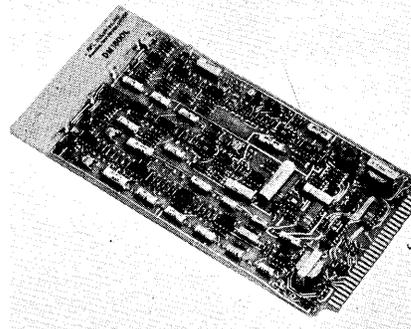


The tape speed can be set at 3-15 ips by the factory; search speed averages 60 ips. The start/stop time ranges from 20 msec at 3 ips to 60 msec at 15 ips. AC and DC models are offered for read-only, read/write, and read-after-write applications. In single quantity, bidirectional read/write models are priced at \$800, unidirectional models at \$750; and a digital electronics interface is \$400. For information:

CIRCLE 311 ON READER CARD

RFL INDUSTRIES, INC.
Boonton, N.J. Booth 1716,18

The emphasis at this booth is on pc card modems that oem designers might incorporate into future products. The series includes the DM 1200 (Bell 202C-compatible), the DM1800 (Bell 202D-compatible), and the Bell 201-compatible DM2400. The new line can also be ordered with enclosures and power supplies for stand-alone versions. Prices for the pc card versions are \$336, \$251, and \$1490, respectively. For information:



CIRCLE 312 ON READER CARD

**LIBRASCOPE DIV.,
 THE SINGER CO.**
Glendale, Calif. Booth 3,5

The model DJ100 direct digital joystick will be shown to engineers interested in graphic display design, air traffic control applications, and machine tool positioning controls. The unit is totally digital and therefore contains no A/D converter or amplifier. It operates on 5-volt dc input to produce direct TTL-compatible output pulses on separate up/down lines for each axis. The stick has 20 degrees of freedom. The output ratio is 90:1 and is controllable from 8-750 pulses per second. The price is less than \$500 in production quantities. For information:

CIRCLE 313 ON READER CARD

TEKTRONIX, INC.
Beaverton, Ore. Booth 720

A number of supporting peripherals for this manufacturer's 4010 business graphics display unit (see Oct. 15, p. 59) have been developed. Two that will appear at the show include the model 4912 digital cassette tape unit, and the model 4911 paper tape reader/punch. The 4912 is a desk-top unit that can be used for on-line storage of approximately 2.5 megabits, for off-line message prepara-

changes are required. Ever. Obviously, this design concept also means easy maintenance and less downtime for your machine. And should the task grow even larger then you are still safe because all three Datacraft computers are software and I/O compatible.

Reliability or easy usage. Which came first? We could give a very self-satisfied answer and say that because Datacraft computers were designed for reliability they are easy to use. And that would be true. But it would be like giving you a software package without the necessary documentation.

Instead, clip the attached coupon for documentation about the Datacraft philosophy of design, construction, and performance. With this package prove to your own satisfaction the price/performance advantage Datacraft can give your application. And you'll also see why we've been able to repeal "Murphy's Third Law of Computer Application."

The DC 6024 series is a family of 24 bit, high speed, digital computers addressable at byte, word, and double word level. The family consists of:

MODEL	FULL CYCLE TIME	PRICE
DC 6024/1	600 nanoseconds	\$51,400
DC 6024/3	1.0 microsecond	\$32,800
DC 6024/5	1.0 microsecond	\$10,900

The DC 6024/5 is expandable in 4K or 8K memory modules up to a 65K word maximum. Models DC 6024/3 and DC 6024/1 are expandable in 8K memory modules up to a 65K word maximum. All models are software and I/O compatible.

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Jeff, please send me the price/performance information I can find in "The DC 6024 Computer Family" plus your memo on how to repeal Murphy's Law. I understand the DC 6024 digital computer is ideally suited for applications requiring real-time control and complex calculations. I have an (end-user) (OEM) application in one of the following fields that I have circled.

- Simulation systems • Wind Tunnel testing • Process control • Scientific experiments • Data acquisition • Nuclear experiments • Chemical analysis • Engineering problem solving • Communications systems • Medical analysis & Monitoring • Training devices • Pollution analysis and control • Optical character recognition • Computer output to microfilm • Satellite processing

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computer manufacturers
have all the answers in data entry...**

**you don't have all the
answers.**

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UNIVAC	Burroughs	IBM	N	C	R	Honeywell	UN
UNIVAC	Burroughs	IBM	N	C	R	Honeywell	UN
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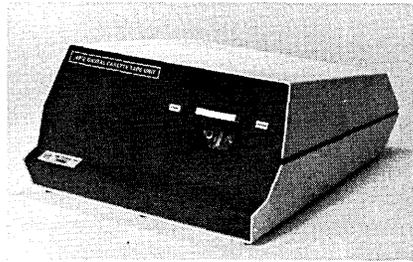
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CIRCLE 44 ON READER CARD



Product Preview



tion, etc. The data transfer rate is 400 cps. The price of the 4912 is \$1950. For information:

CIRCLE 315 ON READER CARD

The 4911 reads at 200 cps and punches at 75 cps, handling paper, mylar, or aluminum tapes. Programs normally filed in a time-sharing computer system can be converted over to the paper tape unit and loaded only when needed, hopefully lowering computing costs. The 4911 is priced at \$2950. For information:

CIRCLE 316 ON READER CARD

UNITED AIR LINES
Chicago, Ill.

Booth 17,19

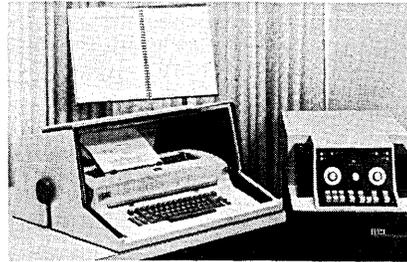
Delivery of delicate equipment is offered by this airline with its "Soft Touch" service. It's claimed that for shipments smaller than truck load size the pricing becomes competitive with van lines when the distance reaches 1,500 miles. Equipment is shipped in special cargo containers that do not require crates or skids, and may be packed by the shippers, or United will pick up the equipment at the shipping location and pack it. For information:

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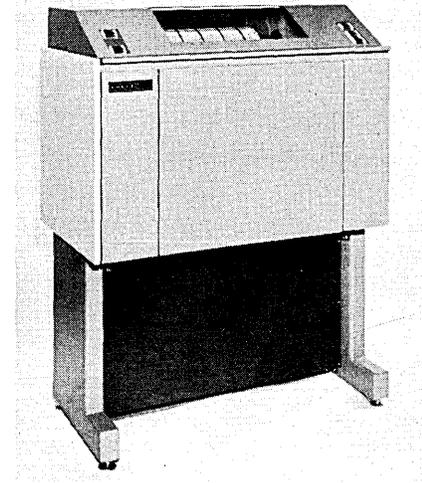


a special sound-absorbing foam. A hinged Plexiglass lid across the front permits easy access to the unit. A variety of finishes is offered to complement either the color of the machine or that of the office. The unit price is \$169.50. For information:

CIRCLE 318 ON READER CARD

VOGUE INSTRUMENT CORP.
Richmond Hill, N.Y. Booth 1620,22

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CIRCLE 101 ON READER CARD

\$10K, without interface. Interfaces are available for a good portion of the mini-computer population, including the Digital PDP-8, -11, and -15 product lines; the Data General Nova line; the Varian 620 series; the Honeywell 316 and 516, etc. Delivery is 30-60 days ARO. For information:

CIRCLE 319 ON READER CARD

XLO COMPUTER PRODUCTS
Walled Lake, Mich. Booth 2222

Ex-Cell-O Corp. is making a number of changes to enhance its image in the computer industry. First it took over direct control of its Bryant Computer Products subsidiary, primarily known as an oem supplier of disc drives. There are

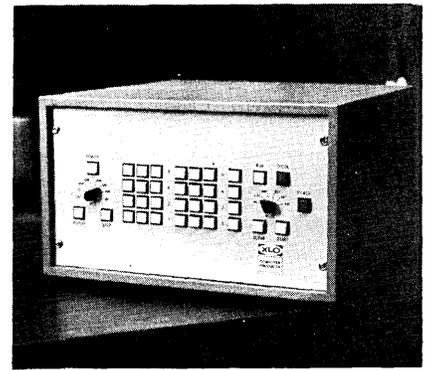


plans afoot to build interfaces for some of those products and get more involved with end users. And it's going to SJCC with a model of just about everything it currently offers, plus some brand new products, on a "let's get acquainted basis."

Users will be offered the model 7700 communications terminal. It consists of a 4-32K controller; a 132-column, 600-lpm printer; and a 300-cpm reader for 80-column cards. A number of options, including tty's, card punches, and other peripherals are offered, but the basic system described above rents for \$607/month on a one-year lease, dropping to as low as \$436/month for multiyear contracts. The communications link can handle 9600-baud transmission. The 7700 is available 60 days ARO. For information:

CIRCLE 320 ON READER CARD

The XLO-8 minicomputer will debut in Atlantic City. It's a byte-oriented unit offered to both end users and manufacturers. Standard are 64 bytes of 500-nsec read-only memory, and 4K of 2-usec random access memory, both expandable up to 32K bytes (for a total of 64K). The cpu contains 95 instructions, 4 registers, built-in arithmetic, 7 priority interrupt channels (which all may have direct access to memory), and a tty interface. The 8 performs binary arithmet-

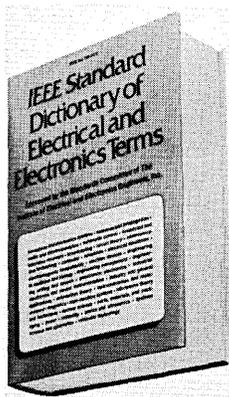


ic and has a channel rate of 500 KB/second. The price for the 4K basic model, complete with power supply, console, display register, and real-time clock, is \$2500, and delivery is 60 days ARO. For information:

CIRCLE 321 ON READER CARD

The model 3322 cartridge drive comes standard with a spindle that accommodates a 75-megabit cartridge, but can optionally be equipped with a fixed cartridge providing an additional 75-megabit capacity. The latency time is 8.3 msec, head positioning time 35 msec, and the transfer rate is 6.5 MHz. Available to oem customers next month, prices for the 3322 range from \$4-7K depending on specific configuration and quantity. For information:

CIRCLE 322 ON READER CARD



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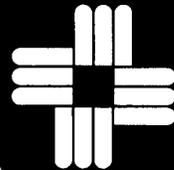
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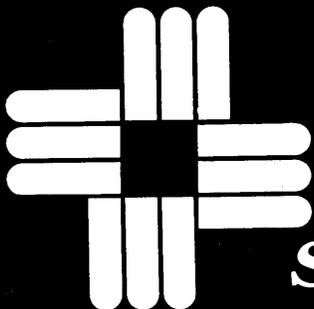
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CIRCLE 31 ON READER CARD

Technology and Health Care Systems in the 1980s

The rains and mists of San Francisco were settling comfortably over the medical people gathering at the Hilton. The attendees represented the most prestigious elements of the federal, state, and municipal governments and a very healthy aliquot of university types.

The meeting was sponsored by the National Center for Health Services Research and Development (NCHSRD), the major in-house arm of the federal government's huge Health Services and Mental Health Administration. Co-sponsors (and the actual organizers) of this particular conference were the members of a scientific review body within the National Center, the Health Care Systems Study Section, chaired by Dr. Morris Collen of the Kaiser-Permanente Medical Group.

The various scheduled sessions which made up the meeting—and believe me, everything including john breaks was scheduled—took up the issues of defining the various key words which made up the subtitle of the conference; namely, health, health care, systems, means of assessment and evaluation, the special interest groups who abut upon the health industry, new cults and beliefs about health and life, and last and (as it turned out) definitely least—technology.

... last and ... definitely least—technology.

The reader will already have guessed that attendees, speakers, conveners, and session chairmen all brought to the confab grossly different perceptions concerning what could, should, or indeed would be discussed.

One's first clue that the meeting just had to have some kind of glitch in it was the obvious fact that the great majority of the scheduled speakers were in no way technologists. They did include good medical, hospital, insurance, and university sociology/community-medicine people. But all this is not computer technology, nor any technology. So what gives?

The second clue that something was afoot came with the realization that the same groups last year sponsored a

meeting with virtually the same topics to which attendance had been limited to 35 persons. This year there were 435. What had happened? "Technology" had been added to the title! The President was interested! Indeed, position papers on "technological initiatives in health care" had flowed between the federal establishment down toward Pennsylvania Avenue for months. (Do any actually get there?)

On the very last day of the conference, at the very moment that the President's new technology honcho, William McGruder, was to be addressing this conference, the President himself was to be addressing the Congress and the Nation with his State of the Union message. Perhaps, one thought, indeed surely, this conference was part of a greater plan to loose computer technology upon the needy poor or the sickly rich, or maybe the just plain Medicare beneficiaries.

But the unsurprising talks dealt with problems of the consumer representative, a review of other countries' nationalized medicine schemes, NASA can do anything, and analyses of Medicare/Medicaid cost overruns.

Surprising and also well said were the remarks of Jane Newitt from the Hudson Institute and Anne Somers from Rutgers.

Mrs. Newitt used the futurist approach of looking at trends over the past two decades and opinion polls in the present to reveal a U.S. of 1985 which had liberalized even further its views on the use of mood drugs, had broadened even further its definition of problem populations such as "alcoholics, drug addicts, certain kinds of criminals, unruly children, and children with learning disabilities" and behavior disorders of a variety of kinds so that these would be included increasingly as medical problems. She predicted a U.S. of 1985 which had decidedly strengthened its concerns with alternatives to allopathic medicine in the form of schemes "centering on special diets, dietary supplements, and physical fitness regimens; folk medicine and non-Western medicine; lay encounter groups, faith healing, and other spiritual and psychological therapies; and

the 'whole man' approaches to health care entailing extended-family and other communal lifestyles."

This projected society would be health conscious but increasingly concerned with psychological factors, including personalized care and treatment of the patient's life setting problems, as well as his physiological derangements. Concomitant with these happenings would be in 1985 a "population bulge" whose age (20-40 years) would leave them concerned primarily with a "decline in energy and virility" and essentially unconcerned with "cancer, heart disease, and problems of the old."

... unimpressed by, and suspicious of ... computers and automation.

As the story unfolded in all its aseptic splendor, it became increasingly clear that among the things with which this future society would be unconcerned, unimpressed by, and suspicious of in health care would be (you guessed it) computers and automation.

Mrs. Newitt noted that "... while inflation (and even uninflated costs) are most certainly propelling us toward more efficient use of technology, more economical allocation of tasks with respect to personnel skill levels, and a relatively declining role for solo medical practice, it is important to note that the public is unlikely to view this trend as progressive, much less exciting ... the goal of being more efficiently processed simply is not the sort for which people man the barricades."

The Newitt bombshell was dropped with such lady-like grace and scholarly candor that one was hardly prepared for the coup de grace, which was delivered by Anne Somers. Through complex but careful reasoning, owing something to J. K. Galbraith, Mrs. Somers concluded that "... further improvements in medical technology will, almost inevitably, lead to further increases in the cost of care and further pressures to spread or socialize these costs, over larger and larger population bases, as well as to bring in

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Health Care Systems in 1980s

outside controls in the effort to moderate the rise." Of special concern to computer people was her conclusion that "the more advanced and the more effective the technology, the greater the overall costs of health care."

She admitted that "growth of technology is probably irreversible." Indeed "telemedicine" and "computerized medical records" are likely to be good things in spite of the fact that "advanced medical technology has helped to exacerbate two pre-existing evils—inflation and fragmentation." In her view, the great challenge today is to bring the growth of technology "under social control and to develop political and other institutions adequate to this task."

. . . some solace to the hungry hardware men . . .

Toward the end of the third and last day came the talk of G. Z. Williams, a speaker who was personally familiar with computers, technology, and automation. He did offer some solace to the hungry hardware men in the audience by predicting in the 1980s the widespread use of "high-speed centrifugal analyzers . . . mass spectrography, high-pressure chromatography, electrochemical activity assays, x-ray spectrography, and multifuorescence methods, each coupled to a computer . . . to provide a new set of measurements." Yet even he somewhat debunked this approach by warning that in terms of the present, for "most quantitative analyses of body constituents, there is little or no data concerning long-term variations in health and early deviations of incipient pathology."

Overheard in elevators and the waiting troughs were mutterings: "Pick your favorite disease and lobby for it"; "Technology is okay, but it hasn't been packaged to sell"; "The less serious our illnesses are the more of them we will have"; "Blue Cross has a problem balancing their books"; and "This 1980 stuff is really great, but what do we do with the 1973 budget?"

In the end the fog and mists began to blow away. The President's State of the Union message was virtually devoid of technology or health. And his man, Mr. McGruder, did *not* deliver his scheduled talk. Another meeting and another group will look at the '73-'74 budget problems. God's Speed to them.

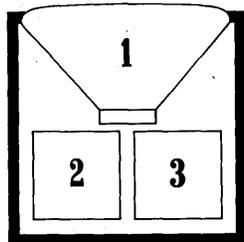
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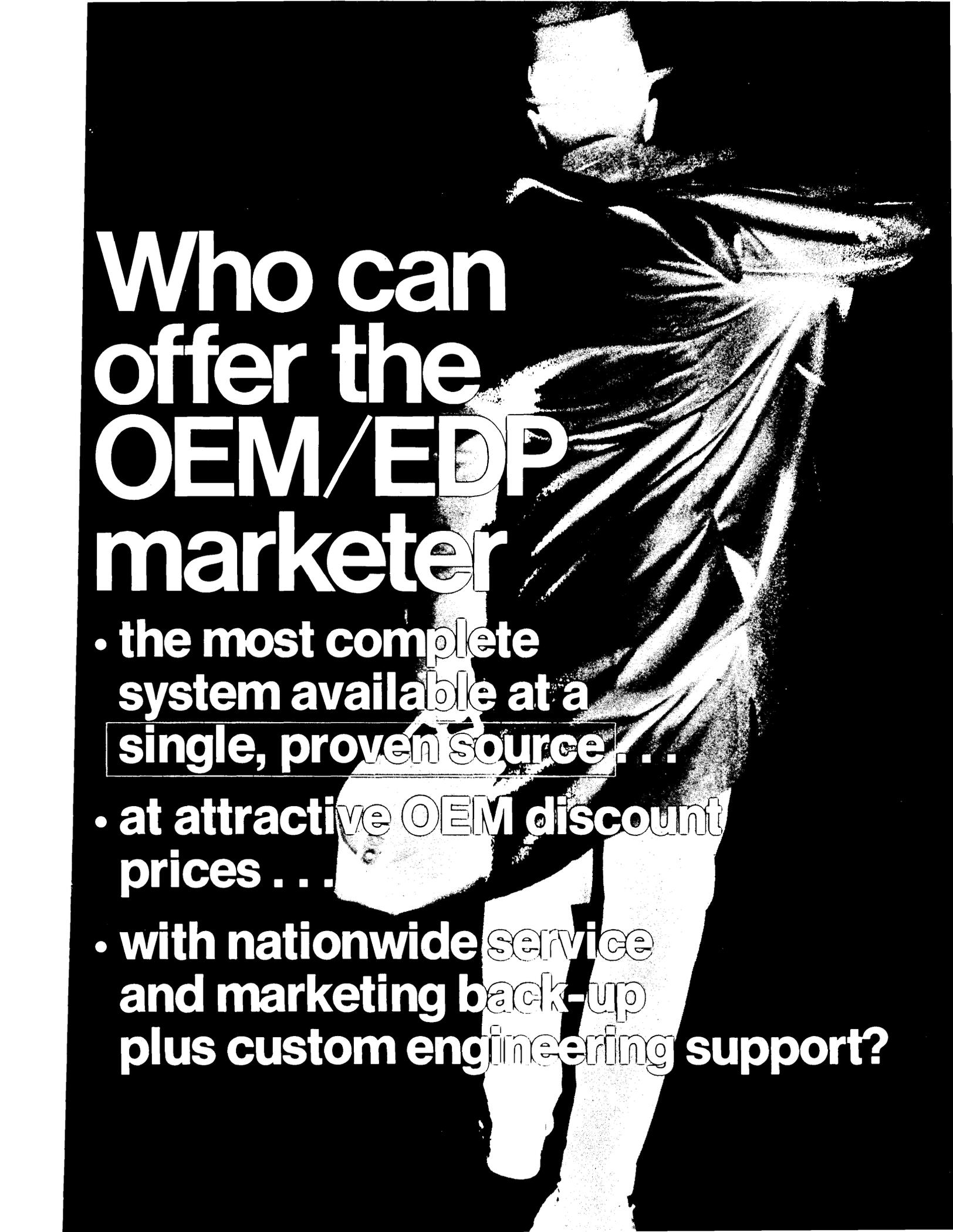
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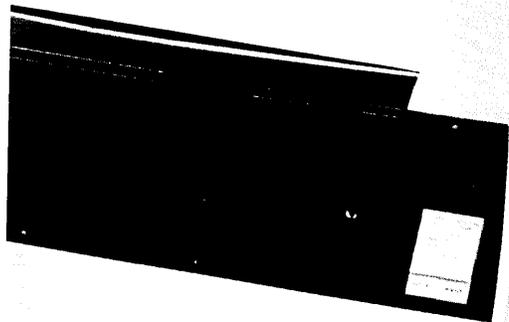
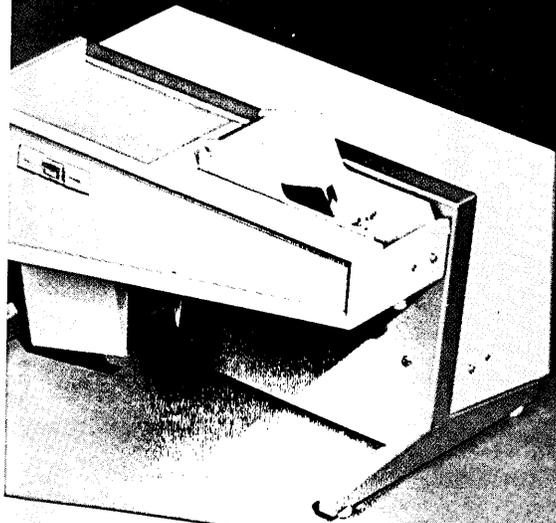


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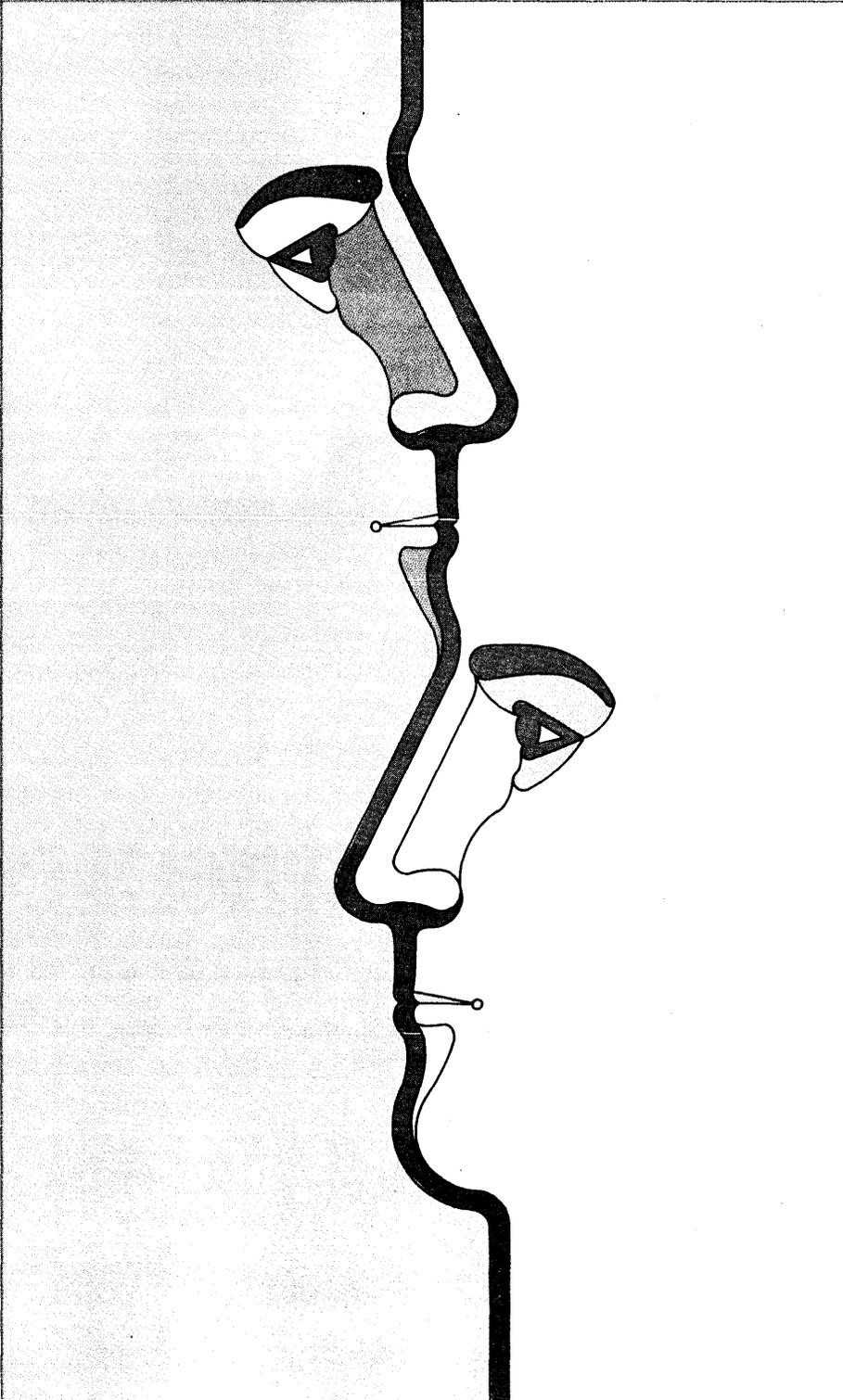
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"That's where the jobs will be," says union leader Lee White, explaining why unions are zeroing in on computer industry people as potential union members. Helping their cause, indirectly, is the Labor Dept.'s Wage and Hour Div. which recently ruled that some programmers and analysts aren't professionals, thus qualified to join unions. That story begins on this page . . .

Herb Drucker is a tall, soft-spoken programming instructor for Univac. But as you'll read on page 118, a lot of Herb's work is done without salary, as the head of TOP, a programming school for the underprivileged in Washington, D.C. . . .

Read all about the Turing machine, page 119. It appears to be an exciting tool to teach high school students how computers work. And there are plans to make them, for around \$100 . . .

IBM won't contest the GAO's half-hearted support of a government procurement policy concerning liability. But the price is heavy, as three big contracts slip out of its hands (122) . . .

Trans Union Systems reports on its first five months using a specialized data communications service, provided by MCI. They've saved money and it's been a nice honeymoon which they hope will last. Page 124 . . .

Personnel

Unions Step Up DP Organizing

When the Dept. of Labor's Wage and Hour Div. ruled that a number of categories of data processing employees, including some programmers and analysts, are not professionals and therefore are nonexempt from provisions of the Fair Labor Standards Act (March, p. 97), several in the industry predicted the ruling would spur attempts by unions to organize data processing people.

Unionization comes under a different act, the National Labor Relations Act, administered by a separate agency, the National Labor Relations Board; but historically the two agencies have used common tests and have applied common language in determining who is a professional. And the unions are aware of this. NLRB, generally the more rigid of the two, has long held that nonsupervisory programmers and analysts are not professionals and do not have the option of joining or not joining a union if a certified bargaining unit exists at their place of employment.

Whether or not it was the Wage and Hour ruling that did it, there does appear to be stepped-up union activity among computer people, albeit hard to pinpoint. As Albert Belman of the Dept. of Labor's Bureau of Labor Statistics Industrial Relations Div. points out, "according to SIC code there is no computer industry," so it's difficult to break out statistics on organized dp personnel.

But they *are* being organized and by a wide variety of unions, including the seemingly unlikely Marine Engineers Beneficial Assn., originally established for below-deck engineers of ocean-going vessels. "Guess when ocean traffic slowed up they decided to come ashore," said a spokesman for a Seattle bank whose data processing employees had a brief affiliation with MEBA.

Probably the most active unions among business computing types are the Office and Professional Employees International Union (OPEIU) and the Communications Workers of America (CWA). The United Auto/Aerospace Workers (UAW), which probably has the lead among keypunch operators, may also become front runner among

scientific programmers if the aims of a budding UAW affiliate in Southern California are realized. The Teamsters and the International Brotherhood of Electrical Workers are in there too. Small independents, such as the Brotherhood of Computer Operators in the San Francisco Bay Area, are popping up. Countless data processing people are covered by company unions, and many in civil service positions are represented by the AFL/CIO Service Employees Union.

Election at EDS

Arthur Lewandowski of OPEIU estimates that 5,000 of his organization's 85,000 members are computer people, "from keypunch all the way up." He said they have six units which can be specifically classed as data centers, in addition to having data center people in such firms as banks and insurance companies. The dp companies in which OPEIU has bargaining units are Diversified Computers of Washington, D.C.; National Data Centre, Vancouver, B.C.; Associate Tabulating, Los Angeles; the Continental Oil Co. data center, Ponca City, Okla.; and Datation, New York City. The union has just completed organizing Dempsey Keypunch Service in Michigan and has petitioned NLRB for a collective bargaining election at Ross Perot's Electronic Data Systems' Oakland, Calif., operation.

In the data centers and in other companies which have dp operations, "about 75% of our leads come from programmers," said Lewandowski. "They get fancy titles, but they're not getting the glowing salaries they were led to expect, and they work all sorts of hours, alone with a bank of machines." They handle the bad shift problem in their contracts, he explained, by requiring a company to give the most desirable shifts to those employees with the greatest seniority and by prohibiting arbitrary changes.

OPEIU was expecting to up its membership by 3,000 April 27 when it was to finalize a merger with a 33-year-old independent union, Associated Unions of America, which has the bulk of its members in Northwestern National and

Northwestern Mutual, both insurance companies with data processing employees. The union hopes to hit the 100,000-member mark this year. It has organizational campaigns going on in a number of Blue Cross and Blue Shield operations, which, if successful, could net quite a few. OPEIU lost an election at Blue Cross in Oakland last December by a vote of 525-519, but Lewandowski said, "there were a number of unfair labor practices on the part of the employer in this instance, and we've complained. There should be a hearing soon and a new election." The union has petitioned for an election in Blue Shield, San Francisco, and is working in both Blue Shield and Blue Cross organizations in New York City and Detroit.

Resistance lessons

Lewandowski feels his organization is the best equipped to represent computer industry people because "our efforts and expertise are tailored to meet the needs of technical and professional personnel." He feels resistance to unionization among such people is lessening "due to the economy in general and the trend toward mergers, conglomerates, and multinational firms where an employee finds decisions are being made miles, maybe even countries, away from him."

CWA's Lee White said his organization represents 550,000 telephone company employees (Bell and others), of whom some 10,000 are in computer-oriented jobs; and about 5,000 computer-type employees in other small units throughout the country. "This definitely will be a major field of activity for us throughout the 1970s," said White. "That's where the jobs will be." To better determine exactly where the jobs will be, CWA has an independent consultant studying the data processing field "to help us find the people."

CWA represents Western Union employees in New York State and is picking up an increasing number of data processing employees through WU's increased activity in the field.

The unit that hopes to make UAW big in the scientific programming field is the National Engineers & Professional Assn., a JAW affiliate which currently is seeking NLRB certification as an official bargaining unit at North American Rockwell in Los Angeles. This group, which now has 7,000, including "several hundred scientific programmers and computer-related personnel," was formed in October 1968 as an independent group and has been affiliat-

ed with UAW since last December. Before its UAW affiliation the group had a brief association with the Marine Engineers, but "we didn't have the autonomy we wanted," and that affiliation was dissolved last November.

Foresees 2 million members

Bob Hunter, president of the association, said it is looking right now for more than NLRB certification, although that's the first step. He was anticipating that UAW at its national convention in late April would certify his group as its Professional Div., enabling the start of a national organizing campaign. Next would come a presentation this month (May 14-17) at a meeting of the Council of Engineering and Scientific Organizations in Washington, D.C., during which they would solicit affiliations from the council's member organizations. Hunter indicated his group would start in the aerospace industries but would move ultimately into other industry and commercial firms. He hopes to have 1-2 million members within a year.

One of the groups within the Council of Engineering and Scientific Organizations which Hunter hopes will affiliate with UAW is the Southern California Professional Engineers Assn., with NLRB certified bargaining units of more than 3,000 members at McDonald-Douglas groups in Los Angeles, Huntington Beach, Long Beach, Santa Monica, Sacramento, Tulsa, Cape Kennedy, and six branch offices. Bob Leventhal, executive secretary of the 25-year-old organization, estimates his group takes in some 500-1,000 programmers. This association has never been affiliated with a national organization. They once considered affiliation with the Marine Engineers but rejected it "because there were no demonstrable advantages."

Another engineering group in the Council is The Engineers and Scientists Guild, which represents some 3,000 employees at Lockheed California Co. and Lockheed Air Services and currently is organizing employees at Lockheed Electronics. This group has 247 dp people in its ranks.

A "rolling strike"

The bank which had a brief brush with the Marine Engineers was the Seattle First National Bank, which claims to be the oldest organized bank in the country. It has a company union, The First Bank Independent Employees Assn., which takes in 30% of the 300 employees in its data center. It also is one

of the few banks ever struck in what a bank spokesman termed "a completely ineffective strike" in late 1968. It was a "rolling strike" in which different locations are struck each day, and the computer center was first. "It was a natural target."

The bank union's affiliation with the Marine group occurred in 1969 and was short lived. "The employees didn't like it."

Belman of the Dept. of Labor said computer people in very large industrial organizations such as autos and steel will tend to be taken into whatever organization represents the blue collar workers. This has been the case, he said, with UAW and Chrysler Corp. but hasn't happened yet with General Motors or Ford nor, as far as he knows, with any companies in steel.

UAW has been active for some time among keypunch operators, computer operators, and computer company clerical workers in the Detroit area and probably will be stepping up this activity. An issue of the Bureau of National Affairs *White Collar Report* last year, following the signing of a contract between UAW and Corporation S in Detroit, quoted UAW officials as saying that other data processing firms in the area had requested organizing help "mostly because of low pay and poor working conditions" and said the union considered data processing employees as "a major organizing target."

And to those scientific programmers in aerospace and other large industrial organizations who want to get something going, Hunter of UAW's National Engineers & Professional Assn. has offered help. He can be contacted at (213) 776-8621.

—Edith Myers

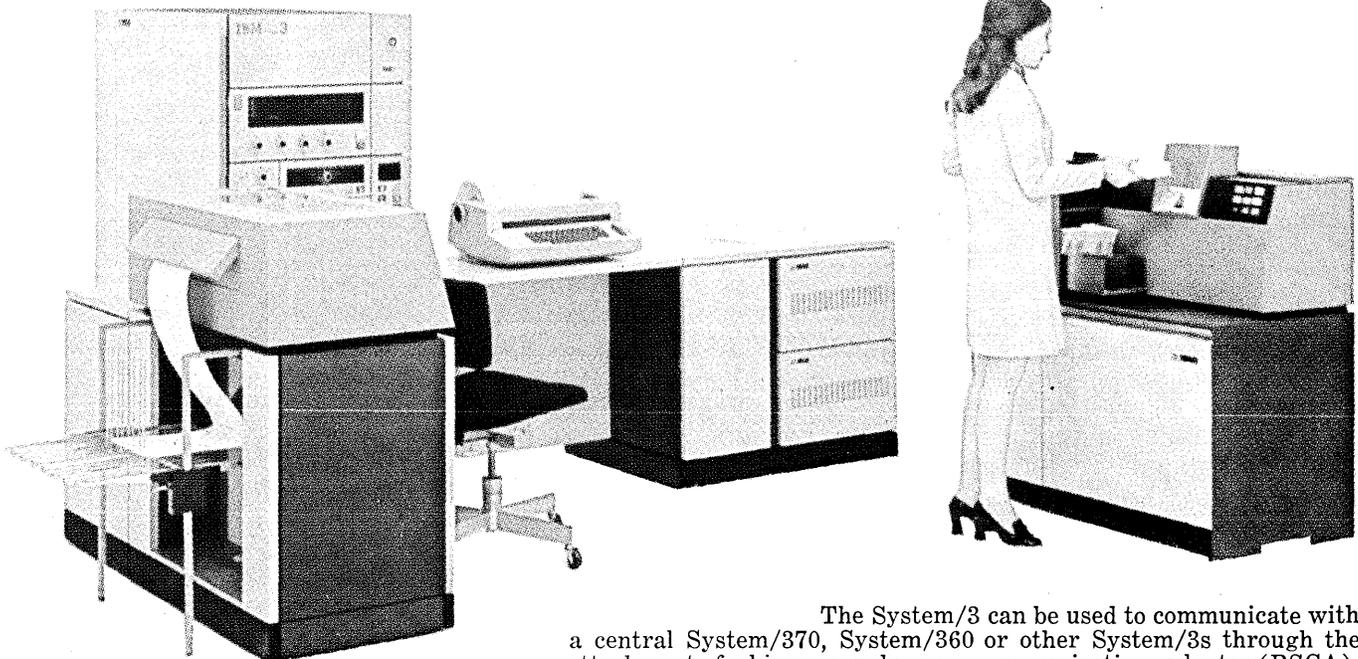
IBM Employee Group Seemingly Headless

When Brian D. Cunningham, a programmer at IBM, San Jose, Calif., circulated a flyer among fellow employees early this year setting forth goals of an organization he called "IBM Norcal Employees Association," one of the aims he mentioned was: "Assure that employees who voluntarily leave IBM receive at least normal severance ..."

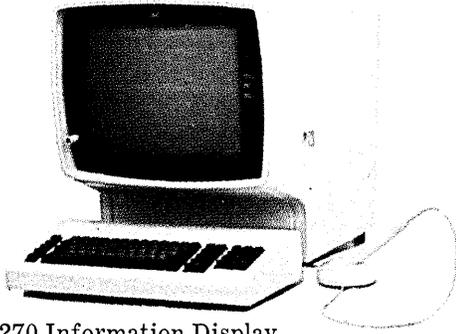
He defined normal severance as "one week's pay for each six months of employment." Currently, he stated, "an employee who voluntarily resigns leaves with empty pockets." Shortly after the flyer was circulated, Cunning-

IBM System/3 enhanced with links to larger systems.

New product enhancements greatly increase the input and output capabilities of the IBM System/3 and make possible a broad interchange of data with other systems, including System/370 and System/360. Language enhancements include ANS COBOL for the System/3 Model 10 and FORTRAN IV for Models 6 and 10.



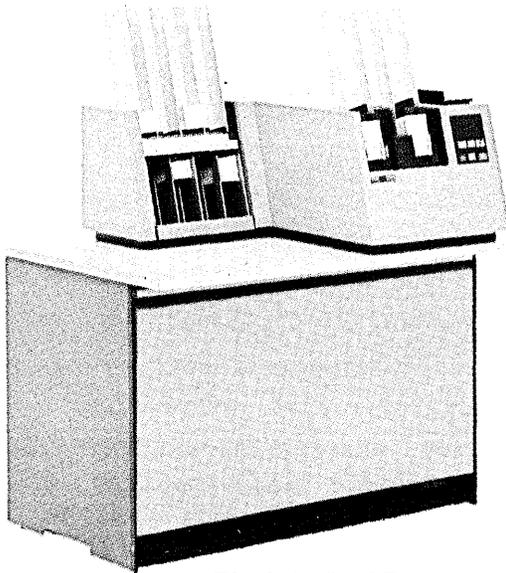
The System/3 can be used to communicate with a central System/370, System/360 or other System/3s through the attachment of a binary synchronous communications adapter (BSCA).



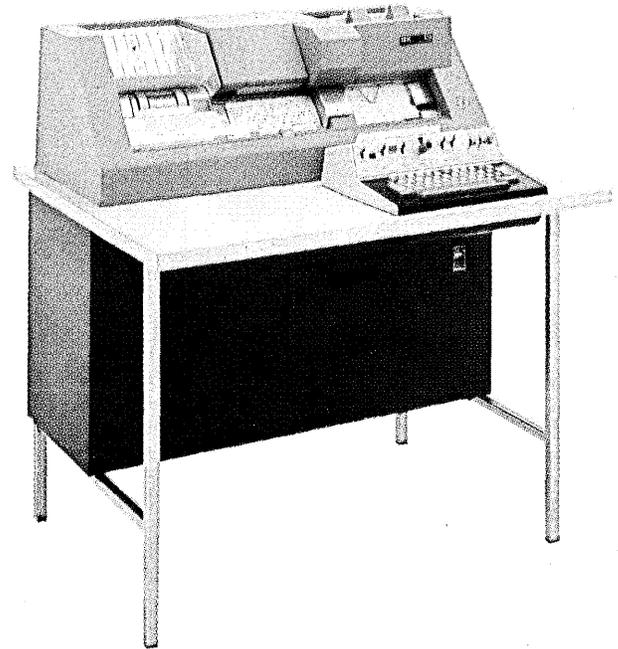
The 3270 Information Display System can be attached to the System/3 Model 10 for local and remote inquiry and data entry. When System/3 is linked to a larger system, information can be exchanged and subsequently displayed by either system.



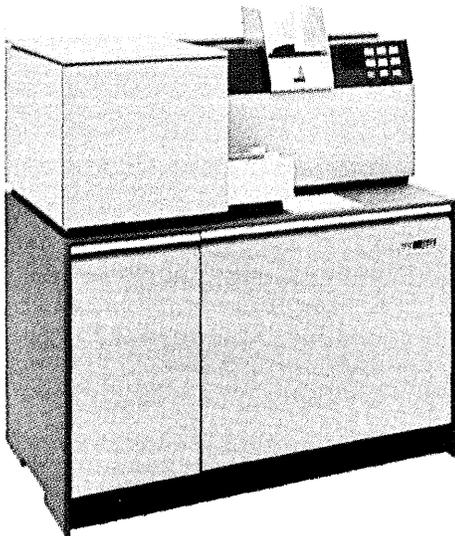
The 3410 Magnetic Tape Subsystem has been announced for most System/370s and System/360s as well as for System/3 Model 10, thus providing the Model 10 for the first time with the speed, versatility and storage capacity of tape.



The 2596 Card Read Punch makes the 96-column card used by the System/3 also usable with System/370 and System/360.



The 129 Card Data Recorder makes the 80-column card usable with System/3 Model 6.



The 1442 Card Read Punch allows the use of the familiar 80-column card in place of the 96-column card on System/3 Model 10 disk systems.

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ham voluntarily resigned to, according to a company spokesman, "pursue other interests." Presumably he left with empty pockets, because his organization seemingly hasn't gotten off the ground. "All we were ever aware of," said the spokesman, public relations man Bill Burr, "was him and the flyers."

Cunningham himself could not be located for comment. Correspondence to a Post Office box number listed on the flyer came back marked "no such box number holder in San Jose." And San Jose area telephone books hadn't heard of him either, nor had offices of a number of labor organizations contacted. His flyer said: "The Association has made contact with organized labor and we have strength in their backing."

Number one among programs listed on Cunningham's flyer was to "Prevent the termination and layoff of IBMers now being accomplished through use of the 'Notice List,' pretext firings, and 'tightening up' of the appraisal system. An employee with over 20 years in IBM was recently terminated, while others

have been forced to resign. Our group will end this disgrace."

The tightening up allegation might have some grounds. An eastern source close to IBM said systems engineers were being assigned to sales offices with expanding staffs, while sales managers were given a specified time to get the staff back to the size it was before the SEs were added.

Another proposed Cunningham program was to "Establish a totally new grievance procedure as a viable substitute to the 'Open Door' (it leads to the street) or 'Speak Up' (and be put down) programs." The association procedure would provide for an employee panel to be the final forum for grievances, and the panel would be elected twice yearly.

The aims set forth by Cunningham are similar to those established by George King, now ex-IBM of Mobile, Ala. (Sept. 15, '71, p. 7), who still is trying to get an IBM employee group he calls The 101 Percenters up and running.

so far is probably less significant than the fact that all 12 are still working for the employers who originally hired them. In half the cases, they've been on the job for more than a year.

The unusual aspect of TOP's operation is that it has required a cash outlay of considerably less than \$1,000. The instructors — currently there are about 25 — are all volunteers, and the equipment and study materials are donated. Obtaining equipment and materials has proven far easier than getting financial support, says Drucker. The Dept. of Labor turned down an application for a grant late last year on the grounds that it didn't have any money. This was about the time Drucker received a commendatory letter from the President. "Your interest in offering assistance to these deserving young people merits the praise and commendation of all our fellow citizens, and I want you to know of my appreciation . . ." said Mr. Nixon.

What, no blacks?

TOP has also asked various professional groups for help. "One national society told us no programmer training course designed to help inner-city blacks could succeed unless it used black instructors," said Drucker. "Since virtually all of our instructors are white, we obviously couldn't be successful, and they weren't interested in helping us. Yet TOP is now almost two years old. This particular society's training programs for disadvantaged blacks haven't lasted more than a year."

One reason for TOP's success is that it puts candidates through a simple but rigorous gauntlet before accepting them as students.

First comes an orientation lecture. "We tell applicants that if they expect to earn a lot of money, they're in the wrong place," says Drucker. Then each applicant takes a modified version of IBM's PAT test and must score at least 35 out of a possible 55. Finally, he is interviewed by Drucker or one of the other staff members. Basic purpose of the interview is to gauge the applicant's motivation. "We reject people who seem to be interested mostly in making a lot of money in a hurry, and we get suspicious of those who have been changing jobs frequently," explains Drucker.

So far, two classes have completed the nine-month TOP course, and a third group started recently. In each case, the pre-selection procedures eliminated better than 50% of the applicants. There is more attrition after the course

Training

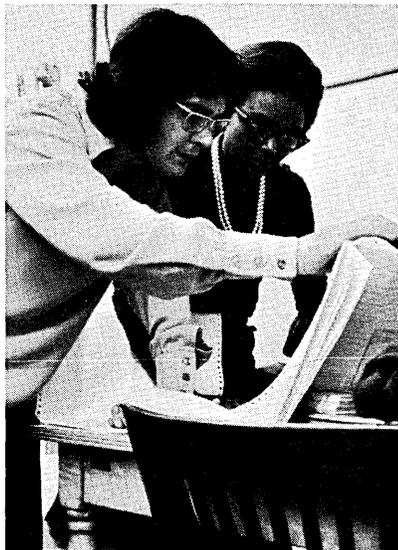
TOP Trains the Disadvantaged

"Two years ago, during the United Fund drive, it occurred to me that just giving money to a worthwhile cause wasn't the most effective way I could contribute. So I started talking to some friends, and pretty soon we were making plans to train disadvantaged people as computer programmers. We knew we were on the right track when Bob Forest wrote an editorial in the June 1970 issue of *Datamation* saying that the computer industry had failed to provide much opportunity for the underprivileged."

This is how Herb Drucker, a tall, soft-spoken programming instructor for Univac, describes the origins of TOP (Training for Opportunities in Programming), a project in Washington, D.C., which since August 1970 has converted 23 disadvantaged blacks into professional programmers. Twelve of the 23 are now working as programmers. The others, who graduated from the course last month, are looking for jobs.

At first glance, this isn't a very dramatic record. But, as Drucker points out, all of TOP's students come from the inner city, and virtually all of them are black, underemployed or unemployed, so "they have two and a half strikes against them before they even start."

The fact that only 12 have found jobs



TOP instructor Terry Monks discusses class problem with student, Elsie Howard.

begins. In the first group, 11 out of 37 finished; in the second, 43 started and 12 finished.

TOP prefers not to accept students with college training. "We feel they can make it on their own," says Drucker. About half of the students enrolled by TOP have high school diplomas; the others, equivalency certificates.

Novel technique

The first month of the course is devoted to basic system concepts. After this comes two months of instruction in Basic and Fortran, four months on Cobol, one month on ALC, and one month on real-time systems. Each class is taught by a lead instructor and one or more assistants who give individualized help to students. Several other novel pedagogical techniques are used. For example, instead of lecturing on each Cobol division in order, the class is taught a basic half-dozen instructions, given necessary data names, and then asked to write a flowchart and code the procedure division of an elementary programming application. The other divisions, JCL, and data are then added to each student-written deck, and the batch of cards is compiled and executed. "The student really gets a lift out of seeing his own program actually process real data," says Drucker, "particularly since, up to this point, he had had only nine hours of Cobol instruction."

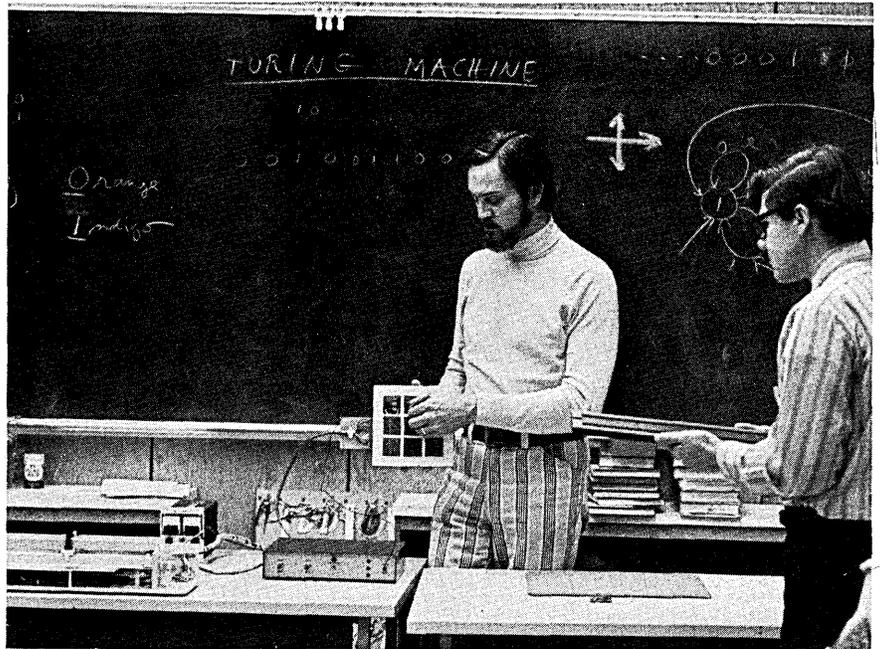
Last year, Drucker was named "Outstanding Young Man of the Year" by the College Park-Adelphi (Md.) Jaycees and was given a "professionalism award" by the Potomac Valley Chapter of the Association of Computer Programmers and Analysts (ACPA). He also received a personally signed letter from G. G. Probst, president of Univac, shortly after the Nixon epistle arrived from the White House.

"All this attention is very flattering," Drucker said recently. "I'm very grateful, but I'd be even happier if more employers would hire our graduates and invest in our training program."

Education

Turing Machine Makes Big Hit

An amazingly provocative working model of a Turing machine, not normally thought of as a particularly fascinating teaching device, was demonstrated recently to some high school math students. It captured the fancy not only of



the kids but also the adults who made this particular presentation possible. And the developers of the machine say they're interested in somehow manufacturing and marketing it.

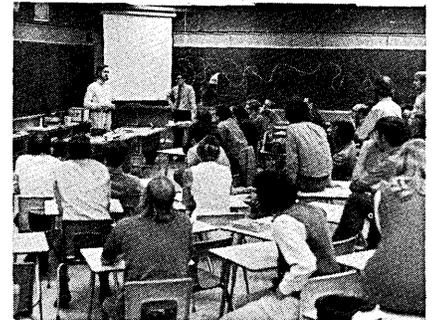
"I used to think the Turing machine was a boring thing to study, but now I'm suddenly excited about it," exclaimed Bob Barton, designer of the Burroughs B5000 and now on the faculty at the Univ. of Utah. Chimed in Alexandra Forsythe: "The clicking and clacking sounds it makes are marvelous." Mrs. Forsythe has been teaching computer concepts at Gunn High School in Palo Alto, Calif., for the last 10 years, and it was in her math class that the demonstration took place.

The occasion was a two-day AFIPS Educational Kits Workshop, organized by Prof. Charles L. Seitz of the Univ. of Utah. For what Seitz calls a Sandra Forsythe Appreciation meeting, the Turing machine was brought by its codevelopers, Dr. Robert Arnzen and Prof. Wesley Clark of Washington Univ. in St. Louis.

The Turing concept

The late Alan M. Turing's concept was that you could take any function and break it down into very simple, repetitive operations. In the course of that formulation, according to Clark, Turing for the first time gave specific definition to the notion of algorithms and what they meant. What he proposed as a model was a machine with a finite number of internal states or conditions, and which had the power to look at an infinitely long tape. On this paper tape, as he visualized it, would be symbols in

A BIG HIT: In photo above, Arnzen, right, holds the register while Clark shows how the state board is programmed. The register, or "tape," fits onto the electromechanical transport at the bottom left of the photo. Below, they demonstrate the new Turing machine to high school students in Palo Alto.



consecutive squares or cells. The machine would have the power to read a symbol, change it to any other symbol that it had in its finite list of symbols (its alphabet), and enter a new state or condition. It would then move to the next square to the right or left.

"And," says Clark, "it's surprising that that very simple formulation is able to develop so richly into everything we now know as the theoretical underpinnings of computers. It was his (Turing's) conjecture that any problem you could think of solving could be put in this form."

By demonstrating these simple operations, then, Arnzen and Clark were able to indicate the functions performed by a computer, and thereby impart to students a feel for the capabilities and limitations of a general-purpose computer. After an hour's presentation, Clark welcomed the students to program and operate the machine, which

Family

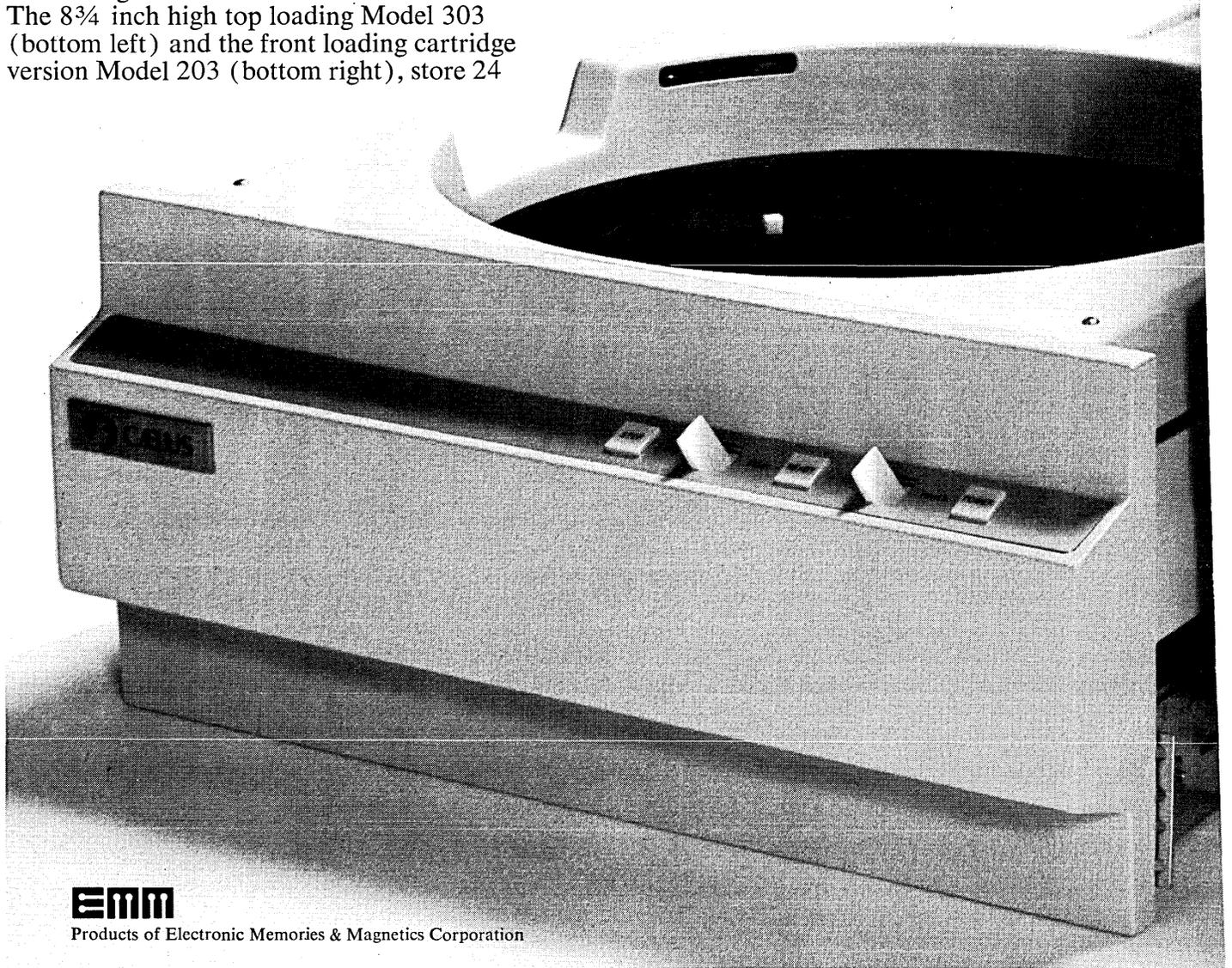
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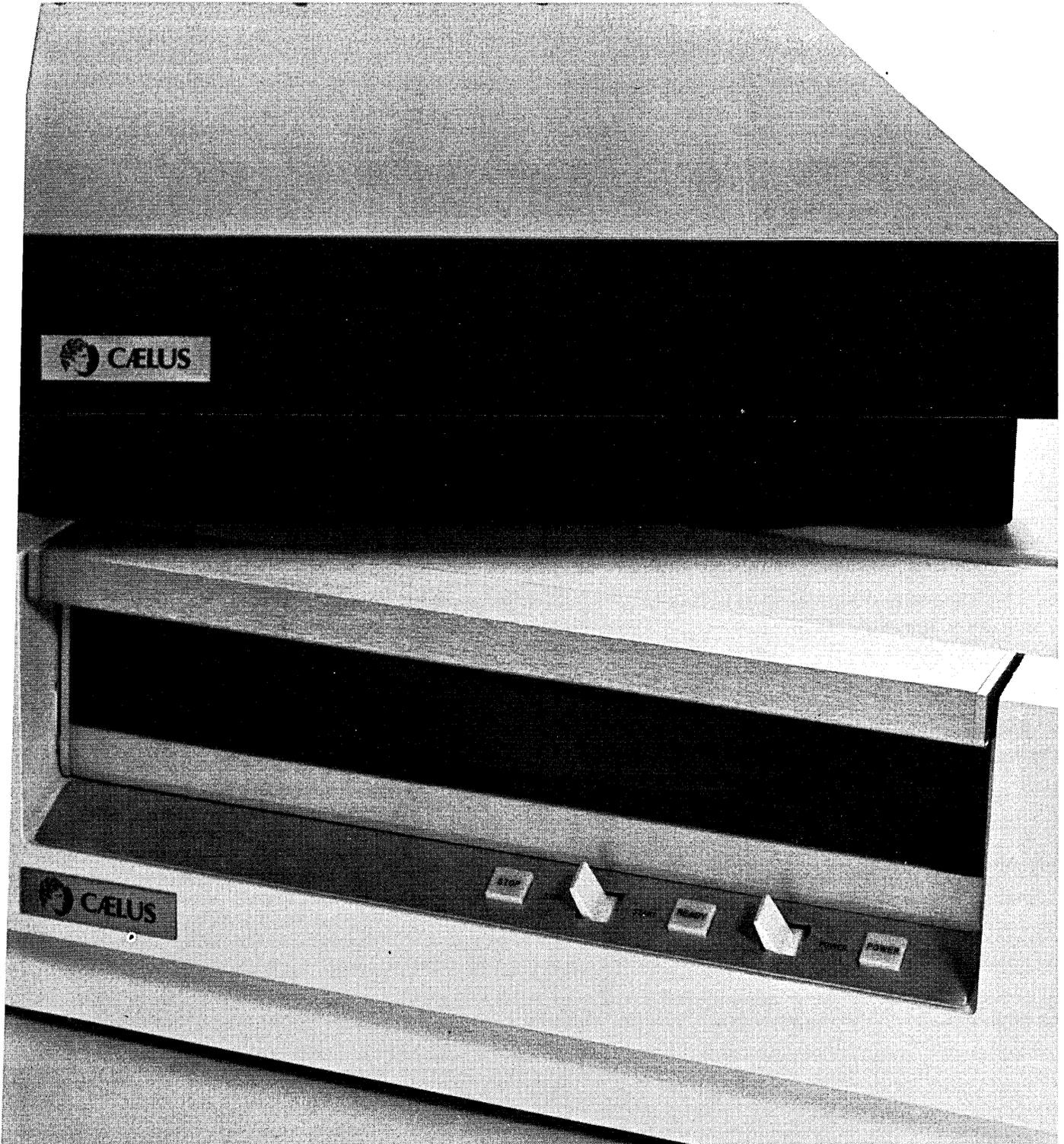
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several did. And an hour later, a few were still there, trying to get their problems run successfully.

Reasonable price

According to Wes Clark, the machine could be produced on a limited scale to sell "in the hundredish-dollar range." He elaborates to say it could be several hundred dollars, depending on the market size (or production run), the profit requirements of the manufacturer, and other factors.

In place of a paper tape, Arnzen and Clark developed a plastic device that resembles a cross between an abacus and a slide rule, thus something more sensible for teaching purposes. They call it a register, instead of a tape. And the symbols are indicated by tabs; there are some 50-60 tabs on the 12-inch-long "register." Programming is performed on a nine-state plugboard, but with those nine states and a three-symbol register, you can add, subtract, multiply, divide, sort, convert from one number representation to another, and play assorted games.

"If you wire it up in a certain way and have at least 57 of those states, you

can construct a so-called universal Turing machine . . . one that has the power to imitate any other Turing machine. And that, of course, is the essence of stored-program, general-purpose computers."

The machine, the developers point out, would be a terrible thing to use for actual computing. "But as a tool for the exposition of basic algorithmic thinking, it's just hard to beat."

This workshop is one of five being sponsored by AFIPS.

—Edward K. Yasaki

Procurement

IBM Gives Up on Liability Issue

If an Air Force bomber crashed because an IBM computer didn't schedule engine maintenance at the right time, the government conceivably could ask IBM to pay for a new plane. This was one example cited by the computer company in its long wrangle with the General Services Administration against its practice which requires ven-

dors to accept unlimited liability for "consequential damages" when supplying the agency with systems (Feb., p. 69).

IBM took its case to the General Accounting Office (GAO), but that office has now given its blessing to GSA, albeit with some reservations. And IBM says it won't appeal the GAO decision.

The argument stems from a series of recent bid solicitations — the Air Force Advanced Logistics System (ALS); the Defense Integrated Data System (DIDS), for the Defense Supply Agency; and a Navy shipyard computer buy. GSA, which handled the bid solicitation in each case, refused to accept a proposal from any vendor who insisted on limiting his warranty. In its complaint to the General Accounting Office, IBM said this refusal "represents a change in the practice uniformly followed in every prior contract with IBM." The company added that it was willing to "fully warrant its product . . . provided the responsibility is defined."

The Comptroller General decided GSA was within its rights, but questioned the necessity and desirability of demanding unlimited contractor liability. The GAO noted that DOD, when it deals on its own with contractors, ex-

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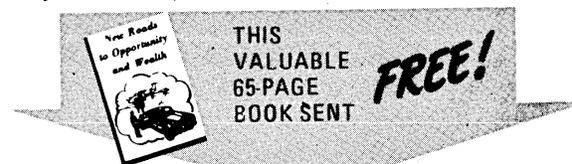


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tracts only a limited warranty from them. Also, the supplier's responsibility, even if not explicitly limited by contract provisions, is limited by "the general legal principles covering consequential damages." Furthermore, said the Comptroller General, GSA may be discouraging vendors from bidding, and encouraging those who do bid to hike their prices. The decision concludes by advising GSA to reconsider its reasons for wanting unlimited liability commitments from contractors.

IBM thinks the Comptroller General's decision is "sympathetic." The company "plans to continue working with GSA to resolve the issues," says a spokesman.

On March 13, Burroughs won the DIDS contract, with a \$24.3 million bid; and on March 20, Honeywell got the Navy job, for \$12.9 million. Soon afterward, ALS was awarded to Control Data. This one is valued at more than \$83 million over a seven-year period.

Communications

Trans Union's Honeymoon

"MCI is saving us money, but the main benefit is the service they provide," reports Art Lemay, vice president and technical director of Trans Union Systems Corp. of Chicago. His company, which supplies credit information to retailers, banks, and loan companies throughout the Midwest, is the first in the country to use a specialized common carrier for data transmission.

Trans Union's experience, with MCI of Chicago, an affiliate of Microwave Communications of America (MCA), is significant because several other data communications users probably will get a similar opportunity within the next year or two. Two more specialized carriers have been authorized by the FCC to build systems and offer service, and additional approvals are likely this year. The two that have won approval, besides MCI, are Interdata Communications (an MCA affiliate), between Washington, D.C., and New York City; and UCC's Datran, between Palo Alto, Calif., and Houston. (See story below.)

Trans Union has been transmitting data on a regular basis over MCI facilities since Jan. 1. Three full-duplex, 4800-baud MCI microwave channels

link a 360/50 in Chicago to crt's, Teletypes, and a high-speed printer in St. Louis. Local loops, supplied by Illinois Bell, connect the Trans Union computing center to the Chicago end of the MCI system, which is located about a mile away, near the top of the 100-story John Hancock Building. At the St. Louis end, the terminal links are provided by Southwestern Bell. Trans Union's system also includes Bell, Milgo, and IBM modems, plus Timeplex multiplexors.

All those vendors

"When you're dealing with so many vendors, it's a big help if one of them assumes overall responsibility for service," says Lemay. "This is what MCI does, at no extra cost; it is the biggest single benefit of doing business with them."

Extent of the benefit is illustrated by a problem that occurred on one of the MCI channels shortly after the Trans Union system went into regular operation. This channel is multiplexed into nine circuits. The high-speed printer uses one circuit, while the other eight carry Teletype traffic. "We ran into trouble every time two tty's finished a transmission within a few seconds of each other," explains Lemay; "any other Teletypes on the line at the same time got cut off." It took nearly three weeks to find out why.

MCI, besides sending in its own troubleshooting crew, headed by chief engineer John Edgren, assembled technicians from IBM, Milgo, Timeplex, Illinois and Southwestern Bell. They checked out each tty circuit at both the Chicago and St. Louis ends of the system, measured signal levels on every pin connection on every piece of hardware, and sent myriad test signals back and forth through individual circuit links. Eventually, the trouble was traced to an incorrect wiring arrangement on the multiplexor.

"If we had been leasing this line from Bell," says Lemay, "it would have taken far longer to find out what was wrong. Bell servicemen concern themselves only with the facilities on their side of the interface; if it turns out that the trouble is on the customer's side, the phone company's man leaves the line the way he found it. The customer then has to get the trouble fixed, either by using his own people or calling in outside help. We don't have that kind of talent in-house, so it's very helpful to get it from MCI, along with their com-

munications channels."

Lemay admits that his happy honeymoon with MCI may not last forever. Being the first customer of a small, newly organized company struggling to attract additional users has obvious advantages. But he's confident they will continue bending over backwards for the foreseeable future. "We can cancel on 30 days' notice if something better comes along," he adds.

Besides the three MCI channels to St. Louis, Lemay leases a 4800-baud channel from Bell; it links the 50 to crt's, tty's, and a high-speed printer in Toledo. In terms of error rates and downtime caused by trouble on the carrier side of the interface, "there is no significant difference between what Bell and MCI offer, although our MCI system really hasn't been operating long enough to tell for sure," he says. But there is a big difference in monthly charges.

All of these channels are full-duplex facilities, leased 24 hours a day, seven days a week. Through the Mod 50, remote users access credit reports on some 7 million consumers. (A 370/155 is scheduled to replace the Model 50 shortly, and service will be expanded to Louisville and Philadelphia.) The records require some 2 billion bytes of data cell storage, plus a 216-million-byte 2314 disc drive. The 360/50 has a 512K-byte core, some of which is Fabrikon add-on memory, the first of that make to be attached to a Model 50. The remote terminals include a total of 124 IBM 2260 crt's, more than 100 tty's, and two high-speed printers.

Most of the terminal hardware is used by credit bureaus in St. Louis, Chicago, and Toledo, some affiliated with Trans Union. Their customers phone in locally for credit information, and clerks — sitting in front of the on-line crt's — then access the 360/50 data base. The Teletypes are used by banks, loan companies, and other large-volume customers of these credit bureaus to get into the file directly. They access the St. Louis end of the MCI system through acoustic couplers and dial-up phone lines.

What it costs

Trans Union pays MCI \$673 per month for the nine-circuit, 4800-baud channel that handles high-speed printer and tty traffic between Chicago and St. Louis. The charge for each of the other two channels, dedicated to crt's, is about \$400.

The \$673 bill consists of \$261 for the MCI portion of the route, \$102 for the



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local loops, and \$310 for circuit terminations. The \$261 charge is based on an intercity line rate of \$1 per mile. Bell levies a sliding scale charge which averages out to \$2 per mile. The local loop charge, \$51 at either end, is a flat rate negotiated by MCI with the Bell carriers. Any users within the Chicago or St. Louis metropolitan areas pay the same amount. The remainder of Trans Union's monthly bill — \$310 — covers the 18 circuit terminations. At no extra cost, MCI furnishes a Milgo 44/48 modem at Trans Union's Chicago terminal, plus a Timeplex MC-70 multiplexor at both the Chicago and St. Louis ends of the system.

"Bell requires us to supply our own modem and multiplexing equipment on the Chicago-Toledo channel," says Lemay. The cost is approximately \$500 per month above and beyond what we pay the phone company. It isn't just the money though. We have to worry about maintenance. And if we want to add a tty circuit, we have to pay Timeplex \$150 for another circuit card. On the Chicago-St. Louis system, where we're using identical MUX equipment, we pay MCI \$10 a month for an additional circuit."

Lemay seems particularly incensed when he talks about the way Bell handles requests for additional circuits and other changes. "They're so arrogant they don't even follow your specifications. It's almost sabotage. And it takes forever." He recalls ordering Teletype machines from Bell, equipped with automatic alarms to signal when the paper runs out and when power is cut off. "We had to send those machines back not once, but twice, to get what we wanted. It took 20 weeks."

Recently, by comparison, Trans Union asked MCI to add alternate voice capability to one of the crt channels linking Chicago to St. Louis. This job, which required extensive modifications at the site to accommodate a new equalizer and a ringing generator, was finished in less than a month.

"We're thinking about switching from 4800- to 9600-baud terminal equipment sometime soon," says Lemay. "I'm reasonably sure our existing channels to St. Louis can accommodate this higher speed because MCI will engineer and test them very carefully to meet our requirements, and they already furnish the equivalent of C4 conditioning at no extra charge."

Lemay is apparently one of a rapidly growing crowd. Last month, Western Union filed a new tariff, offering rate reductions of 14-32% on service between Chicago and St. Louis. The reductions will become effective June 5 if the FCC approves. WU said it was proposing to reduce charges only for those "voice frequency channel services which are threatened by MCI's offering." The company added that it "does not intend to permit the new specialized carriers to capture the growing data communications markets by default. If Western Union is to participate in this growing market, it must offer service at (competitive) rates."

AT&T may be preparing a similar move. A Bell spokesman, asked to comment on the WU tariff proposal, said "we intend to be competitive."

—Phil Hirsch

Datran: Service Early in '74

Data Transmission Corp. (Datran), the data communications subsidiary of University Computing Co., thinks it will be offering commercial service by late '73 or early '74. The company, which early this spring received the FCC's blessing to install the Houston-to-Palo Alto portion of its projected transcontinental microwave system, expects construction permits for the remaining two-thirds of the network to be approved "within the next few months."

Initially, it will be restricted to two-point, leased channels. Switched service will start about six months later, according to present plans. Eight-phase modems, supplied by Nippon Electric Co., will be used east of Houston-Dallas, says Ed Berg, Datran's engineering vp. They will allow the company to derive 8800 subchannels within the 22.5 MHz frequency band requested from the FCC. The western end of the system will use four-phase modems and have 4400 subchannels.

The company is said to be trying to reduce its construction outlay from approximately \$290 million, the currently projected figure, to around \$150 million. This move would reduce the amount of outside financial participation needed. Costs will be cut in part by stretching out the construction schedule. Instead of completing the system by late '74 or early '75, as originally planned, it will be

finished six months to a year later, permitting Datran to use revenues from the initial commercial operation, instead of borrowed funds, for construction. Also, rather than investing in its own local loop connections, Datran may lease them from the established carriers, at least until FCC policy regarding local loop frequencies has been finalized.

University Computing has pledged \$23 million to cover the cost of building the Houston-Palo Alto system which the FCC approved in April. Other funds may come from a four-step sale of stock to private investors and the public which was described in Datran's application. But Datran president Glen Penisten said that "other alternatives" were under consideration; he declined to discuss what the final money-raising plan would look like.

Penisten added that discussions are already under way with a number of potential customers, including UCC.

Remote Services

Infonet: They're Listening Now

Although it had studied such a venture for three years, Computer Sciences Corp. vastly overestimated the size of the remote data processing market when it launched its national information network, Infonet, early in 1970. At that time the company said it was aiming at capturing 15% of a market estimated at \$2 billion, or about \$300 million a year.



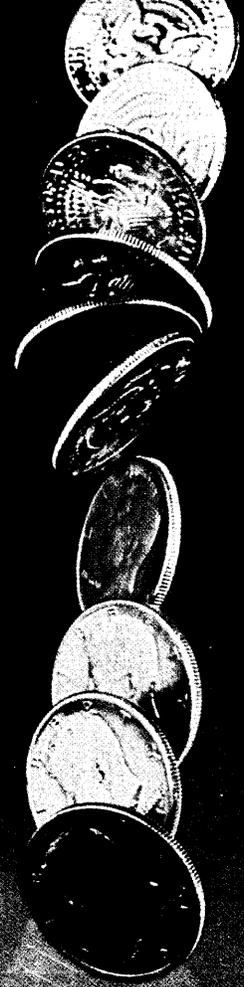
JOHN W. LUKE: He heard the rumors too.

In a recent interview, John W. Luke, Infonet's 47-year-old president, showed how the figures have changed. "It may be a \$1 billion market, I don't know. But if we ever achieve \$300 million, it won't be before '79 or '80; and then it will be due to a tremendous

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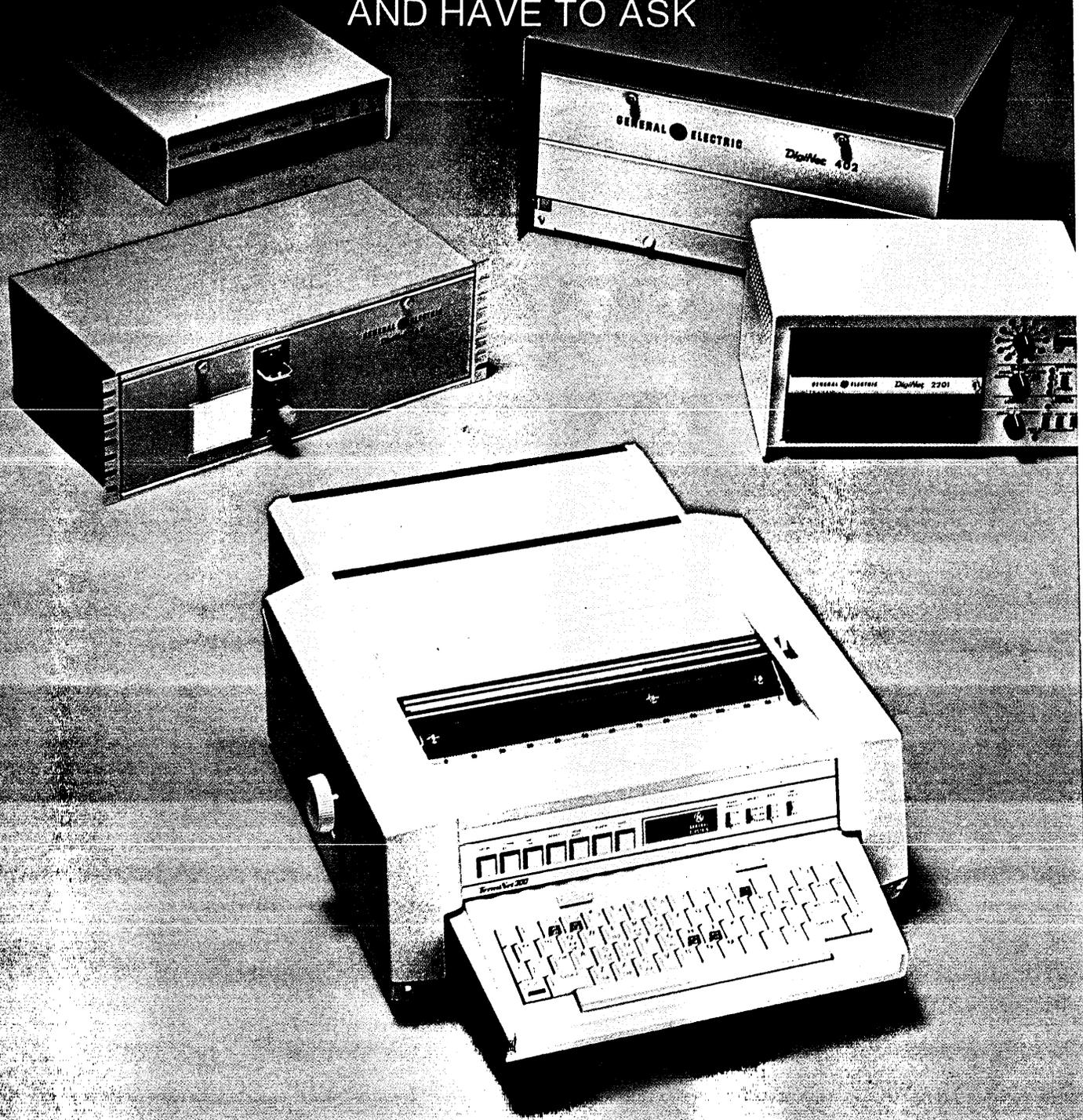
Before taking costly chances on data communication equipment...

There are some
important questions
you need answered



Teleprinters Data Sets and Multiplexers: a value analysis

Most of the things
you should know
AND HAVE TO ASK



Q When should a company start to consider a data communication network?

A When mail delivery of data to be processed is too slow for your business needs.

Q What are the major advantages of a CRT terminal and a teleprinter?

A A CRT (Cathode Ray Tube) provides a momentary visual display.

A teleprinter provides printed permanent data with multiple copies.

CRT's are also available with printed copy. All have advantages to meet specific requirements.

Q What are the advantages of an electronic teleprinter over a mechanical teleprinter?

A While a mechanical teleprinter is low in cost initially, there are major advantages and cost saving features in an electronic teleprinter worth considering. Features like quietness, small size, high speed, and reliability. Higher speeds mean a savings in operator time and line time and cost. Having fewer mechanical parts, an electronic printer's high reliability should mean reduced maintenance costs.

Q Is noise a factor in teleprinters?

A Absolutely. With electronic printers, you can place them in your front office — they're quieter than standard typewriters. This eliminates soundproofing rooms or isolating machines.

Q There are a number of options on an electronic teleprinter. Are they cost savings advantages?

A Yes. This allows you to tailor your machines specifically to each application. Or, you can change as the need arises. General Electric's TermiNet* 300 printer offers you over

20 easy-to-install options to upgrade systems. This eliminates complete re-equipping of a system as your network increases. For example, if you don't have error checking in your network, but decide to add it at a later date — you simply plug in a new circuit board — at minimum cost.

Q Is there a way I can obtain more capacity from my existing communications network?

A Yes. Consideration should be given to the use of multiplexer equipment to carry different transmissions over the same data path. General Electric's DigiNet* 150 and 160 multiplex equipment meets this requirement. These multiplexers are employed in the world's largest time-sharing network — the General Electric Information Services network.

Q Is it necessary to buy special test equipment for installation and maintenance of modems and multiplexers?

A No. Not if you buy features like the ones built into General Electric's data communication products. Built-in testing and diagnostics provide Total Line Control. General Electric's TLC enables the user to rapidly isolate his network problems.

Q Is quality control an important consideration in data communication equipment?

A Quality control is extremely important whether it be teleprinters, modems, multiplexers, concentrators, etc. At General Electric for example, we take extra care to see that you get the best product performance possible.

General Electric's space technology experience has been useful in establishing rigid quality control procedures. After every component and sub-assembly is checked, final tests including vibration and noise are made. Then the entire system is checked, not once, but twice.

Q Is a nationwide network of maintenance service important?

A Data communication equipment requires regular maintenance and service. A nationwide network of locally available servicemen with factory training, special test equipment,

and spare parts provide the capability to get back on line quickly and efficiently. Downtime can be far more costly than any difference in hardware cost.

Q What about user-oriented product documentation?

A In order to best utilize hardware, it's highly recommended that you have complete detailed product literature on all facets of its operation. General Electric feels this to be very important and has developed a full set of user-oriented documentation for all of its equipment.

Q Should I buy or lease this equipment?

A Since General Electric both sells and leases this equipment, we feel we can give you an unbiased answer. Buying this equipment over the long term is less expensive. However, should you want to spread your costs, GE can offer you attractive lease rates.

Q Is it important to do business with a company that has received large repeat orders?

A We think so. It certainly indicates product acceptance and experience. GE has presently shipped 10,000 TermiNet 300 printers which are being used in a wide variety of applications.

Q Is doing business with a company who has single source responsibility important?

A Yes. A single source for data communication equipment gives you single source for service.

Q What about systems capability?

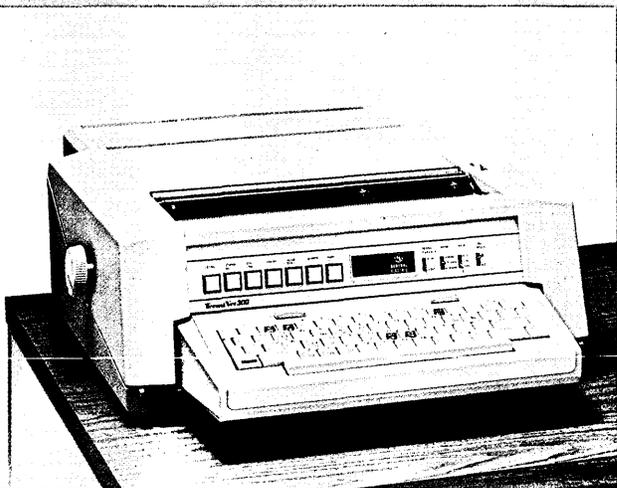
A If you do need systems capability, General Electric has an organization of experienced data communication engineers to help solve your problems.

This may take the form of offering you complete system design and application assistance. Or, the assurance that any one of General Electric's products will be compatible with your system.

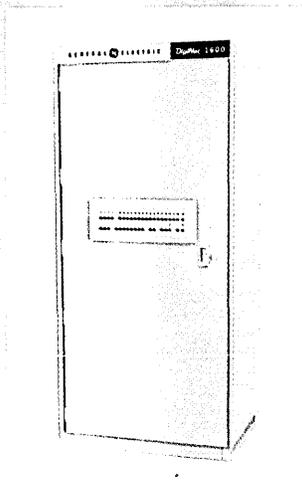
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For data communication products, systems and service

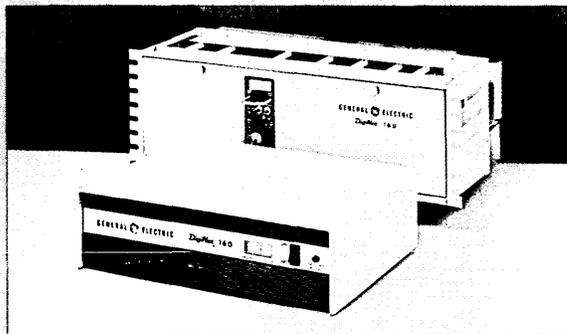
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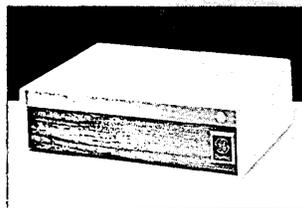
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DigiNet 160 Multiplexer—Offers the most cost effective means of connecting low-speed terminals in diverse locations to a central computing system. Optimum results are obtained when used in conjunction with the data concentrator.



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growth in the use of Infonet facilities for business computing."

Luke adds: "The sources we used for our projections were off, and then came the recession."

Then also came a period of rough times for Infonet's parent, CSC, the 5,000-employee software and facilities management company which unloaded a computerized ticket-selling operation and wrote off \$12.7 million of its development costs. As it negotiated a \$30 million refinancing package with a group of banks, CSC decelerated Infonet's development. (Its planned \$100-million investment has been pared to \$65 million.) The profitability date of February 1972 also was modified. Then late last year there were reports that Infonet was for sale, and finally in February CSC wrote down the development costs against its 1972 earnings, giving rise to more speculation Infonet wasn't long for this world.

But all this time, Luke, who became president in late 1970, was quietly building Infonet, putting in 14-15 hour workdays in the company's El Segundo, Calif., offices — and "hearing the

same rumors. Last July," he said, "I learned from 83 'reliable sources' that I would be fired before the end of the month."

Infonet now has five Univac 1108-based data centers in the U.S. in addition to offices in 11 other cities. In a year, its customers have more than doubled to 1,000 from 400, and Luke says the revenue per customer has increased too, but won't say by how much. Infonet's revenues in the fiscal year ended last March 31 were about \$8 million.

But the really significant milestone in the company's recovery, according to Luke, was in March when it won the General Services Administration's National Teleprocessing Contract, valued at about \$42.7 million over a five-year period. By GSA estimates, it will generate about \$8 million in revenues for Infonet in the first year — equal to what it did with all its customers last year.

It will also require Infonet to step up its development activity — including DML, a data management language, and CSTS, its new time-sharing operating system which replaces CSCX. It

must add lines to five more cities to service all 12 Federal Data Processing Centers; it plans to acquire a fourth computer at the Los Angeles data center, where the data base to be accessed by government agencies will be resident, and it may even add an 1110 later; it will have to augment its staff of 300 and may make some company acquisitions. Thus, Infonet's profitability date has been pushed back again. The company hopes to be profitable by the end of its fiscal year next March, but won't make the prediction publicly. "We've been off on so many things, we're making no more predictions," Luke says.

Even if the GSA order causes some "unanticipated increases in costs," its affect on Infonet's credibility is more than worth it. CSC's highly visible troubles in computerizing New York's Off-Track Betting system seriously weakened Infonet's marketing efforts, Luke says. The GSA order, based on what Luke calls the most exhaustive study ever made of remote data processing services, has changed everything. Within a week CSC had calls from a dozen federal agencies wanting to evaluate the service. Until then, it had only six federal agencies as customers.

Data Communications Programming

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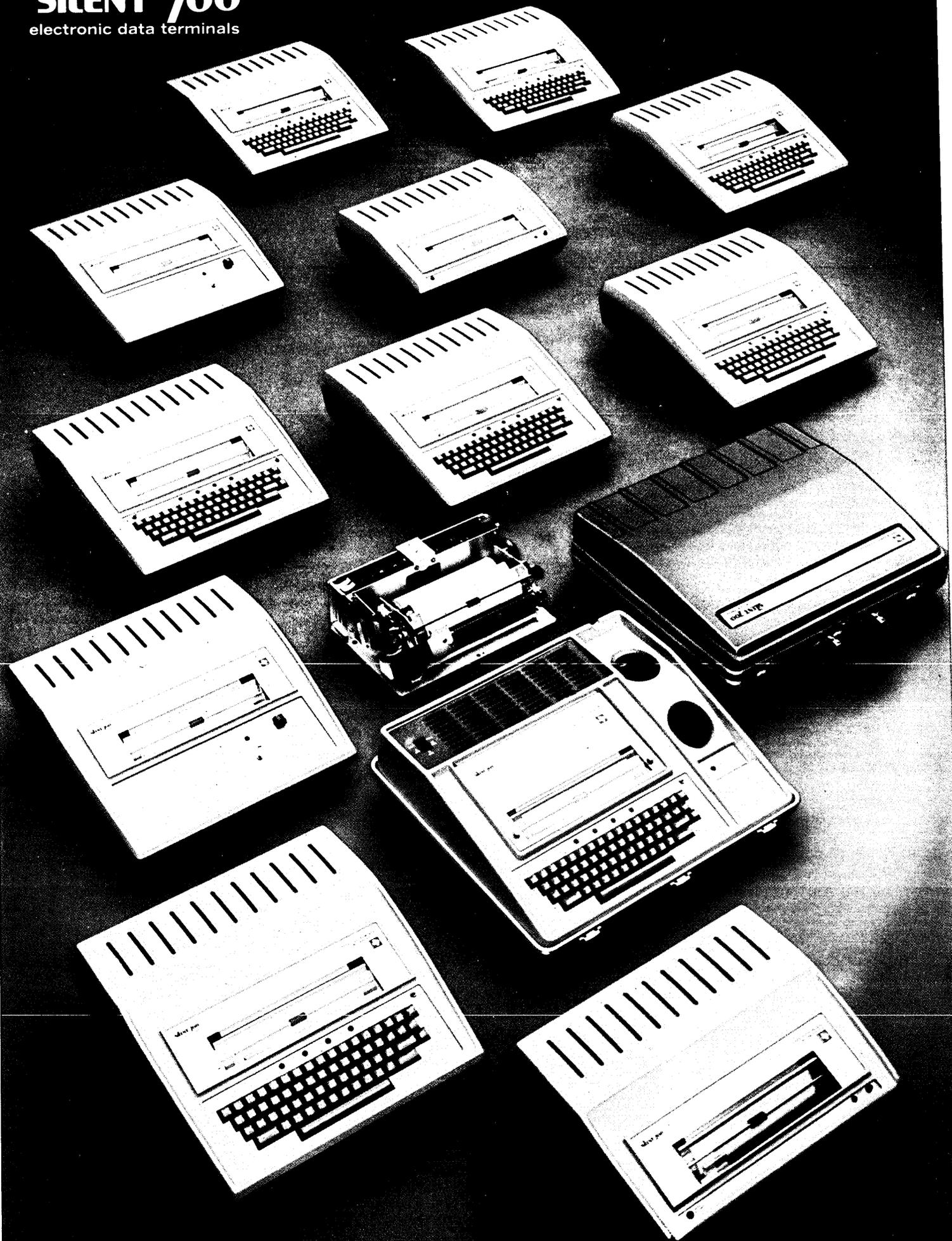
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TEXAS INSTRUMENTS
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executives. Two other service bureaus owned by the telephone company — Continental Data Services, San Francisco; and Financial Data Services, Palatine, Ill. — are apparently on the block. A Continental spokesman, after explaining that his company's investment in commercial dp "wasn't very great (before the divestiture began)," added that "whenever a regulatory body looks down on you for engaging in a particular business, you've got to have pretty strong reasons for continuing it."

Casualty Insurance Needs Answered

The data processing needs of small casualty insurance agencies have pulled a peripherals manufacturer into the insurance business and an insurance company into the computer business.

For the peripherals company, Datum Inc., Anaheim, Calif., it all started in a bowling alley. For the insurance firm, Paul Sybrandt, Inc., Bakersfield, Calif., it started with developing solutions to its own data processing problems.

Datum bills itself as a mini-peripherals (accessories for minicomputers) firm and secondarily as a "problem solver," creating dp systems to solve individual customer problems. Until recently its problem solving had been pretty much limited to technological problems and to the putting together of tailored systems. But then came the incident in the bowling alley.

Left out

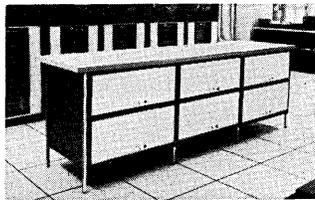
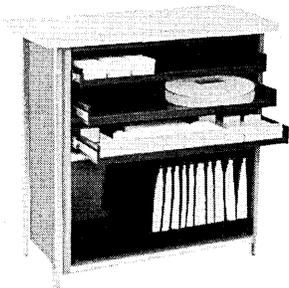
Norm Dawirs, Datum's vice president and marketing manager, was bowling when he was asked by a casual acquaintance what he did for a living. He gave his usual vague answer, that he was associated with the computer industry, and got a far from vague response from the man who happened to be in the casualty insurance field. Seems he didn't feel the computer industry had done much for the small casualty insurance companies, where there was, he felt, a big need. The big life insurance companies had automation, he said, and so did the giants in the casualty field, but the little guys and the agencies were stuck with antiquated methods coupled with increasingly complex regulations.

So Dawirs got to thinking, and Datum

began development of a system for small casualty companies built around a Data General Nova 1210 and one of Datum's high-speed drum memories. It was two and one-half years in development, and Dawirs says it is to his knowledge the only minicomputer-based system which codes, rates, types, and updates homeowner and dwelling fire policies. He believes it is the only system on any kind of computer which can handle dwelling fire policies, which are not structured as are homeowner policies. "It took us eight times as long to write the dwelling fire program as it did the homeowner program, and we did the homeowner first," says Dawirs.

Where IBM fell short

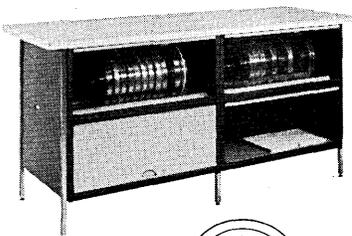
If Datum is first where Dawirs believes it is, number two is not far behind. The Sybrandt agency has been issuing automobile and fleet policies for about a year using an IBM System/3 Model 6, which also handles its accounting. They made a stab at doing homeowner policies but had some problems and had to rework the program. Robert Sybrandt, vice president, said they expected to be doing this again by mid-May. They're also working on a program for dwelling fire policies, which is expected to be



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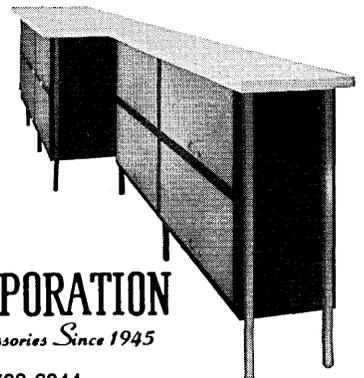
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CIRCLE 99 ON READER CARD

workable by mid-June. Sybrandt started out with programs developed by IBM Systems Engineering Service but found these inadequate, turned them back, and began developing their own in conjunction with a consulting firm, Eden Lord Inc.

But that's not all. The agency soon will be leasing what Sybrandt termed a turnkey system for insurance companies which will include their accounting and policy issuing programs, a cpu (mi-

ni), disc units, a crt, and a 100-cps printer. The system will be offered in a joint venture with a midwestern firm which, at writing, was identified only as "a space-oriented company." Sybrandt said the systems will lease for "less than we're paying now for equipment alone." They're aiming at under \$1K/month, including maintenance, and he thinks they'll make it. Maintenance details and peripherals evaluation were being completed last month.

Sybrandt announced these plans in a general way at an insurance agents' convention last September and received 300 inquiries from all over the country. In early March they wrote to these people outlining more specific plans, and "we received 19 orders." Sybrandt said the system will be tested this summer "at the plant and at our San Diego office" and probably will be certified for delivery in September. Only then will the agency begin its own system in Bakersfield. In the meantime they'll continue with the S/3.

The new system, Sybrandt said, will be operable by anyone who can use a 10-key adder. "We're doing what IBM advertised it would do with the System/3 Model 6. They said anyone could operate it, and this isn't true." He said his agency got the first commercial Model 6 and found out early that they had to hire a trained computer operator.

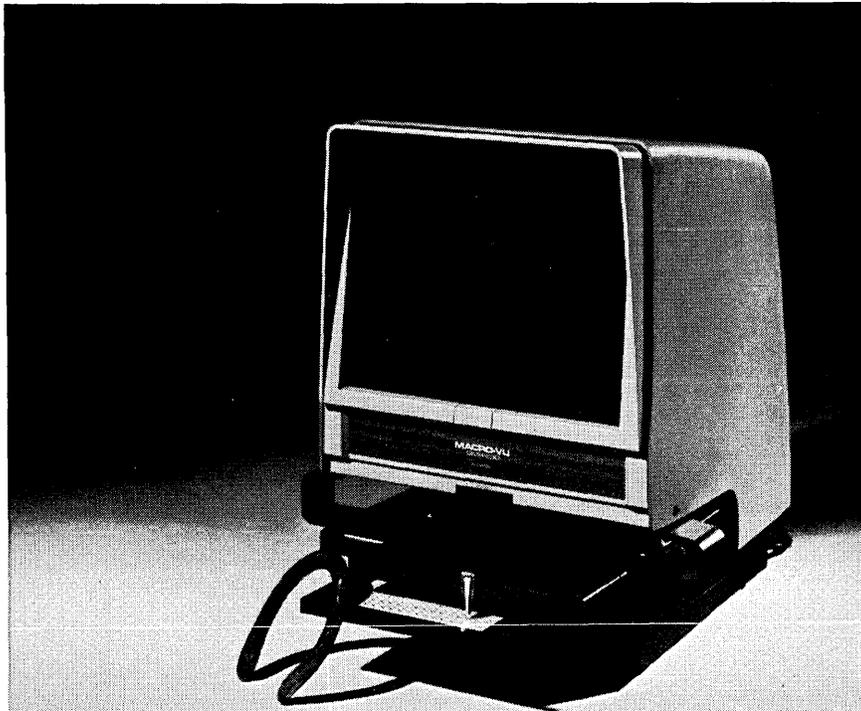
Fast batch

The Sybrandt agency writes from \$2-3 million in insurance per year. With the S/3, policies are batch produced at 24 seconds per policy. For each policy there is also 2½ minutes of input and 2½ minutes of coding, for a total of 5 minutes, 24 seconds, where formerly it took overall some 20 minutes per policy. For a renewal cycle which is currently being entered — the agency has had the system a full year — policy issuance will be instantaneous. Sybrandt said they hadn't attempted to determine comparative costs per policy "because of the different functions the system is performing."

Datum offers its system primarily as a service. It has five companies using its services at \$1 per policy. The newest is a company which insures travel trailers exclusively. Dawirs says they can put a new company on the system in 60 days. He said his customers estimate it takes \$3-4 per policy for manual handling.

The Datum service is aimed at "small to medium companies writing \$1-2 million in premiums per year," and "there are 1,800 of these in California alone," Dawirs said. Currently Datum is concentrating on Southern California, but future plans include possible franchised or wholly owned centers in other parts of the country. Datum is not going to push sales of the system but "won't turn away orders." Priced at \$25-35K, depending on configuration, the system can store up to 256K words and process up to 550 policies per day with a fast operator.

And Dawirs likes bowling better than ever.



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CIRCLE 85 ON READER CARD

Xerox Lab Tools Up for Research Effort

Already overcrowded is Xerox's two-year-old corporate research lab in Palo Alto, Calif. Last month, some of its people began moving into two other facilities nearby, and by the end of this year they will be occupying almost three times the space originally leased.

The Xerox PARC (Palo Alto Research Center) now employs 75, a figure expected to grow to 200 within the next two years. "Currently, we're in a planning mode," says one of the computer scientists, Robert W. Taylor. He says the bulk of their effort is going into planning, hiring, and "tool building." Among these tools is a microprogrammed computer under development for research purposes and due for completion early next year.

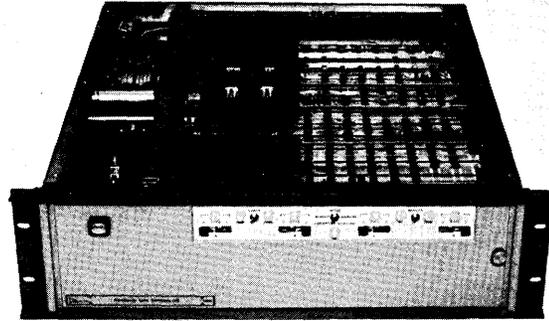
Taylor was Ivan Sutherland's successor as director of Information Processing Techniques at ARPA (the Defense Dept.'s Advanced Research Projects Agency) when he met Dr. George E. Pake, now head of Xerox PARC. Pake, at that time a physics prof and vice chancellor and provost at Washington Univ., St. Louis, was also a member of the President's Science Advisory Committee. Under him, the center is organized into three groups: the Computer Sciences Lab, Systems Sciences Lab, and the Physical Sciences Lab. Staffing the first two are some 15-20 computer research people, the remainder of the center's technical crew being optics specialists and solid-state physicists/materials scientists.

It was the hiring of these computer specialists, from such eminent places as MIT; Stanford; Bolt, Beranek & Newman; and Berkeley Computer Corp., that immediately sparked the interest of many. They were anticipating a serious effort by the giant copier firm — which had only recently acquired Scientific Data Systems — to challenge Numero Uno in the mainframe business. From all indications, this is not to be. If the gauntlet is to be thrown down by Xerox, it may look more like a typewriter than a computer, for Xerox is scheduled to acquire Diablo Systems Inc. and its nifty new printer/typewriter (see April, p. 103).

But at Xerox PARC, the reaction by Bob Taylor was: "What does Diablo make?"

May, 1972

Until mini-computers get smart enough to talk to mag. tapes here's a great



conversation piece

Name just one magnetic tape formatter versatile enough to handle dialogue between most mini-computers and multiple tape units. Seven- and nine-track mix, NRZ and phase-encoded formats, different densities, several speeds. And play software-compatible controller too.

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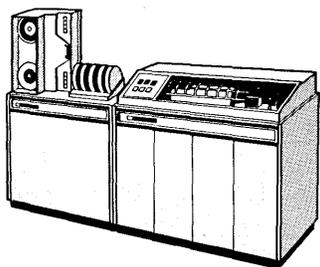
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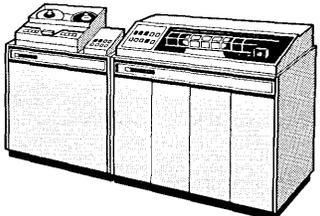
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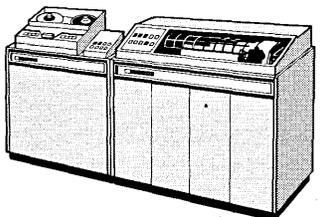
Systems Marketing Offices: Boston 617/237-1950; Chicago 312/325-6630; Cleveland 216/464-2151; Dallas 214/231-8265; Detroit 313/354-5880; Los Angeles 213/475-0681; New York 212/532-9504; Philadelphia 609/667-2000; San Francisco 415/421-9375; Washington, D.C. 301/652-8120.



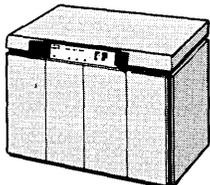
FACT Satellite Printer Model/5300. The System/4000 Satellite with a Format and Automatic Code Translator (FACT) controller handles multiple-format programs and data tables. Processes tapes in densities up to 1600 bpi in 7-track, 9-track or 7/9-track combined formats. Prints up to 136 characters per line.



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CIRCLE 88 ON READER CARD

May, 1972

According to Taylor, it seems unlikely that Xerox will become a computer company, but rather will develop systems that produce revenue for the firm with each usage. Just like their copiers. And the stress will be on ease of use by the public, just like their copiers. "Xerox is in the information business," he explains. "And one can foresee business machines that transform information from one form to another, perhaps more usable, form." Beyond that, Taylor refuses to speak of specific research directions, saying that he disdains stories of glorious plans that fail to reach fruition.

IBM: Hail to Thee Who Left

After 16 years with IBM, during which he attained considerable stature as an executive in the company's World Trade Corp., Robert W. McGrath decided to leave and establish his own sales training and marketing consulting business. This was nothing new, of course. Bright and talented executives have been exiting IBM for years to join other companies or to start their own businesses.

But this very cycle of turnover set McGrath to thinking. Why wouldn't these men who had worked together so many years in all parts of the world be interested (at a price, of course) in knowing where their contemporaries were now located? And so a year and a half ago in Cleveland, the *IBM Alumni Directory* was born.

McGrath's first step was to write 25 letters to old friends still with IBM, outlining his project and asking their personal help in collecting names from their Christmas card lists and the like. The first reply came immediately: "Such requests should be sent to the home, dummy!" But the second one said, "I have tried to react to your request," and contained 152 names and addresses. The first issue, with an eventual 717 names, was off and running.

The fifth edition of the directory is now on the presses, and it promises to rival the pilot issue in interest and appeal. For Number Five contains portions of the long-squelched *IBM Song Book*, dating back to pre-World War II days when International Business Machines Corp. was basically just a manu-

facturer of office machines, principally precomputer punch card hardware.

Oldtimers still remember the songs being belted out at dinners and receptions marking the annual tours of IBM founder T. J. Watson, Sr., to various company branches and facilities. But in the late '40s, men who hadn't sung



ROBERT W. McGRATH: Newest feature in the alumni directory is a song book.

much at Tarawa or during the Battle of the Bulge weren't exactly thrilled at such goings-on during company meetings and the song book was quietly phased out. "Actually, it was confiscated," laughs McGrath.

But this month, such old-time favorites as "March On With IBM," "Hail To The IBM," or the ever-popular "IBM School Song" may ring out again. At least Bob McGrath will publish the lyrics along with his directory, which now includes the names and current addresses of nearly 1,500 ex-IBMers.

Labor of love (and profit)

McGrath, now a vice president of the Dallas-based Recognition Equipment International, Inc., started the publication as a labor of love, but at the same time he "couldn't imagine a man with IBM training overlooking the profit motive." Although McGrath now directs his energies toward the directory only on weekends — "It's my hobby now" — he claims it still remains profitable. Only McGrath and the Post Office know how many copies are sold, and McGrath isn't talking, but the pocket-sized compilation is circulated to far more than the nearly 1,500 people it lists — about a thousand of the alums are subscribers. It naturally has wide appeal to professionally oriented executive recruiters and management consultants,

for the listings are mostly top-drawer executives in about 450 companies, principally in the data processing field. More than a third of the names are followed by the magic titles of chairman of the board, president, or vice president. McGrath gets \$10 an issue or \$25 a year for the quarterlies; he admits the alumni get a "special rate."

The cohesiveness of ex-IBMers comes as no surprise to McGrath. He claims a spirit or "mystique" lingers long after a man has left the company. "IBM creates a high degree of professionalism and employee dedication," he says. "Most of them are achievers, and that competitive spirit is internal as well as external. It's no wonder to me we all want to know where our friends have gone and what they're doing."

But how has America's fifth-ranked corporation with annual sales of some \$8 billion reacted to the unofficial "alumni association"? McGrath says it simply hasn't — and he didn't expect it to. The only official communication he has ever received from Armonk (IBM's corporate headquarters in New York's Westchester County) was a purchase order from the library — at the full subscription rate, of course. McGrath, an unabashed IBM-booster, is obviously proud of his "15 or so" IBM-paid subscriptions from around the country.

But it wasn't always so. His attempts at building a list for the first issue met considerable resistance from some individuals within the giant corporation. Some of McGrath's early mail contained statements like: "It's just plain against the rules and could get me in serious trouble" (which McGrath vehemently denies); "I really think it would be inadvisable for me to pass the information you asked for"; or simply a terse, "This would be confidential information and I would be unable to give it to you anyway." McGrath smilingly says, "I didn't realize a family Christmas card list was such a big secret!"

The names come in

In spite of the cautious ones, mostly the names came in — and they're still coming. Each issue now contains forms for additions and deletions. "The first issue had the names of two men I later discovered had never worked for IBM," McGrath reveals, "which says something — but I'm not sure what." They have since been removed from the list. Only one bonafide IBM-ex requested

his name not be included — and he didn't give a reason.

As to why the talent keeps leaving IBM at the rate of perhaps 2,000 a year, McGrath suspects it may be the very "bigness of the company. IBM is somewhat like a full-dress parade at West Point," he asserts. "If several cadets keel over, hardly anyone notices, for there are so many of them.

"The experience you gain at IBM often is highly specialized and too narrow." So with those who leave the company "only the extremely creative ones — those who can adapt to new situations and become good profit-minded *general managers* — really make good."

Another Dallas IBM alum claims that "responsibilities within IBM are so limited and kept within such rigidly narrow bounds that walking under the huge IBM umbrella poses few challenges and often makes advancement difficult. The longer you stay at IBM, the less chance you have of getting away from it," he concludes.

But perhaps the most poignant insight to anonymity under the corporate "umbrella" was revealed in a handwritten letter from an IBM employee answering McGrath's original request for names of alumni:

"Unfortunately I still find myself in the same position as when we last worked together with no prospect for improvement, yet too chicken to quit and face the world after all these years with IBM. As for the list of ex-IBMers, you know it is a long one, but unfortunately I have not maintained contact with anyone who has left."

McGrath solemnly concludes, "He gets a free copy of every issue now."

Biomedicine

Link-8 Restores Paralyzed Brain

A stroke victim will often suffer from paralysis, the result of damage to, or even destruction of, portions of the brain that control the movement of an arm or leg. Scientists at Stanford Research Institute, Menlo Park, Calif.,

working on the thesis that an undamaged part of the brain might take over the lost motor function, have come up with a computer-based system that works, at least on monkeys.

To simulate the effects of a stroke, they removed small portions of the brain to induce paralysis, implanted electrodes to other parts of the brain, and enabled the monkey to again use that limb. In a dramatic demonstration, they even trained a monkey to flip the switch on the Link-8 computer (with its good arm) so it could reach out and feed itself with the formerly paralyzed arm.

According to Leonard R. Pinneo of SRI, principal scientist, the computer program occupies slightly more than half the DEC Link-8's 4K memory. It is a table of instructions from which to turn on each stimulator — controlling when the current is turned on, its maximum current and rate of rise, and when it's turned off. These stimulations, in a proper sequence, produce the movements in a monkey's limb. One obvious progression would be to miniaturize the so-called Programmed Brain Stimulator.

Within the state of the art

"It's within the state of the art now," Pinneo told *Datamation*. "The controls theoretically could be put on tape, rather than a small computer." With a hardwired device, he adds, there wouldn't be any need to carry around a computer. "I could conceive of a device that a person with a paralyzed arm might carry with him. He could push any one of a number of buttons that preprogram a stimulation of the brain to produce sequences of movement in that arm that are goal-directed, like eating or turning a knob or opening or closing a door. The parameters to do this could be worked out on a large computer, and these parameters put into the smaller device, which is hardwired. And the hardwired program could be tailored to the specific patient's problem." He adds that there would still be a need for a large computer to work out all the permutations and compilations necessary for the individual.

Actions induced in monkeys have included reaching out and grasping food, bringing it back to the mouth, scratching its back, and climbing a fence. In all, more than 200 locations in the brain stem where elementary movements could be induced by electrical stimulation have been found. And these include such actions as finger movements, opening and closing of the

mouth, movement of the tongue, the tail, and the eyes.

Unfortunately, in the midst of this research and when it was about three years away from possible application to humans, funding for the program by the Office of Naval Research was discontinued. This occurred a year and half ago with the passage of a so-called Mansfield Amendment, which prevents DOD money from being spent for non-military research. And since then, Pinneo has been able to spend only minimal time on his project, which had been under way for some five years.

International

Buying Authority Realigned in U.K.

The British government has moved into action on the first really imaginative effort to bring some semblance of order to the computer business. It is expected to be the first of a two-part reconstruction. With the first reform, the government has in effect put its own house in order as the major edp purchasing agency. This should ease the second phase of realignment, that of the manufacturers through the terms of their research and development support from the government.

In practice, the changes, which came into effect on April 1, are based on recommendations from a Parliamentary select committee on science and technology, which reported on the future prospects for the U.K. computer industry after a year-long inquiry. One of their criticisms was of inefficiencies created by fragmentation of responsibility between Ministry departments. Now a single Central Computer Agency has been created for approving expenditures for hardware and software, currently running at \$80 million a year. This agency is part of the Civil Service Dept.

In theory, this department had been responsible for policy, planning, and operational support of edp installations. But evaluation of systems proposals was done by the technical support unit of the Dept. of Trade and Industry (which in turn had some now historic but influential connections with the Treasury and Post Office).

The actual process of tendering and exchanging contracts was the job of a third department, Her Majesty's Stationery Office, that was constantly get-

ting into hot water because standard forms of contract were unsuited to the needs of edp operations. From now on, each government department will be responsible for its own existing computer operations but will need financial approval of new projects by the Central Computer Agency. Direct sponsorship of the computer industry through grants for research and development, etc., will come under the Dept. of Trade and Industry.

State intervention to prop up the industry is inevitable, and this was another major item examined in the select committee report. During April, the Trade and Industry department was completing details of the way support should be given in the light of both local and European prospects for cooperation. The scale of R&D support to be made available to ICL was expected to be \$40-50 million a year for the next three or four years, about one-half the level suggested by the select committee.

The director of the new Central Computer Agency will be Stephen Spain, a Civil Service under secretary. His staff numbers 600, of whom 400 came from the Stationery Office, 100 from the Trade and Industry technical support unit, and 100 from Civil Service.

On starting day, government computer installations in 20 central departments numbered 213 — 93 for scientific work and 120 for a wide range of administrative dp. A total of 12,000 staff, including military personnel, was divided between data preparation and support (6,500); and management, systems programming, and computer operations (over 5,000).

In a statement to Parliament, Lord Jellicoe, Minister in charge of Civil Service, said the government took the view that computing in government required an increasingly close association between policy, planning, and execution. In the future, government, as a major computer user, would be able to speak more clearly with a single central voice. The agency itself would offer greater scope for increased professionalism for computer careers in government.

—Pearce Wright

Mrs. Hoodless' Terminal

Elisabeth Hoodless is the youthful executive director of London's Community Service Volunteers, and she had a

computer problem. It was solved — sort of — last month, but the story behind the solution is an elaborate one that reflects well on Honeywell and the British Post Office and, in passing, chalks a bit of a black mark against IBM.

The organization, which matches young volunteers wanting to do social service work with the elderly and the mentally and physically handicapped who need their help, first felt the problem last year when it was placing some 1,300 volunteers. This required matching the volunteers' age, abilities, and interests with those in need all over the U.K. With a budget of only \$250,000, its administrative machinery had about reached its saturation.

Last month, Mrs. Hoodless finally took delivery on a time-sharing terminal in London. It will allow her, she says, to double the service's capacity for immediate matching of help offered with help wanted at no extra cost.

When the problem arose, Mrs. Hoodless asked for time on the 360/40 owned by the government of her local district. After all, she explained to the City Council, the machine was used only 55 hours a week. To Mrs. Hoodless' disappointment, it wasn't long before the council found other work to fill the computer time.

But Elisabeth was undaunted, sallying forth to the local IBM fortress, no less. To IBM her argument was plausible: IBM had plenty of open time, and what better cause than to support this endeavor in the social services. Progress seemed satisfactory until the IBM bureau learned in horror that it was not going to receive money. And Mrs. Hoodless' latest scheme fizzled.

By happy coincidence, a novel competition had been contrived by the weekly magazine *New Scientist*, Honeywell Information Systems, and the Post Office. This offered an annual prize of a free terminal for a year, including \$2600 of computer time and phone line cost to the GEIS time-sharing system Honeywell had acquired. The challenge for the prize was an essay on the most original application of a time-sharing service. Needless to say, one of the competitors was Elisabeth Hoodless . . . and she won. Announcing this to their essayist, the judges at *New Scientist* were somewhat alarmed to discover she had not the remotest idea of how to operate such a complicated device.

But in stepped Honeywell in the form of customer relations manager David Slocombe. He discovered that Christo-

pher Rynkiewicz, one of the young volunteers working with backward children, had brushed against computers at the Univ. of Wales. Under guidance over the past three months, Rynkiewicz has designed, programmed, and gotten the system on the air.

There is another twist to the whole affair. At a press conference introducing the terminal installation, Lord Windlesham, a senior member of the present Conservative government, gave his blessing on this decidedly liberal organization. He indicated that the Cabinet would be delighted if the numbers of volunteers could be doubled yet again.

But just when everyone seemed to be getting along, the redoubtable *New Scientist* magazine published an unusual statement saying it would have to reconsider its arrangement with Honeywell Information Systems over the future of the competition. This was prompted by an article carried in the same issue describing the latest types of U.S. antipersonnel weapons in use in Vietnam. Although the computer manufacturer cited most devastatingly in the detailed analysis was IBM, on the basis that Honeywell was known to engage in antipersonnel devices, the editor of *New Scientist*, Dr. Bernard Dixon, felt conscience bound to question his alignment with HIS. It has since been learned that Dr. Dixon was under considerable pressure from an organization called the British Society for Social Responsibility in Science. It includes members of Dr. Dixon's staff and also numbers some vociferous left-wing academics. All this *began* simply enough ...

Japan Steps Up Subsidies

Protected by a restrictive import policy, the Japanese computer industry has been trying to develop a technical competence that would enable it to compete against foreign-made products. This holding action, which has subjected the government there to increasing flak from abroad, has finally started to loosen. The Japanese have removed import quotas, not to be confused with tariffs, on all peripherals except for memories and terminals.

Nothing to be terribly elated about, it's still a first step, a symbolic move,

and a necessary prelude to the liberalization of import restrictions, according to one close observer. The "quota," he explains, was something the officials could cite in turning down a supplier's application for an import license, but no one ever saw any numbers that indicated when an upper limit had been reached. Still, if the tariff reductions anticipated over the next few years are to have any significance, the dropping of these quotas must come first.

In anticipation of this gradual liberalization of both import and capital restrictions, thereby opening the Japanese computer market to foreign firms, the government in Tokyo has stepped up significantly its subsidization of the domestic industry. For fiscal 1972, which starts in April, the Ministry of International Trade and Industry (MITI) has budgeted almost \$24 million to develop a stronger industry and a higher level of technology. This figure is up from \$4 million in the previous fiscal year.

A large share of this recently announced, six-fold increase will go for a so-called 3.75 generation of computers and for competitive peripherals and terminals. The three mainframe-producing combines of Hitachi-Fujitsu, Nippon Electric-Toshiba, and Oki-Mitsubishi stand to get some \$15 million, or up to 50% of their developmental costs. An additional \$2.27 million is earmarked for peripherals makers, which includes the mainframers. Among these companies, the government looks for a nucleus of firms capable of producing equipment that's competitive in price and performance with peripherals produced abroad. Neither of these subsidies existed in the previous year's MITI budget, according to the Tokyo-based *JCI News*.

Over the next three years, through fiscal '74, the publication notes, the government has promised the mainframers some \$110 million for its R&D costs leading to the new computer series. This results from last year's reorganization of what had been six computer manufacturers into three cooperative link-ups. Now, if the 30-plus companies in the peripherals field can come up with similar, sensible arrangements, the government is saying in effect that they too might be in line for handsome handouts.

Receiving a lesser amount during fiscal '72 is the software sector. An arm of MITI called the Information Technology

Promotion Agency (IPA) receives \$2.6 million, not much more than last year. With money purportedly provided by both the government and private industry, the IPA funds the development, purchase, and marketing of software that no user or manufacturer could afford to undertake on its own. To date, IPA funds have been released for the development of file management systems for a medium-scale and a large-scale computer, for some utility packages, and a system to convert the Japanese alphabet to the more complex ideographs called *Kanji*.

Selling Direct to Red China

Trading between China and Europe existed before President Nixon's visit, but commercial ties received a flip as a result of that diplomatic overture. Although Britain's ICL (and the former Elliott Computers) had made sales to China in the past, the plan to sell direct instead of through Indian and Hong Kong intermediaries may have been helped along by ICL's participation in a trade mission to Peking and Shanghai last month.

It's been about five years since the last hardware from Britain found its way under the bamboo curtain, but ICL is optimistic about the prospects for the small to medium processors of the 1900A series. These are thought attractive for the Chinese situation and yet are of a nonstrategic scale. Thus they would not infringe the list of embargoed goods monitored by Washington and her 12 partners in NATO.

People

Morris Publisher of Datamation

James M. Morris, associate publisher of *Datamation* since last May, has been named publisher of the magazine. He succeeds Gardner F. Landon, executive vice president of Technical Publishing Co., who will devote full time to the company's corporate development.

Mr. Morris, who is both an engineer and veteran publishing executive, joined *Datamation* in 1963 as a sales representative after seven years with McGraw-Hill Publishing Co. He is a graduate electrical engineer from Univ. of Detroit, and before entering the pub-

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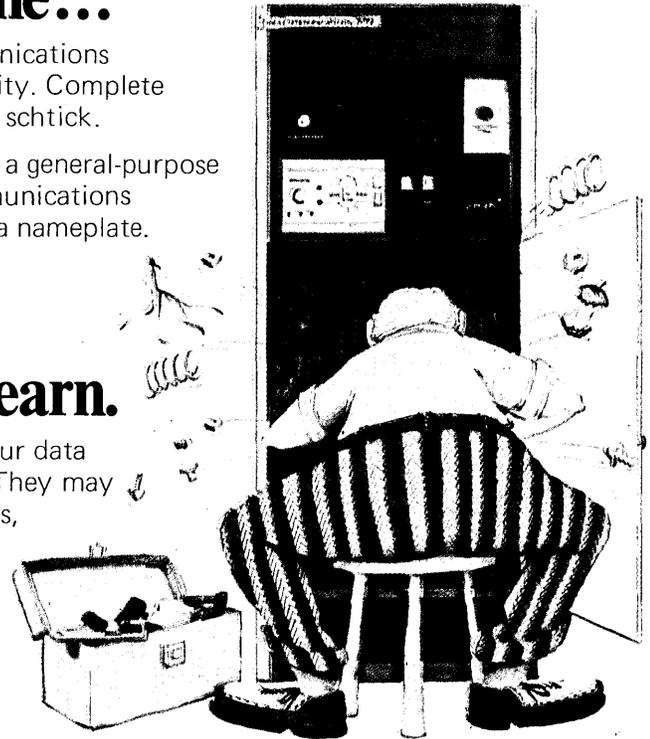
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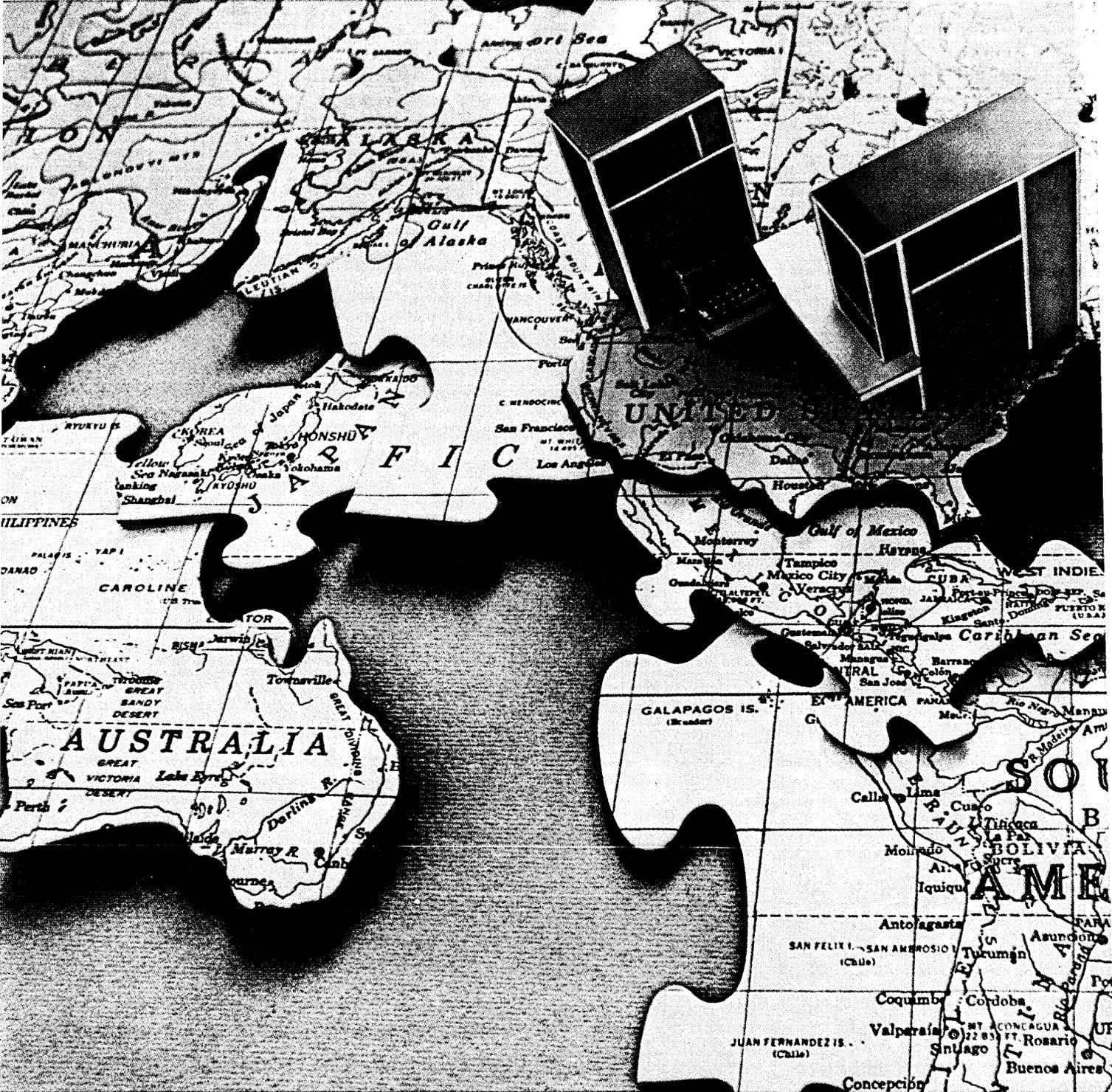
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lishing business worked with General Precision Equipment Corp. and Sperry Rand.

He was named assistant publisher in June 1970 and since then has been in charged of the day-to-day operations of



JAMES M. MORRIS

the magazine in addition to coordinating editorial, circulation, and sales activities. He also has been responsible for development of related ventures for the magazine, including inauguration of a European edition. His offices are in Greenwich, Conn.

Mr. Morris has been actively involved in the Boy Scouts of America since 1955 and is community chairman of the Mamaroneck-Larchmont District. He is a Republican county committeeman in New York's Westchester County where he resides with his wife and seven children.

The Cops and IBM and Lawrence Tate

"On the basis of newspaper accounts, it appears evident to us that Mr. Lawrence A. Tate has been the victim of an abuse of police power and certainly he has been the victim of the usurpation of the judicial function by the IBM Corporation, his employer of 18 years standing."

This is the first paragraph of a four-paragraph petition circulated by The Committee for Social Responsibility in Engineering among faculty members in computer science at universities across the country. At last count the committee had some 60 signatures on copies of the petition.

Its subject, 45-year-old Lawrence A. Tate, was at this time last year with IBM Corp. on the staff of the assistant general manager for operations, Data Processing Group, at a salary of \$31,-

200. According to his resume, his duties included "analysis, risk assessment, and resource evaluation of product development and manufacturing programs, resolution of interdivisional problems, long-range technical planning studies including organizational and business implications." He joined IBM in 1953 and worked first in development of communications products.

Last August Tate was found guilty in Village Court, Tarrytown, N.Y., on two misdemeanor counts, maintaining a criminal nuisance and obstructing government administration. His 17-year-old daughter, Cindy, was convicted of possessing dangerous drugs. Following the convictions, Tate was called into the office of Roy Brubaker, an IBM group director and his immediate superior, and told he was discharged. "I wasn't given a reason then," said Tate, "but he had a copy of a *New York Times* article about the trial in front of him and there were three red circles around the three places where IBM's name was mentioned."

A Don Quixote

The Committee for Social Responsibility in Engineering, which describes itself as an insurgent group of engineers with members drawn from engineering schools and industrial organizations running the gamut from undergraduates to Fellows of the IEEE, became interested in the Tate case as a result of the *New York Times* coverage of the trial. "Initially we were leery," said Ted Werntz, committee coordinator, "but we met with him and talked to many people who had been associated with him within IBM and outside, "and we determined he is exactly as he appears to be — simply a Don Quixote."

He was referring to Tate's contention that his troubles with local police that culminated in his trial and conviction were the result of police retaliation. Tate claims his troubles began in March 1970 when his daughter and nine other students at Irvington (N.Y.) High School were arrested during their lunch hour by local police and charged with "loitering with intent to use dangerous drugs." The other students accepted a minimal form of probation in return for having the charges dropped, but Tate insisted on a jury trial for his daughter. The case was dismissed for lack of evidence after the jury failed to reach a verdict. Tate filed a \$125,000 suit against the Irvington police for false arrest. This case is

still pending and will continue to be postponed, says Tate, until settlement of a now-more-important-to-him action, the appeal of his conviction. This appeal was expected to be ready for filing by the April 7 deadline for the spring session of the district appellate court.

Tate contends his filing of the false arrest suit initiated a long period of police "harassment" of himself and his daughter which included a period of three months' surveillance of his home prior to the raid which led to his arrest and subsequent conviction. He claims his conviction was the result of perjury on the part of some of the police officers who testified, of planted evidence, and of bad handling of his case by his own lawyer, whom he has since fired.

When the Committee on Social Responsibility in Engineering decided Tate's cause was a just one, it drafted its petition and initiated a series of correspondence with IBM president Frank Cary. The committee was seeking a meeting with Cary to "discuss the Tate case in particular and IBM's general position on such matters." Cary's consistent response was that "we view Mr. Tate's separation from IBM as a confidential matter between the IBM Corporation and Mr. Tate, and we do not feel it is appropriate to discuss the matter with anyone outside the company."

This position that the reasons for an employee separation are a confidential matter between employer and employee was still the official IBM answer to questions about the Tate case last month.

Breakfast at Armonk

But Tate himself eventually was told why he was fired. He said he was contacted by Cary last October "when it got back to him that I hadn't been told why I was fired. We had a breakfast meeting and a pleasant chat. He told me I was fired because my conviction on the misdemeanor charges would interfere with my ability to work with other employees and they had no spot for me in which I could work as a recluse. He left the door open for possible reemployment should the convictions be set aside. I told him I thought the situation had caught IBM in a panic and cost-cutting mode."

According to Tate, Werntz, and Prof. Stephen H. Unger of the computer science faculty of Columbia Univ., who was one of the committee members who corresponded with Cary, a number of Speak Ups — written notices like suggestions which IBM encourages its employees to write on matters of policy

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or corporate practices — have been written on the Tate situation, but none had been published in the company's internal publication, though it is common practice to do this if a number are written on a single subject. IBM declined to comment on this point.

Tate has sought other employment since his dismissal by IBM but without much luck. "I have a lot of overkill with potential employers. With some, the conviction on the misdemeanor charges has made me a no-no." Currently he is teaching a course in telecommunications at Columbia and is in the early stages of planning a company of his own, "but it's too soon to go into detail on that."

The CRSE petition's third paragraph reads: "We call upon the management of the IBM Corporation to reinstate Mr. Tate with back pay, and to revise its administrative procedures so as to preclude penalizing of any employee for reasons unrelated to his qualifications or performance on his job." Tate said he is still "on the best of terms" with the people with whom he worked at IBM and that his situation has "made some of them nervous and others horrified." Would he go back to IBM? Tate's answer to this question was: "My cash flow is strictly negative."

Financial

Venture Capitalist Likes DP Firms

During these days of the new hyper-aggressive IBM, the computer industry as a venture capital investment has all the allure of the livery stable business. Many venture capitalists — if they have any money left — have been avoiding computer-related investments like the proverbial plague in the wake of IBM's price-cutting.

One exception, however, is David J. Dunn of Idanta Partners. "I still like the computer business from an investment standpoint," says Dunn. "One of the reasons is that I like to compete with strong capable companies in a business that's difficult to enter."

A good example is Prime Computer Corp., Natick, Mass., which Idanta has just bankrolled. The new firm, which is a minicomputer systems company, is headed by Robert C. Baron, a former

executive with Honeywell's Computer Control operation.

One reason Dunn still likes the computer industry is that he feels it is possible for new companies to compete against IBM, and more important perhaps is his hope that the computer Goliath will tone down its overly aggressive stance largely because of growing antitrust pressures. Dunn's reasoning goes something like this: In the past several months, IBM's price-cutting of many products has helped IBM maintain its market share; but the process has cut revenues not only of IBM's competitors, but of IBM itself. Dunn feels that IBM will begin to take more of a business point of view — and be willing to lose some market share here and there in return for higher profits.

Two that made it

Dunn cites two relatively new computer start-ups that he has been involved in as a venture capitalist that have been able to compete successfully against IBM — Inforex and Storage Technology. Inforex, a data entry company, has shipped more key-to-disc systems than any other manufacturer; and Storage Technology, although not yet three years old, has already shipped some \$15 million worth of tape drives. Both firms meet Dunn's criteria of competing with strong, capable companies and being in an industry segment that is difficult to enter. Both have required a great deal of money to get beyond the lift-off stage. Dunn did the Inforex and Storage Technology deals when he was a partner at J. H. Whitney & Co.

At Idanta, Dunn has resources similar to what he had at Whitney, which is a way of saying that he has a great deal of money to invest. Dunn won't say precisely how much money Idanta has, but he indicates the company has somewhere between \$5 and \$10 million to invest.

The San-Diego-based Idanta is financed by Splay Vest Inc. of Fort Worth, Texas, a corporation whose revenues are generated primarily by the oil business. Dunn's goal for Idanta is ambitious — he figures its average annual appreciation will be between 30 and 50% compounded. In addition to the Prime Computer deal, Idanta has invested in a bank and a hair products firm.

Another partner in Idanta is ex-IBM

Russell J. Robelen, who headed cpu design on the 360/50. While Robelen spends a great deal of his time examining computer and high technology opportunities, he also gets involved in reviewing Idanta's other deals. "We're essentially generalists," says Robelen.

Knowing the territory

Dunn is primarily a financial man (graduate of the U.S. Naval Academy and Harvard Business School) but has made a point to learn the computer business via self-study and IBM courses. "I liked the computer peripheral field, so I studied it," recalls Dunn. "If you know a field and like a field, then you can do a deal fast."

Like the Storage Technology deal. Dunn was sailing his boat up the East Coast in the summer of 1969, and when he called his office from port at Annapolis, Md., he was told of a company start-up in Colorado. Dunn tied up his boat, flew to Boulder, made the deal that night with the other founders of Storage Technology. Whitney put \$250,000 into Storage Technology and, as this is written, that original investment had grown to be worth more than \$7 million.

Dunn and Robelen are constantly on the move, pursuing their policy of being on the road 25% of the time to keep on top of their investments and, more important, to examine new deals. They see themselves as the antithesis of the traditional venture capitalists, who sit back and wait for deals to come along. Idanta's policy is that it can't look at enough deals. The company considered 200 deals between October and January.

Automated Testing

The Computer As Mechanic

Foreign automobile manufacturers often beat their American counterparts in incorporating advanced technology into their products. Some examples: It was Jaguar in the '50s that thought the disc brake used on aircraft could be a much better system on autos than the drum brake. Chrysler Corp., probably this country's most engineering-oriented manufacturer, advertises that all their products are equipped with simple, reliable torsion bar suspension. The original patent for the torsion bar was assigned in the '30s to Ferdinand Pors-

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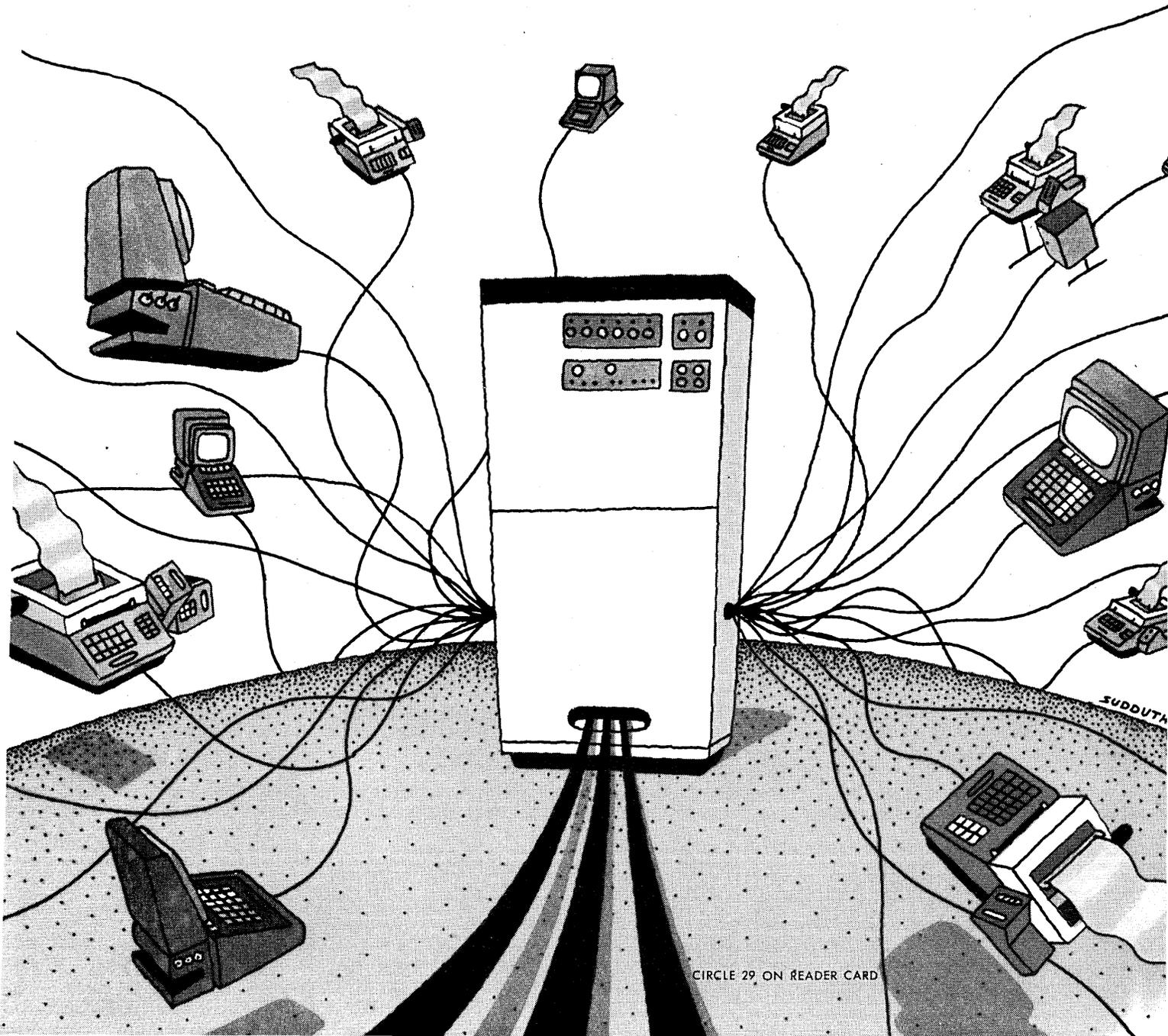
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che, founder of the firm of the same name. The rotary engine used by Japan's Mazda (under license from Germany's NSU) has so many advantages over reciprocating engines that it may replace them by the end of this decade — that is, if American manufacturers start building them, which they are thinking of doing.

European leadership

And it appears that the foreigners have a good head start in using computers and automatic controllers not only to build them, but to test them and even put them into the cars. Volkswagen probably leads the world in this department — which is interesting for a firm whose product doesn't differ very much from Porsche's original design for it dating back to the '30s. Several years ago VW stuck a little controller on one of their engine's fuel injection units (developed by Mercedes-Benz, 1953) to control the amount of fuel supplied the engine, depending on engine load, power required, etc. And as you read this there is a Hewlett-Packard 2116 minicomputer riding around in a van to

spot check new and used Volkswagens at dealerships to make sure they comply with pollution regulations.

VW seems to like the idea of having computers in and around its cars. Since the middle of last year they have been putting sockets in VW engine compartments. The socket is wired to components throughout the car. When the car is being prepared for delivery, or is brought in for service, the mechanic plugs this socket into a cord attached to a computer built to VW's specifications by Allis-Chalmers Corp. in this country. A plastic program card for the year and model VW being tested is inserted into the system to supply parameters for comparison purposes.

Built-in analysis

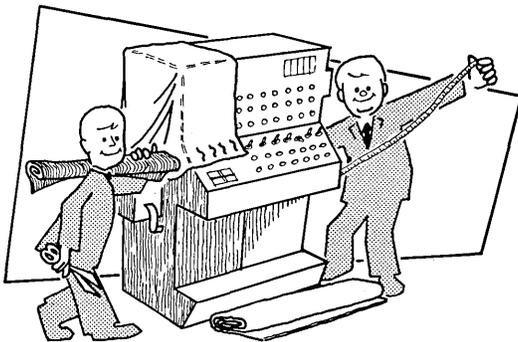
The system then starts checking the condition of such things as the battery; ignition; parking, stop, and turn signal lamps; and even the engine's compression ratio — a good indicator of overall engine condition. When a manual check is required, information is displayed to the mechanic on a hand-held device equipped with go/no-go buttons to get

his evaluation of such things as tire wear. The information from more than 60 check-list items is analyzed and printed out on a sheet for the mechanic's and owner's information. The whole testing sequence is said to take 21 minutes — exactly half of what it used to take doing everything manually.

The Computerized Self-Analysis System, as it's called, is scheduled to be operational in all large dealerships by the end of the 1973 model year. VWs dating back to 1965 models will also be tested on the equipment, with all information supplied manually; and cars built before that will be tested on existing equipment.

The system would seem to benefit a lot of people. Buyers should like the idea of monitoring the car's performance — the sales people certainly hope so. The quicker test time benefits both the dealer and the buyer. Emission checks are performed in the testing sequence, which should help lead to cleaner air for everyone. Just about everybody benefits except Detroit's auto makers. Perhaps five to ten years from now they'll get around to the idea — as soon as they've exhausted all the possibilities in designing sequential turn signals.

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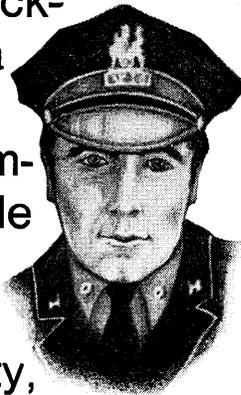
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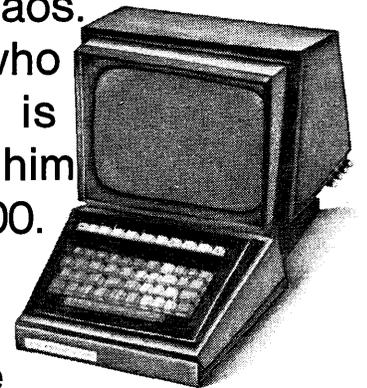
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Simulation

A Model to End All Models

The application of computer-based models for solving land-use problems, urban transportation planning, pollution difficulties, and other environmental nasties is increasing in scope. But the most recent report in this field might legitimately be described as the model to end all models. For the main conclusion is that without a total overhaul of politico-economic policies, the civilized world as we know it has little more than a couple of generations to run.

This is the gist of the findings in *The Limits to Growth*, an MIT research report on work sponsored by a group called the Club of Rome. To perform this study, a world model was built to investigate five major trends: accelerating industrialization, rapid population growth, widespread malnutrition, depletion of nonrenewable resources, and a deteriorating environment. These are all interconnected, and their develop-

ment is measured in decades or centuries, rather than months or years. The outlook is none too cheery.

The model has been rated as the most complex yet constructed of dominant interacting components of world systems. The analysis was to cover a rash of problems — poverty in the midst of plenty, degradation of the environment, loss of faith in institutions, uncontrolled urban spread, insecurity of employment, alienation of youth, rejection of traditional values, and inflationary and other monetary and economic disruptions.

These seemingly divergent issues combine to form what the Club of Rome calls the "world problematique." But they have three characteristics in common: They occur to some degree in all societies. They contain technical, social, economic, and political elements. And, most important of all, they interact.

The beginning

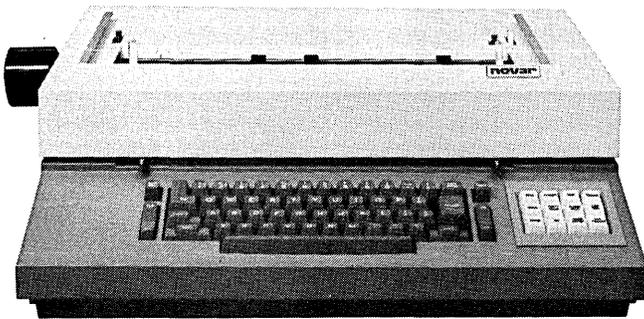
The first part of the development of a mathematical model from this descriptive assessment started in the summer of 1970 with a meeting at Bern, Switzer-

land, and Cambridge, Mass., with Prof. Jay Forrester of MIT. The computer pioneer explained the basis for defining a global model and the analytical techniques for detailing the behavior and relationships of most of the components.

This led to support funded through the Volkswagen Foundation for the work in systems dynamics to begin at MIT under the direction of Prof. Dennis Meadows. And it is his team, with members from the U.S., Turkey, Iran, Germany, India, and Norway, which produced the voluminous first model on which *The Limits to Growth* is based.

Meadows' team examined the five basic factors said to determine and therefore ultimately limit growth on this planet — population, agricultural production, natural resources, industrial production, and pollution. In practice, the model extrapolates rather than predicts; but the authors say if you do not believe the extrapolations, you are assuming momentous major changes will have taken place. Their modeling of alternative circumstances shows no sign of the type or scale of change which would produce stabilizing force to counteract the movement toward physical degradation and collapse.

All of the five basic factors to the



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RCA

CIRCLE 95 ON READER CARD

DATAMATION

study are assuming higher numeric values year by year in a pattern of exponential growth. Nearly all man's activities charted in the report — from the use of fertilizer to the expansion of cities — can be represented by exponential growth curves. The mathematical concept of exponential growth needs little expertise to grasp, for it is easy to show the surprising suddenness with which the curve approaches a fixed limit. But add to this the interaction of different factors all subject to exponential growth, and a frightening picture of a headlong rush to disaster presents itself.

The authors say they believe their model is the only one that's truly global in scope, with a time horizon of more than 30 years, and that includes the important variables of population growth, food production, and pollution not as in-

dependent entities but as interactive elements, as they are in the real world. And they say there is no reason to be satisfied with the model in its present form. The intention is to alter, expand, and improve it as experience and the world data base improve.

What the report allegedly demonstrates is that without computer modeling the subtle interaction between rising population, mineral resource depletion, pollution, and so on would never become measurable or comprehensible to man. And, more importantly, the overall global effect of changes to one of these factors could not be assessed in world terms.

It turns out that population control would not be enough to stabilize things, and a massive attempt to control pollution within the expanding system would simply precipitate collapse.

funds for a scheduled statewide implementation next January of the Medical Management System (MMS).

Computer Exonerated: The Tenth Circuit Court of Appeals in Denver ruled a company is responsible for the actions of its computer because "a computer operates only in accordance with the information and directions supplied by its human programmers." In upholding a trial court decision against State Farm Mutual Insurance Co. — which had claimed it was not liable in an accident which occurred the same day a policy was automatically renewed by its computer system because the insured's check had arrived after the accident and the retroactive renewal had been issued in error — the judge ruled the reinstatement was a direct result of the errors and oversights of State Farm agents and employees and . . . "the fact that the actual processing of the policy is carried out by an unimaginative mechanical device can have no effect on the company's responsibilities for these errors and oversights."

Benchmarks

"Benchmarks" is a new column that records events in the computing business that are worthy of note in the judgment of our editors.

Good Riddance: A year ago, RCA's computer operation lost \$9.2 million in the first quarter, pulling overall company net down to \$23.8 million. A year later, with the computer operation out of the way, the company's net in the January-March period had soared 53% to \$36.3 million. Sale of another RCA computer-related operation, its Video-comp electronic photocomposition and typesetting business, was expected to be finalized last month, bringing RCA an initial cash payment of \$2.1 million and a share of future revenues. But RCA isn't entirely out of the computer business. Its Aerospace Systems Div. received a \$5 million-plus contract for hardware integration of a military data processing system which it says will have one of the largest mass memories ever used in a tactical environment.

Survivors Profit Too: IBM's first quarter earnings this year were \$305.7 million, up 21.9% from the year before. Revenues were up 23.6% to \$2.31 billion. The computer colossus attributed the gains to 370 shipments.

Strewing the Path: IBM has made it easier for RCA 301 and Honeywell 200 series users to go to its 370/135 and 145. Number One is marketing emulators for 301 and series 200 programs.

The 301 emulator is priced at \$675 monthly and the 200 emulator at \$625/month.

RCA/Univac Revisited: Computer Machinery Corp., Los Angeles data entry firm, has played Univac to Redcor Corp.'s RCA in a tentative agreement with Transamerica Computer Co. through which it would take over the customer base for bankrupt Redcor's KeyLogic data entry equipment. Under the agreement, Computer Machinery will sell \$12 million worth of its data entry equipment; will receive KeyLogic equipment now on lease and generating \$140,000 in monthly rental; and will acquire the existing KeyLogic service organization. Transamerica acquired the KeyLogic equipment from Redcor in 1971.

California Projects Defunded: As the budget for the state of California was moving through the legislature last month, it looked as if two big edp expenditures were out. One, a proposed Expanded Data Reporting System (EDSR) for the State Dept. of Social Welfare (Feb., p. 85), was totally defunded in a version of the budget passed out of the Assembly into the Senate. The senate was expected to agree on this and on elimination of

No Interface Standard: The National Bureau of Standards' computer center, charged with coming up with a standard interface to facilitate connection of independent peripherals to government computers, said in a draft report that a single standard is not technically possible at this time. The draft does urge that the government require mainframe bidders to give detailed interface specifications as part of their bid proposals, an alternative acceptable to some independents. The draft went to the General Services Administration, the Office of Management and Budget, and the General Accounting Office.

MICR Imprinter Accused: Somewhere in Nevada a fugitive Magnetic Ink Character Recognition imprinter is being used to code phony checks. Four checks have been uncovered carrying the correct code of an airline. Ranging in value from \$30 to \$300, they were passed in Reno and cleared by a San Francisco bank which did not read the checks manually but simply read the MICR code at the bottom. They were exposed when a clerk at the airline noticed they were a slightly different color than regular airline checks. "For all we know," said Reno police, "these guys could have the correct identification numbers for several businesses which have not yet caught on." □

Hardware

Hardware Notes . . .

Datamation will be running a survey of stored program communication processors in the near future. If your firm's products should be included, write for a questionnaire c/o 94 S. Los Robles, Pasadena, CA 91101.

A couple of companies reached important milestones recently. Rapidly growing Inforex shipped key-to-disc entry system number 1,000 to the Missouri Farmers Association. At year's end Inforex had 800 systems shipped and over 6,000 keystations installed, and already this year the keystation count has gone over 7,000. Also reaching the 1,000 mark with its principal product—mini-computers—is Microdata Corp. of Santa Ana, Calif. It's estimated that only five other minicomputer makers have sold more than 1,000 minis.

Data Recall Corp. of El Segundo, Calif., has purchased Weismantel Associates. Among the product lines taken over by Data Recall is an IBM 360/65 memory system allowing users to expand the 65 up to a full two megabytes in 256K-byte increments. Information may be obtained from Data Recall's marketing arm, Computer Investors Group, Inc., of Stamford, Conn.

Varian Data Machines has decided not to separately price some features on its 620/L and 620/f computers that formerly added \$1500 to those models. Included are hardware multiply/divide, real-time clock, power failure/restart, and eight levels of priority interrupts.

Two engineers at IBM's systems development laboratory in Endicott, N.Y., have developed a method of reconstructing holographic images using standard light sources. In the new process, a simple imaging lens is used to correct the first-order blurring. The development could help hold down the cost of large-scale holographic storage systems that will be developed in the future.

Oops Dept. The \$50K typical system of Cybermatics Inc.'s Tin Can (March, p. 116) does not include disc storage capability, as none is required for that application.

Accounting Computer

The NCR 399 is hard to categorize because it is so many products in one. Its 8-16K 1.2-usec byte-oriented memory, high-level programming language, and peripheral complement (cassette storage for now, with magnetic ledger, card reader/punch, paper tape, disc, and 300-lpm printer equipment to follow later this year) make the 399 sound like a full-fledged computer. On the other hand, its 1200-9600 baud communications feature qualifies it as a very intelligent remote batch terminal, able to converse in ASCII (and optionally in EBCDIC) to practically any computer for whatever additional processing might be required, or to other 399s.



About the only thing that indicates that the 399 was developed by the accounting machine designers is its appearance. For now, printing is limited to a 24-cps Selectric-type printer that prints an 88-character ASCII set on multiple forms. Both 11- and 16-inch ledger cards are accommodated, storing 940 and 1,500 digits, respectively. Forms handling options include an adjustable handler for widths ranging from 4 to 23 inches, a split platen and two independent continuous forms feeders, etc. One cassette drive is standard, providing 750-cps i/o, with a second drive optional. Basic systems sell for \$14K and rent for \$420 month. First deliveries are scheduled for October. NCR, Dayton, Ohio. For information:

CIRCLE 246 ON READER CARD

Disc Storage

The CDS-100 is very similar to the IBM "floppy disc" that came out with the 370 series equipment, but surprisingly will not be marketed as a plug-to-plug replacement for it. Instead, the 100 is offered to key entry, point-of-sale, data

logging, and auxiliary storage system designers for incorporation into those products. The 32-track version of the 100 stores over 600 Kilobits on its 7½-inch disc (resembling a 45-rpm record in a jacket, but actually spinning at 90 rpm). The 64-track version stores 1.3 megabits. Both drives have 33-Kilobit transfer rates and 40-msec track-to-track access times. A single CDS-100 is priced at \$750; "records" are \$1-2 each. Delivery is 60-90 days. CENTURY DATA SYSTEMS, INC., Anaheim, Calif. For information:

CIRCLE 267 ON READER CARD

Graphic Display

Model L of the ADDS/900 graphic display product line is intended for process control, computer-aided design, simulation, and command-and-control applications. The basic system includes a digital display controller with microprogramming and subroutine capability, a constant-velocity vector/position generator, a 22-stroke ASCII character generator, and a 21-inch crt for \$35,900. The system can be expanded up to 128 characters, 16 control characters, 12 display stations, and 360° character and vector rotation, additional display processors, hard copy printers, etc. SANDERS ASSOCIATES, INC., Nashua, N.H. For information:

CIRCLE 268 ON READER CARD

Microfilm Readers

The Ektalite portable microfilm readers display 20X (model 120) and 40X (model 140) standard 4 x 6-inch microfiche or Recordak Microthin jackets. The display screen is constructed of a highly reflective material that requires only a 12-volt bulb for a light source but is said to provide contrast levels comparable to those of printed paper in a well-lighted room. The readers will be available in the



fourth quarter for \$95 and \$110.
EASTMAN KODAK CO., Rochester, N.Y.
For information:
CIRCLE 265 ON READER CARD

Terminal

The model 717 is a 2741-type terminal intended for conversational applications such as text editing, on-line inquiry and response, and time-sharing. It communicates at 15 cps over standard interfaces to most major manufacturers' computers. It rents for approximately \$100/month on a one-year lease, and is available off-the-shelf. TST COMMUNICATIONS, INC., Rockville, Md. For information:

CIRCLE 266 ON READER CARD

I/O Device

This company's first product is called the Data Director, and it's unusual. Magnetic-stripe cards in several different sizes are the storage medium, with data written at 556 bpi on eight tracks.



A 3½ x 7⅝-inch card can store more than 26,000 bits. Visual information can be written or typed on the non-magnetic portion of the cards. Interfacing to any minicomputer or terminal is accomplished through a standard interface. The Data Director sells for \$1880. B INDUSTRIES, INC., Phoenix, Ariz. For information:

CIRCLE 270 ON READER CARD

NCR Card Equipment

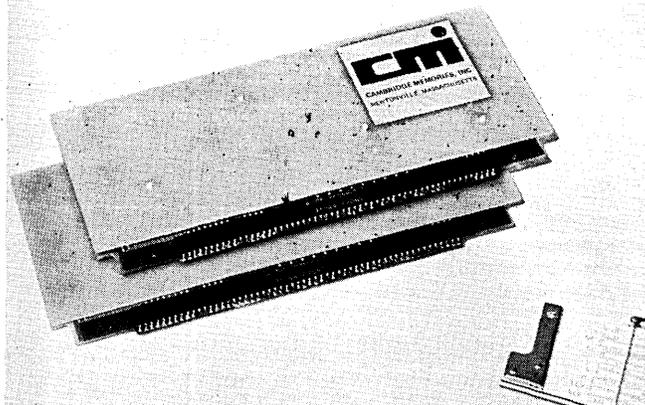
Two card reader/punches and two card punch units have been announced for users of NCR's Century Series of computers. The model 686-102 reads 800 cpm and punches 83-294 cpm, depending on the number of columns that must be punched. It rents for \$500/month.

The 686-111 is slower in reading and punching at 560 and 60-180 cpm, respectively, renting for \$400/month.

The punch versions of these peripherals are the 686-302 and 686-311 models that have the punching speeds of the units listed above and rent for \$400/month and \$300/month. THE NATIONAL CASH REGISTER CO., Dayton, Ohio. For information:

CIRCLE 258 ON READER CARD

product spotlight



Low-cost Bulk Memory

Disc and drum storage devices have reigned supreme for more than 20 years as the most practical way to store large amounts of information. But there are always enough disadvantages inherent in mechanical devices to keep scientists searching for better ways to store lots of information.

It would seem to be a pretty good bet that solid-state memories like this manufacturer's DOTRAM will replace a sizeable number of discs and drums, if not obsolete these devices altogether by the end of this decade through continued development.

The DOTRAM-4 and DOTRAM-16 (DOTRAM stands for Domain Tip Random Access Memory) stores data in tiny magnetic spots (domains) which move through channels etched on an aluminum film. The technology is similar to the Bell Laboratories' "bubble" memory, but has progressed through the prototype stage and is now commercially available to system designers.

The DOTRAM-16 has a capacity of up to 16 megabits that can be organized in 8- to 36-bit word lengths depending on how the TTL-compatible interface elec-

tronics are attached. The products are technically BORAM's, (Block-Oriented Random Access Memories) in that they access and transfer a block of information each time they are asked to by the cpu. The access time for the DOTRAM-16 is 1 usec per block (a block is the equivalent of 2K of 16-bit words), and the transfer rate goes up to 1 MHz. The compact unit is available as memory cards or in a 10½-inch rack-mounted system that requires less than 100 Watts of power. A 1-megabit DOTRAM-16 is priced at approximately \$2300 for oem orders of 200 units.

The DOTRAM-4 is a smaller, slower version of the 16, but its price of \$490 each (for the same oem quantity as the 16) for a 4K by 16-bit version should interest calculator and terminal builders. Its capacity ranges from 40-160K bits, expandable in 10K increments. Its access time is 500 nsec per 2K block, and the asynchronous transfer rate goes up to 200 KHz. This memory can be organized in 4- to 16-bit word lengths. The products are available off the shelf. CAMBRIDGE MEMORIES, INC., Newton, Mass. For information:

CIRCLE 254 ON READER CARD

High-performance Mtu

Not long ago this manufacturer introduced a 250-ips tape drive that provided an impressive 400 KB transfer rate for the entire IBM 370 line and the top half of the 360 series. Now the density has been doubled on the 3500/3800 series, available in a number of speeds ranging from 75 to 250 ips. The transfer rate of the 3200-bpi 250-ips drive is a full 800 KB, just under the IBM 3330 disc's 806-KB rate. Such high performance requires very good quality tape, but the manufacturer states that tape quality has improved sufficiently during the last year to make such a drive practical—and perhaps even decrease the error rate. No software changes are said to be required to take advantage of the impressive speed of the 3500/3800 line, but some of the

lower models of the 360 are limited by their channel rates. Prices range from \$510 (75 ips) to \$840 (250 ips) per month on a one-year contract. Deliveries are scheduled for the first quarter of next year. STORAGE TECHNOLOGY CORP., Louisville, Colo. For information:

CIRCLE 255 ON READER CARD

1130 Peripherals

This manufacturer has specialized in software programs for the IBM 1130 computer for some years, and now it has decided to offer some hardware additions to the 3,000-plus users of that 16-bit machine.

Add-on memory heads the list, taking the 32K 1130 up to a full 64K words. The price on what is thought to

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CIRCLE 111 ON READER CARD

hardware

be a typical order—adding 24K to an 8K system—is \$25,500, including installation, and \$770/month, including maintenance in service areas, on a two-year lease.

The second peripheral is a 2314-type disc storage unit and a controller capable of handling two discs, which would put over 20 million words online. The price for the controller and the first disc drive is \$23,750, including all necessary cabling and software, and \$810/month on a two-year lease.

A 132-column, 600-lpm printer with a sound-deadening cabinet is also available. It sells for \$18K and rents for \$785/month, including software, cabling, and maintenance in service areas. Deliveries on these products is 45-90 days ARO, and initial shipments have begun. LOGICON, INC., Torrance, Calif. For information:

CIRCLE 247 ON READER CARD

Commo Error Checking

The model 221 transmission test set is inserted into a communications network between a terminal and its modem. It stays there permanently to display error rates on a light-emitting-diode display in the form of one error in n bits transmitted. The reason it is permanently attached is because there is always the chance that a bad connection to a portable unit might be causing the error indications. The price is \$2500, with first deliveries scheduled for this month. There are quantity discounts to end users. A less-capable unit, the model 220, is priced at \$1700. It would be used at remote sites. Both models can monitor baud rates as high as 250 Kilobaud. ANTEKNA, Mountain View, Calif. For information:

CIRCLE 248 ON READER CARD

Magnetic Printer

The DI-240 prints its 96-character ASCII set at 240 cps—and does it in an interesting manner. A character generator supplies the appropriate 10x12 dot matrix character to a magnetic belt, which then transfers the image to ordinary paper using pressure. The LSI character generator can be replaced



with units containing Russian, Hebrew, Greek, or other character sets. And the printer is said to be quiet enough to place in an office environment, printing an entire 8 x 10-inch page in 20 seconds. The line length is 80 columns. The RS-232-compatible printer can handle asynchronous data rates up to 50 Kilobaud. The price for the DI-240 is \$4100, and deliveries are scheduled for July. DATA INTERFACE ASSOCIATES, Danbury, Conn. For information:

CIRCLE 249 ON READER CARD

Printer Interface

An interface has been developed for the Printer Technology, Inc., PRINTEC 100 printer (Dec. 1, p. 55) permitting it to be attached to the Data General product line, and the Digital Computer Controls line-up of 16-bit computers. The price of the interface, including software, is \$575. MINI-SYSTEMS, INC., Minneapolis, Minn. For information:

CIRCLE 253 ON READER CARD

PDP-11 Memory

MTI also builds products a little more conventional than magnetic domain memories spotlighted in this section. This one is a semiconductor memory system for PDP-11 users, requiring only one connection to the 11's Unibus channel. Sizes range from 4-28K 16-bit words in 4K modules. An 8K system complete with power supply and rack mount is priced at \$4990. There are a number of options available, including segments of read-only memory, early warning power failure indication, software diagnostics, table-top packaging, and battery power capability. Delivery is approximately 90 days. MEMORY TECHNOLOGY, INC., Sudbury, Mass. For information:

CIRCLE 252 ON READER CARD

Color Imaging System

Color imaging systems are, or can be, used in applications where visual display of digital information increases viewer understanding. An example would be the display of digitized X-rays: It is much easier for the eye to see changes of color than to see gradations of grey. And the color display of three-dimensional objects is much easier to interpret than a black-and-white image.

The Spectrovision color imaging system was originally developed for NASA and is now available as a commercial product. It can be used as a computer peripheral (it's IBM-compatible) or can be equipped with a minicomputer and supporting software for stand-alone use. It uses a standard 525-line tv screen with a 30 Hz refresh rate; and controls permit the operator to assign

and reassign color values, correct or compensate displayed values, or rescale on any of three axes. Prices start at approximately \$25K for a black-and-white system, ranging upward to \$60K for full color. The system may also be leased. AEROJET-GENERAL DATA SYSTEMS, El Monte, Calif. For information:

CIRCLE 250 ON READER CARD

PDP-8 Cartridge

The trouble with most storage media offered as alternatives to paper tape is that they usually cost more. But the \$1490 price of the TP-1375 Micro-Deck pretty much destroys that problem. The 1375 stores up to 256K 12-bit words on its four-track cartridge and has a transfer rate of 2000 baud, or about 167 KC. The price includes supporting software, i/o cables, power supply, and controller. Delivery is 30 days. TENNECOMP SYSTEMS, INC., Oak Ridge, Tenn. For information:

CIRCLE 251 ON READER CARD

Off-line Printing

Two models of off-line print stations are offered to IBM computer installations. The model 50 is intended for 360 users and includes a 600-lpm 132-column line printer, minicomputer



with 8K of 16-bit memory, and 2311 or 2314 disc drive and necessary software. The model 53 differs from the model 50 in having a 5440- or 2310-type disc and is intended for System/3 installations. The model 50 is priced at \$59,750; the model 53, an even \$10K less. Service and maintenance and lease contracts are offered. DIVA ASSOCIATES INC., Red Bank, N.J. For information:

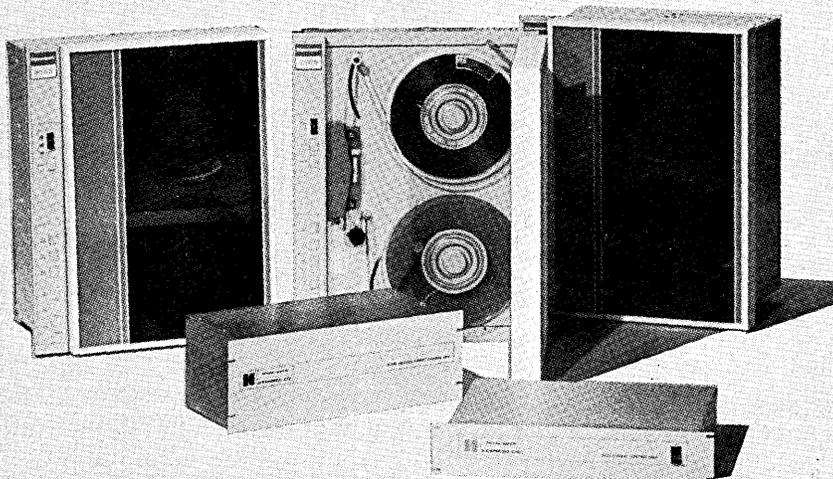
CIRCLE 256 ON READER CARD

Commo Processor

In an industry full of paper tiger product announcements with delivery dates far in the future, this manufacturer is notable because it usually announces its products together with news of the first installation. In this case it's the MODCOMP III programmable commu-

May, 1972

System 8000 Click! It's 800 cpi Click! It's 1600 cpi



No other tape system clicks like that.

That's because no other tape system has the dual density 800/1600 cpi capability of System 8000. And, the 1600 cpi need not be purchased now — it can be added at any time. That's just one of the features. Others include single-line commands such as "Read one record, Write one record," etc. for ease of interface.

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Add a Model 8216 PE Format Control Unit and (click) all 8109 transports become dual density 800/1600 cpi. Automatic density selection, postamble/preamble generation; error detection and correction and des skew register are provided.

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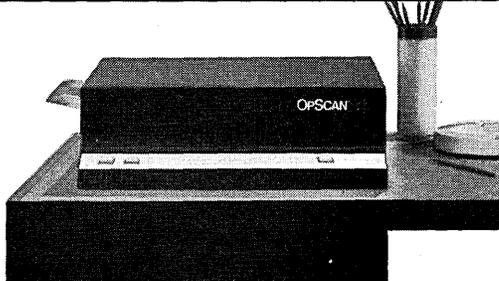
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CIRCLE 107 ON READER CARD

hardware _____

communications processor based on the firm's MODCOMP III 16-bit computer. The first III processor has gone to Purdue Univ. to front-end communications activity from remote campuses into a CDC 6500 computer. Its 800-nsec cycle time for up to 64K words helps the III attain an 800-kilobaud rate sufficient to support 16 50-kilobaud lines. Interfaces for IBM and XDS computers are also available. The basic III with 4K of core and communications firmware is priced at \$14,500. Asynchronous multiplexors are available for controlling up to 128 asynchronous lines, or up to 64 synchronous lines, for approximately \$400/line. MODULAR COMPUTER SYSTEMS, Fort Lauderdale, Fla. For information:

CIRCLE 257 ON READER CARD

Cassette Storage

The Datastore 41 is a cassette storage device for use with IBM 2741-type terminals, connecting between the 2741 and the modem. It can be used to prepare information in a local mode before transmission to the computer



for processing. When switched on-line, it transfers data at 150 or 300 baud. The unit can also transmit data, simultaneously listing it on the 2741 together with the replies from the computer. The Datastore 41 sells for less than \$2K and can be rented for \$44/-month on a one-year lease. Delivery is 60 days. LIVERMORE DATA SYSTEMS, INC., Livermore, Calif. For information:

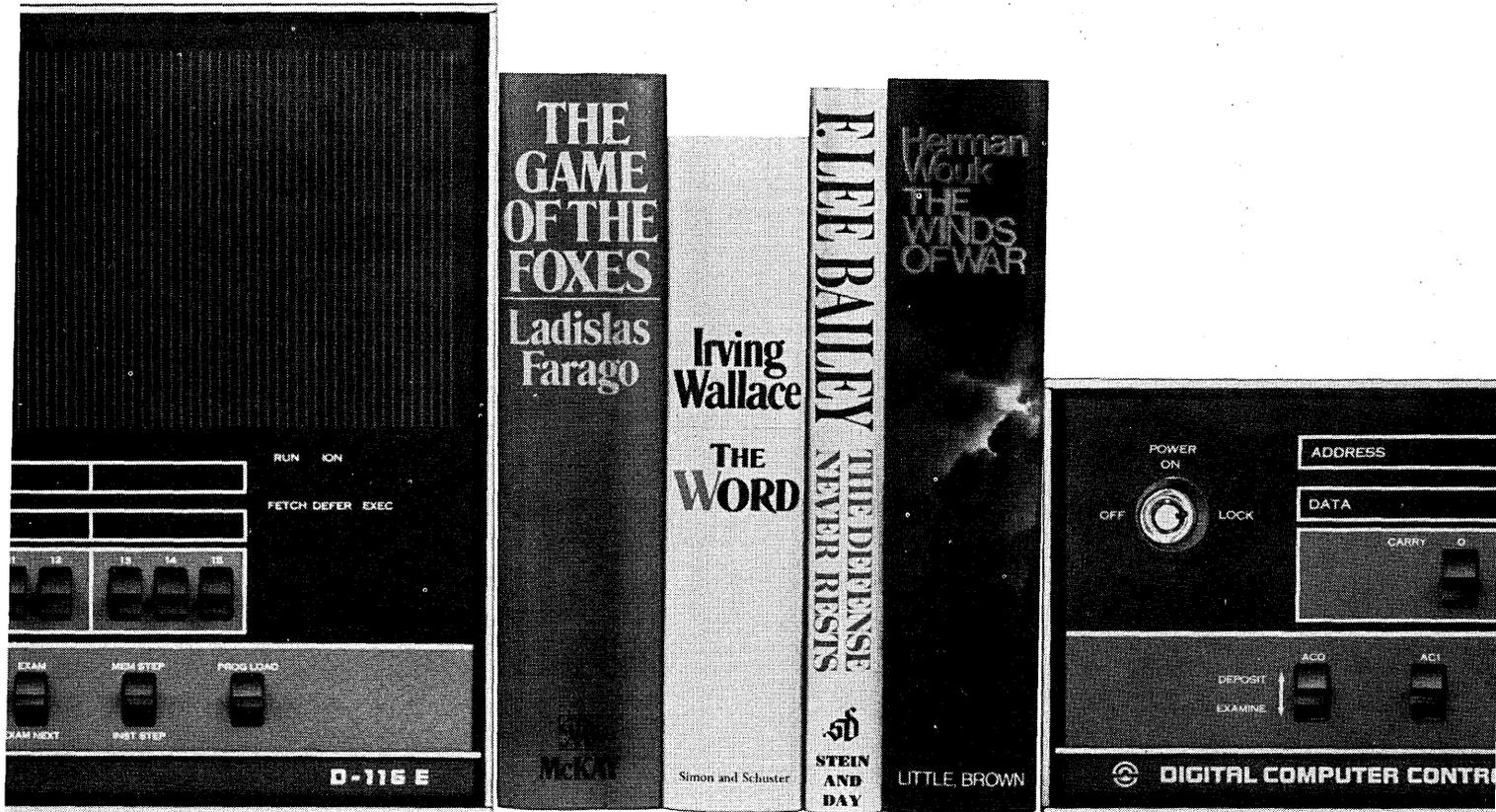
CIRCLE 261 ON READER CARD

Multiplexor

The ADS 670 is a time-division multiplexor that can multiplex from 16-128 low-speed (46-1200 baud) lines over up to six single voice-grade telephone lines. The unit accommodates all five-through eight-bit code levels, and features automatic baud rate detection. System operation and line conditions are displayed on the front panel. The price of a 32-channel model is approx-

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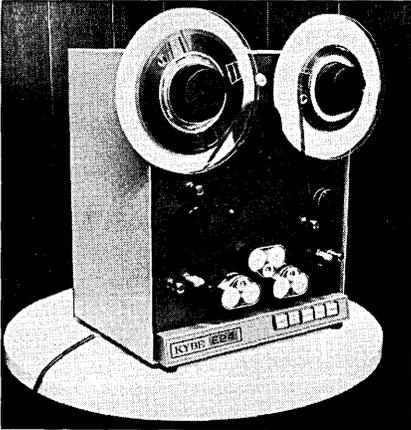
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imately \$9K. AMERICAN DATA SYSTEMS, Canoga Park, Calif. For information:

CIRCLE 271 ON READER CARD

Tape Cleaner

The E-24 Mod II is a tape cleaner/re-winder that features dual sapphire cleaning blades and automatically advancing reloadable tissues. Two-way



cleaning of a reel of tape takes 4.8 minutes, and the E-24 has positive braking in the event of motor failure.

The unit is priced at \$2355 and rents for \$95/month on a one-year contract. KYBE CORP., Waltham, Mass. For information:

CIRCLE 269 ON READER CARD

Batch Terminals

Three batch terminals for low-, medium-, and high-speed applications are offered to users of CDC and other equipment, including the 360/370 series. The 730 terminal series includes the 731, with a communications speed of 4800 baud; the 732 for 9600-baud lines; and the 733, which goes up to 50-Kilobaud rates. The terminals can be made up from an assortment of card equipment, line printers, and a drum memory for program storage. The basic configuration, priced at \$830/month on a one-year contract, includes an 8K-byte controller, 300-cpm reader, 300-lpm 136-column printer, control console, and operator keyboard. Deliveries begin next month. CONTROL DATA CORP., Minneapolis, Minn. For information:

CIRCLE 260 ON READER CARD

Educational Data Entry

There are several ways the model 1200 educational data terminal can be used by individual schools or districts. In the classroom the 1200 can be used to

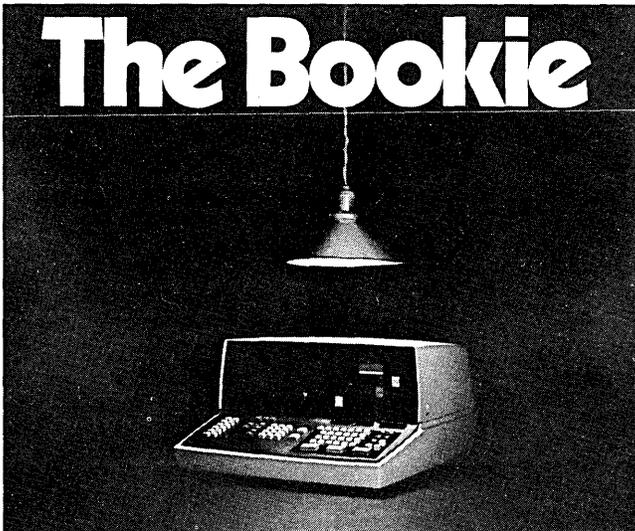
grade tests ranging from simple true-false quizzes to the multiple-choice, multiple-answer variety. A master card is used to program the unit. The number of correct answers on the individual cards is indicated, or may be withheld at the instructor's option.

The 1200 can also be used for other school-related applications such as class scheduling and attendance reporting. Information is transmitted to a central receiver unit for storage on computer-compatible tape. When desired, this tape can transmit over direct line or the dial network to a computer for processing. A typical system, consisting of 20 terminals and the central receiver, would be priced at approximately \$70K. Delivery is 30 days. EDUCATIONAL MANAGEMENT SYSTEMS, Richland, Wash. For information:

CIRCLE 259 ON READER CARD

Disc Storage

The model 650 flexible disc file uses a 7.5-inch cartridge to store 1.5 megabits of information. It has a track-to-track access time of less than 50 msec and a transfer rate of 300 KHz. The unit is offered to oem manufacturers in both read-only and read/write versions, with the primary application thought to be microcode or diagnostic program storage in computers or controllers. Secondary applications include auxilli-



There are 1,150 legal bookies in the big city. Sleek Wyle CRT display terminals which are part of New York's off-track betting system.

Why was Wyle awarded this \$2.5 million contract by Computer Sciences Corporation?

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Wyle also has a direct replacement for the IBM 2260/2848 CRT clusters with more features for less money.

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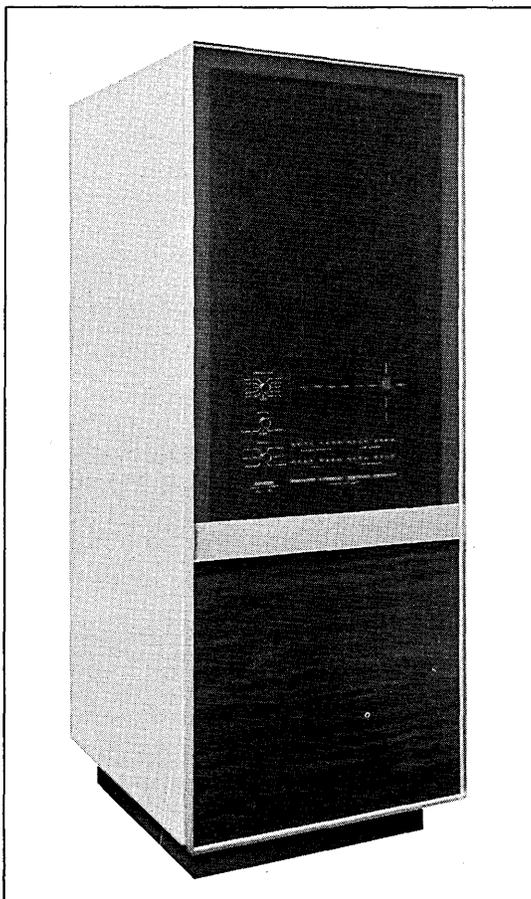
CIRCLE 91 ON READER CARD

DATAMATION

COMTEC

CT/90

PROGRAMMABLE COMMUNICATIONS PROCESSOR



The CT/90 Offers

- **Multi-Host Interface**
- **Full Range Automatic Terminal Recognition**
- **Standard Store and Forward Capability**
- **Dynamic Network Control**
- Incrementally expandable to 1024 lines
- Throughput enhancement
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- Message switching remote concentrator for all major host computers
- Complete compatibility with host software
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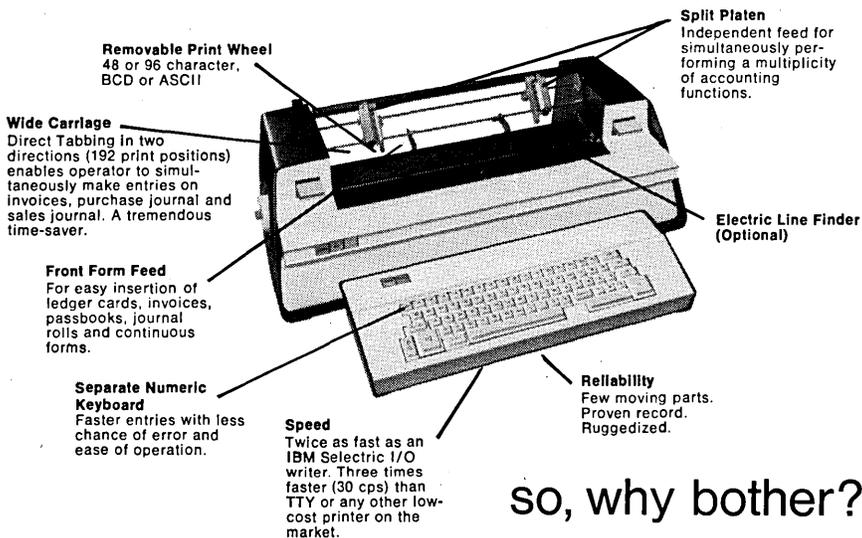
Comtec has complete systems design capabilities in all areas of data communications. For information on how we can tailor our systems to fit your requirements, call our Marketing Department at our Los Angeles Operation: (213) 757-9211.



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If you spec'd an I/O printer that would turn your 'mini' into a 'maxi' accounting system... it would look like this



so, why bother?

We also have a full line of readers and punches

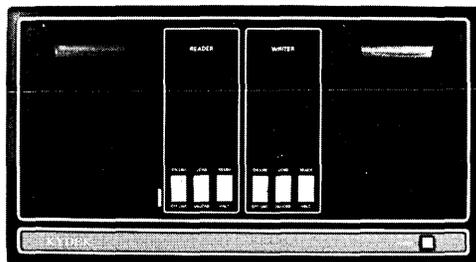
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CIRCLE 36 ON READER CARD

KYDEK The paper tape replacer



Tired of slow and tedious paper tape I/O? Can't afford to have your computer spend so much time doing so little? Want to take better advantage of the high data rates that impressed you when you bought your mini? Then the paper tape utility routines. Replace it with KYDEK.

KYDEK is a complete cassette tape system that's designed specifically as a plug-to-plug replacement for paper tape. Not a cassette for disk replacement. Not a substitute for a reel-to-reel tape drive. But a fast, extremely reliable and practical alternative to paper tape I/O. You use it exactly the same way you use paper tape. Load and store programs. Debug and develop new programs. Reads and writes data incrementally. And do it all under control of the paper tape utility routines and programming system you're presently using—without modification.

KYDEK is compatible with all popular minis. It's available as either a table top or 19" rack mountable unit, complete with power supply and I/O interfacing cables. You can install it yourself in minutes.

Make your mini a mover. Get KYDEK—the paper tape replacer. Write for details or better yet, call Bob Borshay at Kybe in Waltham 617-899-0012.



KYBE

KYBE CORPORATION
132 Calvary Street, Waltham, Mass. 02154
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Offices & representatives worldwide

CIRCLE 104 ON READER CARD

hardware

ary storage, remote terminal data acquisition, data logging, key-entry recording, point-of-sale recording, and programmable calculator storage. An order of 100 units would drop the unit price under \$1500 for a 650, including drive mechanism, head, head actuator, and related electronics. Evaluation units are scheduled for next month. MEMOREX CORP., Santa Clara, Calif. For information:

CIRCLE 272 ON READER CARD

Ledger Card Computer

The latest addition to the popular P-300 series of computerized accounting machines is the P-354. It comes in memory sizes of 400, 600, and 1,000 words, with the 64-bit word size capable of storing 16 characters. It uses a



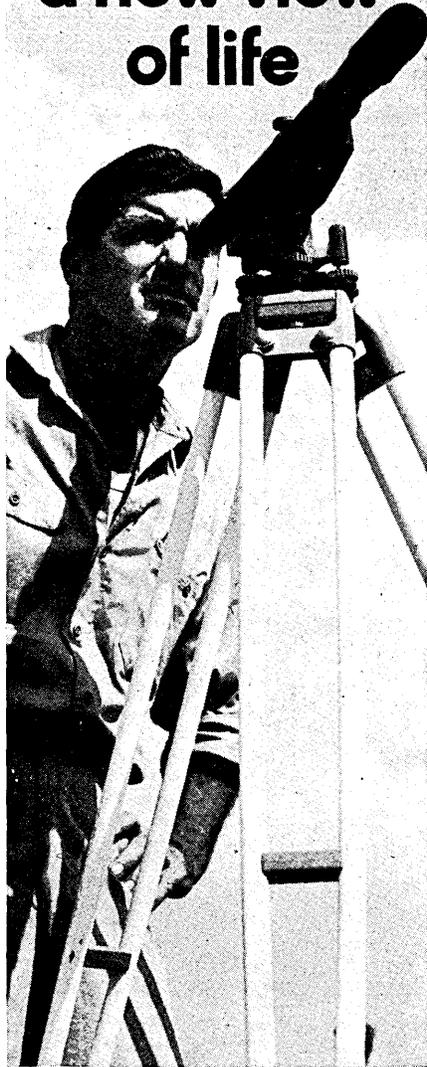
672-digit magnetic-stripe storage card technique, and can also be programmed using standard punch cards. Four sizes of ledger cards are accommodated, ranging in width 8 to 14 inches, 13 inches long. There are a number of prepackaged programs available to support payroll, invoicing, accounting, and inventory control applications. The monthly rental of \$410 includes 400 words of memory, keyboard, 18-inch carriage, and 40-cps serial printer. PHILIPS BUSINESS SYSTEMS INC., New York, N.Y. For information:

CIRCLE 264 ON READER CARD

Educational Systems

Data General's announcement of five systems for the educational community is significant; it means that the hitherto oem-oriented firm will undertake at least some selected user markets. The

**He has
a new view
of life**



He saw for himself how modern coronary care units, more effective drugs and new methods of rehabilitation helped him beat the big one — heart attack.

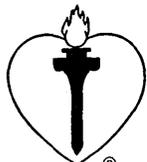
Research scientists, many helped by your Heart Fund dollars, made these advances possible.

For greater advances in treatment and prevention . . .

GIVE...
so more will live
HEART FUND

Contributed by the Publisher

May, 1972



Seminar series, based on the highly successful Nova line of 16-bit computers, ranges from the Seminar 1, a single-user system with 8K of memory and a tty (\$8500, including installation), to the Seminar 5, capable of handling 16 users with its 24K memory, 256K fixed-head disc, and 1.2-megaword moving-head disc. Five tty's and installation are included in the \$50,975 price. The series uses the BASIC language. Delivery is 90 days. DATA GENERAL CORP., Southboro, Mass. For information:
CIRCLE 262 ON READER CARD

370/155 Memory

The MTI-755 semiconductor memory system for 370/155s isn't the first to be announced, but it may be the first to be delivered. The standard IBM storage increments, ranging from 256K to 2 megabytes, is offered; and the first customer will receive its 1-megabyte module before the end of June. No cpu changes are required with the 755; it attaches to the Storage Adapter on the 370. The pricing schedule shows that the memories are generally about 25% under IBM's core memory price, with 256K priced at \$99K. Nationwide maintenance is being negotiated with a service firm. MEMORY TECHNOLOGY, INC., Sudbury, Mass. For information:
CIRCLE 263 ON READER CARD

Tape Drives

A tape subsystem is offered for this manufacturer's D-112 minicomputer and the compatible Digital PDP-8. The controller can handle up to eight TU-7 and TU-9 drives. Densities can be 200, 556, or 800 bpi; the speed is 45 ips. The controller and one tape drive is \$8500; each additional drive is \$5500. DIGITAL COMPUTER CONTROLS INC., Fairfield, N.J.
CIRCLE 282 ON READER CARD

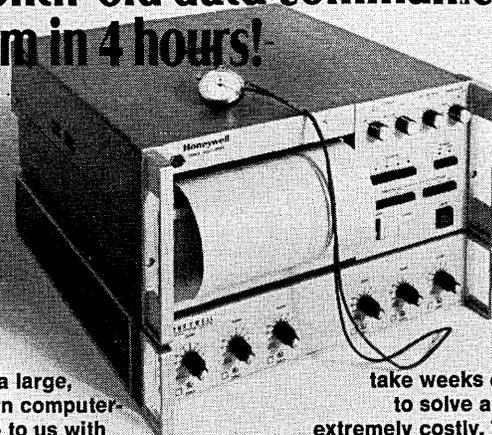
Commo Feature

A communication feature is offered to users of this manufacturer's Key Entry system, permitting communication to IBM 360 computers via the 2701/2703 transmission control units or through the BISYNC adapter on the 360/20. Depending on modems used, this allows data transmission at rates ranging from 300-9600 baud. The price of the option is \$2800, and it rents for \$100/month, including maintenance. INFOREX, Burlington, Mass.
CIRCLE 281 ON READER CARD

Graphics Interface

The Graph-In/360 is offered to oem's for connection of graphic i/o devices directly to selector or multiplexor channels on 360s and 370s. The controller operates as a standard channel control unit when the device address has been assigned. A cable is supplied for up to 32 data signals, with designers having to specify only signal level and polarity. The price is \$7500 and delivery is 90 days aro. A CONSULTANT CO., Montecito, Calif.
CIRCLE 286 ON READER CARD

**This Honeywell System solved ⁴⁰⁰
a 6-month-old data communications
problem in 4 hours!**



Recently, a large, Midwestern computer-user came to us with a data transmission problem which had been plaguing him for six months and had cost him thousands of dollars. We solved the problem in 4 hours. While only a small percentage of all data transmission problems involving message integrity are this major, these are the ones that

take weeks or months to solve and can be extremely costly. These are the kind of problems we can isolate . . . in minutes. And save you money in the bargain. Let us prove what we say. Call Robert L. Shipman 303-771-4700 or write MS-218, Honeywell, Test Instruments Division, P.O. Box 5227, Denver, Colorado 80217.

Honeywell
The Automation Company

CIRCLE 115 ON READER CARD

Microfilm Cartridge

The Micro Cartridge is a 16mm microfilm strip and container for use on 3M, Micro Reader, Dietzgen, Microscan, Ednalite, and Northstar readers. They are priced at \$1.25 in small quantities under 1,000. MICROFILM PRODUCTS, INC., New York, N.Y.

CIRCLE 280 ON READER CARD

COM Peripherals

Two 132-column printers, one a 600-lpm impact design and the other a 3000-lpm electrostatic unit, are now available for this manufacturer's Beta COM 600L and 700L systems. Accompanying software packages provide users with off-line print capability, simultaneous paper and microfilm output, and the capability to put an entire data file on film and print selected portions. The printers are priced at \$19,500 and \$23,000, respectively. DATA SYSTEMS DIV., GOULD, INC., Newton, Mass.

CIRCLE 285 ON READER CARD

Tape Cleaner

The Mark IIIA tape cleaner processes paper, mylar, or standard magnetic tape, requiring approximately five minutes for a standard 10½-inch reel. The device sells for \$1800 and is available 30 days aro. DATA PRODUCTS CORP., Woodland Hills, Calif.

CIRCLE 283 ON READER CARD

Card Readers

Two card readers are now available for the META 4 minicomputer systems. The model 3463 reads 80-column cards at 600 cpm and sells for \$5950. The 3465 reads 1000 cpm and sells for \$7950. DIGITAL SCIENTIFIC CORP., San Diego, Calif.

CIRCLE 287 ON READER CARD

Microfiche Camera

The 42X camera is a step-and-repeat model that allows users to make fiche from office documents for use along with computer-generated fiche in retrieval systems. The system does not require a dark-room. Controls regulate exposure, frame position, film advance, film, and frame count. It sells for \$7950 and is available 90 days aro. IMAGE SYSTEMS, INC., Culver City, Calif.

CIRCLE 284 ON READER CARD

PDP-8 Printer

System 5096 consists of a 100-cps serial printer and interface for the PDP-8 minicomputer. Included in the under \$3K price are a 64-character ASCII set, cables, and supporting I/O routines. Optional are a 96-character set, specialized data formats, ocr fonts, etc. DATUM INC., Anaheim, Calif.

CIRCLE 288 ON READER CARD

"Topless" S/3 Readers

A perforated 96-column card and the readers to accommodate them are offered to S/3 Model 6 and 10 users. The "topless" card permits a user to detach the portion with the interpreted alphanumeric

information from the punched portion. On model 10s, the 8603 and 9603 read at 500 and 250 cpm, respectively, and on a model 6, the 8603 reads at 750 cpm. Both readers sell for \$6500, and the card prices range between \$1.65 and \$2.25 per thousand. BRIDGE DATA PRODUCTS, INC., Philadelphia, Pa.

CIRCLE 289 ON READER CARD

Digital Trainer

The Digital Logic Lab is an attaché-sized unit containing a 9-MHz clock that can be single stepped, 40 individual integrated circuits mounted on pc boards showing the truth table for the board, 18 indicator lamps, ROM's, RAM's, and light-emitting diode displays. The complete laboratory sells for \$795, and is available approximately 60 days aro. TEACHING DEVICES INC., Carlisle, Mass.

CIRCLE 290 ON READER CARD

Digital Trainers

Several models of digital logic trainers are offered to the educational community. A battery-powered trainer with a number of flip-flops, gates, manual input switches, patch cords, etc., is priced at only \$450, including carrying case and student manual. The DS-8-T systems trainer is a larger, conventionally powered system that can be made up from a long list of modules, including control panel, analog/digital converters, decoders, and even a core memory. Modules are priced separately, with the basic mounting panel priced at \$207.50. PACE INTERNATIONAL CORP., Studio City, Calif.

CIRCLE 291 ON READER CARD

THERE IS A BETTER WAY TO TRAIN PROGRAMMERS — WITH A \$750.00 COMPUTER

Start the trainee with basic concepts and a KENBAK-1 computer. Let the computer illustrate and reinforce the ideas. Alternate theory and practice for better comprehension and retention of the material. Let the immediate feedback from the hands-on experience motivate and encourage the trainee. Allow generous amounts of experimentation and self-discovery.

Use the manuals supplied with the computer to support the training. For detailed assistance there is the Instructor's Guide. For the trainee there is a Workbook with exercises, questions, and specialized work spaces. The Laboratory Exercises can be used for self-study or with minimum guidance. For the experienced programmer there is the Programming Reference Manual.

This is the Kenbak method for training programmers with the \$750.00 KENBAK-1 computer. Results are better, the learner progresses rapidly,

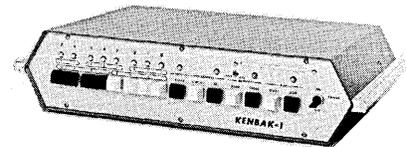
and money is saved by reducing the total training time.

Even though the purchase price of the KENBAK-1 computer is equivalent to only \$12.50 per month on a five year depreciation, there are lots of features:

- 3 programming registers
- 5 addressing modes
- More than 200 different instructions including arithmetic, logic, transfer, jumps, bit test and bit manipulations, shifts, and rotates
- Register-to-register operations
- 256 bytes of semiconductor memory
- Register entry and display
- Single instruction execution mode
- Overflow and carry detection

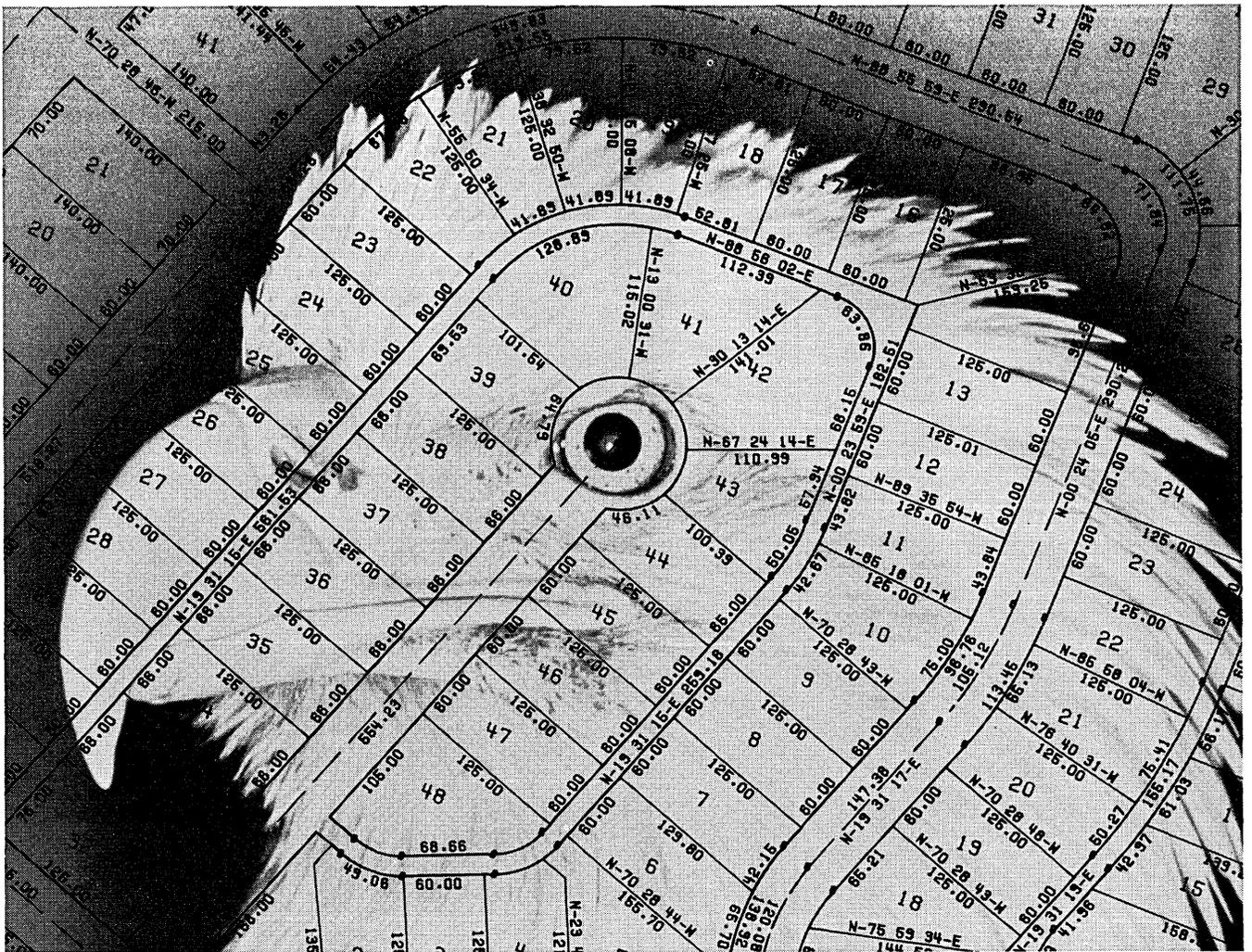
- Fourteen pounds
- 4.5" x 19" x 12"
- One year warranty

Adaptable to unusual requirements, the Kenbak method is a better way to train programmers, students, management executives, maintenance technicians and field personnel.



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CIRCLE 117 ON READER CARD



The Plotter With an Eagle Eye. It Stops Errors Dead.

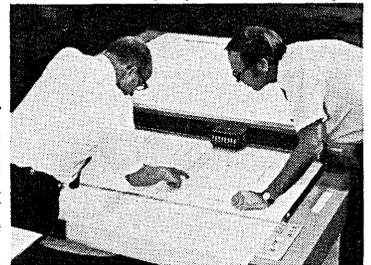
The unique DATAPLOTTER 430®. It's truly the only plotter that spots and stops drawing errors before they're made. Because it's the single plotter with an eagle-eyed predetector.

When our machine senses an anomaly coming up—say, some hash or a bit of bit drop-out—the pen lifts. Everything comes to a dead halt. Even physical disturbances and bothersome static electricity are caught before they are committed to paper. All automatically.

Then, when you're ready to start again, you just back up to the trouble spot. The DATAPLOTTER 430 picks up from there. You won't be able to tell where the retracing began. And you've saved your drawing, your manpower plus your computer time, something you couldn't possibly do on any other plotter.

This predetector is just one feature that engineers find valuable in applications such as mapping, subdivision platting, topo and contour drawing. Even on linen or for direct reproduction masters. Needless to say, we have program packages ready and waiting for these and other applications.

So we think it might just prove your foresight to learn about all the other advanced features we've built into the DATAPLOTTER 430. For instance, resolution to .001 inches, smooth-line curve-tracing speeds of 16 ips, compatibility with a wide variety of computer systems, not to mention new EAI computer-based civil-engineering systems. And we could go on, but that's what brochures are for. Write for ours. Or better yet, why don't you telephone us for more information today.



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West Long Branch, New Jersey 07764
(201) 229-1100

Software & Services

Software Notes . . .

The emerging controversy on whether software is taxable may be affected by the Supreme Court's decision in the Benson and Tabbot case this fall. The Court will hear the appeal brought by the U.S. Patent Office and decide whether software is a concept or a patentable process. The decision will have far-reaching effects on users and manufacturers, for at stake is the cost of programming—estimated to reach \$15 billion per year by 1975. (See "Legal Protection of EDP Software," p. 66.)

Computer Sciences Corp. has developed a totally new operating system to support its Infont service. Called CSTS, it will probably be well received by users since it allows them to run their programs in either interactive or batch modes for all languages without any special procedures. Even the file protocol was simplified so that a user wouldn't have to learn different file manipulation methods for each language and mode.

The topic of war has returned to the campus in a palatable form. The "spacewar" computer program written at MIT nearly 15 years ago has turned up on a DEC PDP-11 mini at a coffee house near Stanford Univ. in Calif. For 10¢ each, combatants chase each other's rocket across a crt equipped with dual controls, simultaneously firing 20 torpedos while dodging the opponent's sorties. The developers of the high-class pinball machine have formed Mini-computer Applications, Inc. to market the systems commercially. The \$20K system would seem to have a natural market—coffee houses near every university in the country.

Letter-writing programs have become increasingly sophisticated in the past few years, but it appears that some additional development is needed. An IBM district manager recently received a computer-generated letter, addressed to a Mr. Intl B. Mac Hines, complete with the salutation Dear Mr. Mac Hines. Hearing the story for the first time another IBMer commented, "It has finally happened. The computers have turned on their makers!"

Fortran Editing

FORTREDIT is a program offered to OS and DOS users for cleaning up FORTRAN source programs without another debug run. In its resequence mode, the package produces statement, continuation card, and identification sequence numbers all in ascending order, and all references to statement numbers within the program are automatically changed to the new number. In its rename mode FORTREDIT changes the names of all designated subprogram references to a user-supplied table of present/desired name pairs. Suggested JCL for OS and DOS and three years of maintenance are included in the \$500 price. Installation and application assistance are optional. COMPUTATION PLANNING, INC., Bethesda, Md. For information:

CIRCLE 224 ON READER CARD

Auditing Software

CARS 2 (Computer Audit Retrieval System) is an expanded version of an earlier package that did much the same application—aid auditors in performing audits. Now offered are random sampling and sequential sampling without attributes. Extraction and counting (now called surveying) criteria have been nearly doubled, and AND/OR logic is present. While all of this sounds complicated, it's claimed to be easier for non-dp-trained auditors to use, thanks in part to completely redesigned user forms said to reduce audit preparation time by roughly 50%. Requiring typically 44K bytes on 360s, the COBOL system is supplied in source deck form for all operating systems of that computer for \$8500. COMPUTER AUDIT SYSTEMS, INC., East Orange, N.J. For information:

CIRCLE 225 ON READER CARD

S/3 Cobol

SICLOPS (Simplified Interpretive Cobol Operating System) is a load-and-go translator/executive for IBM System/3 computers. The minimum equipment requirement is a model 5410 cpu with at least 8K bytes of memory, a 5203 or 1403 printer, and a 5424 multifunction card unit. The syntax of the card-support package is a subset of COBOL, and few changes are said to be necessary to run SICLOPS-generated programs on other computers running standard COBOL. SICLOPS includes all basic data definitions, file descriptions, arithmetic, log, I/O, and control statements, and some more sophisticated features allowing multiple moves, subscripting, and editing. The monitor

runs in a regular mode or in a debug mode that provides diagnostic, program trace, and data area content information. The SICLOPS package is priced at \$1200. GENA-SYS GENERAL SYSTEMS SERVICES, West Bend, Wis. For information:

CIRCLE 231 ON READER CARD

Random Data Analysis

DATA/70S is a scientific and engineering data management and random data analysis program. It is based on the MAC/RAN time series analysis program that has been around for about five years but has additional capabilities for constructing data files, file maintenance, data retrieval, and both printed and graphic output display, making the program suitable for business applications.

The FORTRAN IV program is large, typically requiring 32K of 36-bit-word memory, and running more efficiently in twice that amount. Current MAC/RAN users can obtain individual additional modules for various prices and all of them for \$17K. The basic DATA/70S version of MAC/RAN is priced at \$18K, including program checkout and verification on the user's machine, on-site courses for analysts and operators, documentation, and guaranteed maintenance service. AGBABIAN ASSOCIATES, Los Angeles, Calif. For information:

CIRCLE 232 ON READER CARD

RPG Interrupt Routine

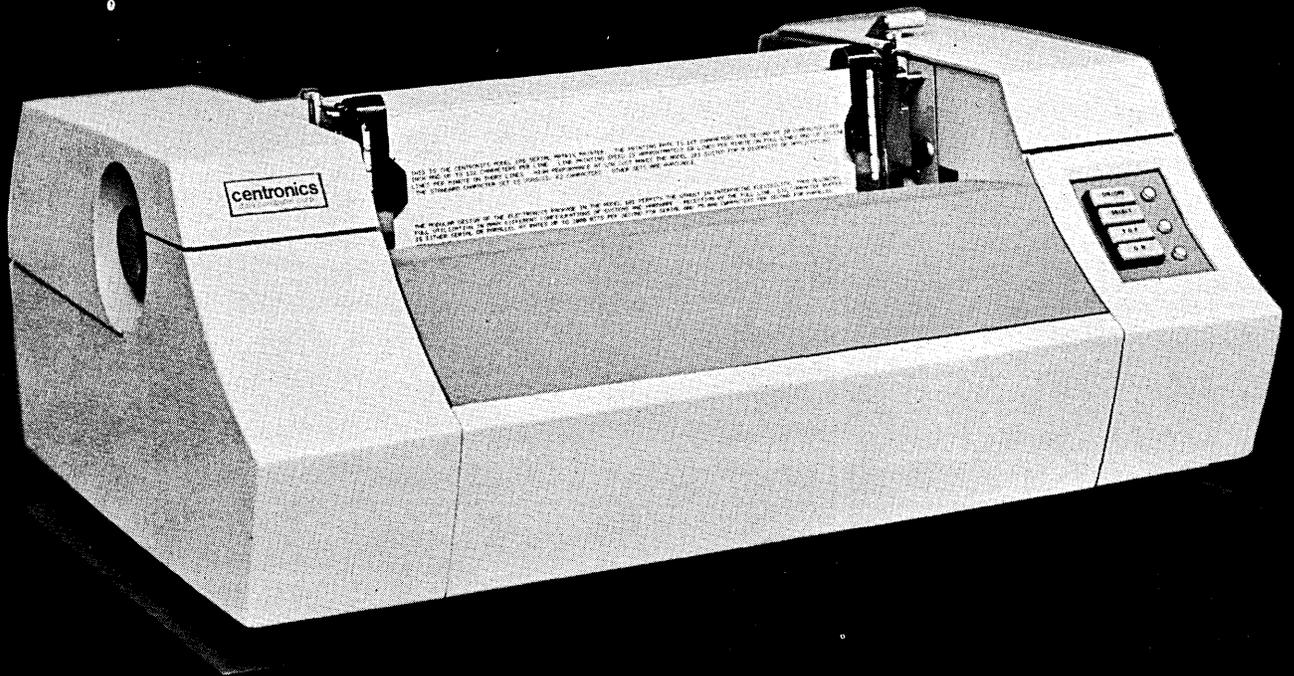
There must be a number of uses for this nameless subroutine, whose purpose is to allow the user to interrupt the normal RPG processing and retrieve a one-byte input field from SYSLOG. A console message indicates that the subroutine has been entered and is enabled. After that, depressing the interrupt key is all that is required to obtain the message "request option" and enter the one-byte input field. This byte can be interrogated by the calling program to initiate some special operation such as ending the job, printing a total, etc. Less than 1K bytes of memory on 360s running DOS-ALP are required. The price is \$49.95 and includes documentation. COMPUTER PROCEDURES CORP., Valley Stream, N.Y. For information:

CIRCLE 226 ON READER CARD

Long Record Processing

LREAD is a 360 BAL and FORTRAN program that reads "gapless" or very long record magnetic tapes and copies the

at
Booth
422

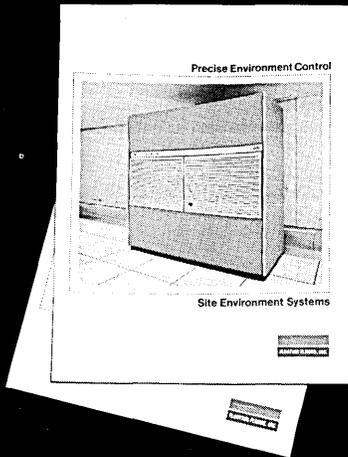


That's where the new ideas and new printers are. That's what you'd expect from the company that's delivered over 2,000 units since starting production a year ago. Price, performance and reliability must be good. Stop by during the show and see our exciting new printers.

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CIRCLE 78 ON READER CARD

software & services

data in blocked form to another tape unit, disc, or other bulk storage device. Such a program can be used to process tapes containing skew, parity, or other errors and also by installations processing incremental recorder tapes generated in numerous scientific applications. A model 30 or larger 360 computer is required. The price for LREAD is \$550, including documentation. UNIVERSAL COMPUTER APPLICATIONS, Palo Alto, Calif. For information:

CIRCLE 227 ON READER CARD

IBM 3705 Software

About the only reason IBM's recently announced 3705 communications controller (see April, p. 112) can't be programmed from 360 computers is that IBM will not release the required software—evidently hoping that 360 users will get off the dime and start thinking about 370 equipment. That doesn't concern this software house, however. It offers a software package called 370 ϕ that gives the 3705's network control functions to the 360 user. As a bonus, prospective buyers are not even limited to running 370 ϕ in the 3705; it also runs on the GTE Tempo I and the Digital PDP-11 front-ends.

The three-module 370 ϕ consists of a 360-resident TCAM message control program, a communications processor program, and a communications program generator. A typical system sells for \$35K. PHI COMPUTER SERVICES INC., Arlington, Mass. For information:

CIRCLE 228 ON READER CARD

Cobol Enhancement

This replacement for one of the modules in IBM's ANSI COBOL compiler (both the OS and DOS) is said to increase compiler throughput by 50% when the cross-reference option is specified. No additional memory is required. A free trial period is provided for product evaluation. The price per cpu is \$250. BOOTHE COMPUTER CORP., Sherman Oaks, Calif. For information:

CIRCLE 229 ON READER CARD

DOS Module Replacement

This vendor seems to be going over the modules of the IBM DOS operating system and rewriting them one by one. The latest is the often-used LOAD module. Offered as a replacement is FAST-LOAD, which is claimed to cut load and fetch times by 80% when operating on FGP phases of 3K-bytes average length, and

96% for phases cataloged in the normal core image library. Instead of reading in only one phase block at a time (1,688 bytes maximum) from 2314, 2319, or 2311 discs, FAST-LOAD pulls in up to four blocks. Using FAST-LOAD adds 304 to 326 bytes for the loader and 10-17 bytes for each phase. The price of \$500 includes a programming instruction leaflet. BOOTHE DATA SYSTEMS, INC., New York, N.Y. For information:

CIRCLE 230 ON READER CARD

Varian Software

Three software programs have been announced for the entire 620 line of 16-bit computers. PERT, one of the most famous programs ever written, can now run on machines in this series with 16K of memory, a tty, and either a magnetic tape unit or disc/drum memory. The price is \$300 for the program in either card or paper tape form.

CIRCLE 233 ON READER CARD

BEST (Basic Executive Scheduler and Timekeeper) is a real-time monitor similar to the recently announced VORTEX package, but not requiring the extended instruction set of the 620/f to run. A variable number of core-resident routines can run concurrently within a relative priority system, with scheduling based on time of day. It requires 4K of memory, and is supplied in paper tape form for \$30 and card form for \$50.

CIRCLE 234 ON READER CARD

RPG IV, a business-oriented language and system for the 620 line, is available in two versions: a 4K stand-alone version and a 12K version that is combined with the Master Operating System. There is no charge for RPG IV. VARIAN DATA MACHINES, Irvine, Calif. For information:

CIRCLE 235 ON READER CARD

Used Computer Marketing

The marketing assistance plan offered by this firm is a variation on the computer matchmaking idea. In this case, however, it is the personality traits (machine features) of computers that are analyzed, in an attempt to find an interested "date" in the form of a client who might like to buy the computer. The need stems from the problems users have in disposing of purchased computers when it comes time to trade for a new model.

Included in the marketing assistance plan is a written equipment appraisal and market analysis for the particular computer, together with a strategy on

"SOFTWARE. SERVICE. SYSTEMS SUPPORT. THAT'S WHAT WE NEED WITH A COM."



A COM unit can put your computer tape data on microfilm at fantastic speed, with big savings in paper costs, too.

But even the best COM system is only as good as the manufacturer's backup support. And when you're using a Kodak KOM-80 or KOM-90 microfilmer, it's nice to know that you have Kodak's full resources in software, service, and systems support to call upon.

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Only one way to make it worth your while to have our name on your peripherals instead of the name from your main frame.

We've got to do you one better.

Which we can.

Witness our 3160 high speed printer and the comparable IBM equipment.

Our printer speed is 1250 lines per minute instead of 1100. Line length is 160 characters instead of 132. Price? Typical savings with MDS are \$150 per month per printer.

Our printer has a built-in controller instead of a separate unit. We're plug-to-plug compatible with IBM 360 and 370, of course.

Any questions? Good. You ask, we'll answer. Just write or call our nearest office collect.

In seven years, we've come on to be the largest independent makers of peripherals by making peripherals our first business. We're out to earn yours.

Mohawk Data Sciences Corp.,
Palisade Street,
Herkimer, N. Y. 13350.
Phone (315) 867-6610.



MDS is moving in plug-to-plug.



software & services

how the computer should be disposed of. A fact sheet is prepared for TBI to use (and which the selling company may use independently) as a direct mail piece to selected brokers, dealers, and computer purchasing personnel. An advertising schedule is also arranged in publications that are selected for their ability to reach interested parties. The charge for the service is \$435, which is refunded against the brokerage commission if the sale is made through a TBI office. TBI EQUIPMENT DIV., Elmsford, New York. For information:

CIRCLE 236 ON READER CARD

Accounting System

Often, programs for doing accounts receivables, inventory accounting, and billing/invoicing tasks exist as completely separate jobs. But the CATS A/R package integrates these functions to reduce the amount of duplicate information that would normally be entered in separate jobs. The COBOL D program is intended for multiclient, multilocation data centers and is set up to run on 32K dos 360s and 370s. Among the features of CATS A/R are automatic aging of accounts; finance charge calculation for individual invoices; and sales analysis by salesman, department, store, and division. The price of the program ranges from \$10K to \$12,500, depending upon how many reports the customer chooses from the total of 26 that are offered. The price includes installation, training, warranty, and documentation. Monthly rental and royalty arrangements are available. COMPUTER WARES INC., Birmingham, Ala. For information:

CIRCLE 237 ON READER CARD

Accounts Receivable

A service designed for manufacturers, wholesalers, and distributors is available from NCR's 40 data centers across the U.S. and Canada. The open item accounts receivable system generates monthly customer statements, credit analysis, cash flow projection, and sales analysis by salesman and territory. Input may be in the form of optical-print paper tape, punched paper tape, punched cards, or magnetic tape. There is a one-time charge of \$350 plus 20¢ per account to set up a master file. Processing charges depend upon the volume, but the minimum monthly charge is \$150. THE NATIONAL CASH REGISTER CO., Dayton, Ohio. For information:

CIRCLE 238 ON READER CARD

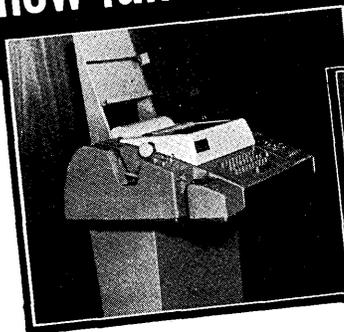
We're big in cassettes.

If you think a cassette's place is in the home, you haven't seen our data recorders at work. Sure, TEAC is a household word in stereo cassettes. But now the word's out about our worldwide experience and expertise with cassette data recorders. Analog and digital. So they're finally being given their rightful place in business and industry. With our R-70 (*in front below*) you get a handful of dependable features. A switch lets you record FM or direct on any of four channels. Even add voiced comments. Channels can be individually monitored with a built-in meter and/or output to your scope. Its FM mode frequency is DC to 800 Hz; direct mode, 100 to 8kHz. It runs on its own self-contained batteries or plugs into an AC or DC source. It lets you track down data fast with its built-in tape counter and a light goes on at the end of the tape. The Philips-type cassette is instrumentation grade and commercially available. As for our little pair of digital cassette recorders, they're big in the OEM business. Invaluable as data acquisition and transmission components, the compact MT-5 and MT-6 (*l. to r.*) provide low-cost storage of two-million bits per cassette and an 800 bpi packing density. Just made for mini-computer, point-of-sale and machine tool control applications. For more on them and our R-70, write or call Ken Williamson, Director of Marketing, Technical Products, TEAC Corporation of America, 7733 Telegraph Rd., Montebello, CA 90640. Phone (213) 726-0303. You'll find out how our being big in the cassette business can help you in your business. **TEAC®**



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CIRCLE 114 ON READER CARD

We help George Litho publish this 1500 page directory overnight. Every night.



Singer MS 6020 Micrographic System 16 and 6024 Datacraft Computer.

George Litho of San Francisco takes on some of the hardest publishing jobs in the country.

One of them is for a customer that needs a 1500-page directory re-set and reprinted every working day.

Easier said than done. But George Lithograph makes it look easy. With our help: with our technology in computerized photo composition.

The schedule is a plant manager's nightmare. Computer data tapes arrive from the customer at 8 PM every working day.

A partial shipment must be ready at midnight.

The complete job must be on the delivery trucks at 5 AM the next morning.

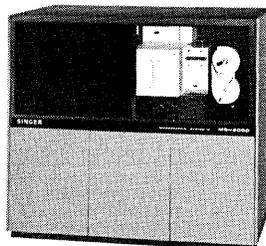
That's the schedule. Here's the way it's met: Copy arrives on 9-track, 1600 bpi data tape, directly from the customer's computer.

The Comgraphics Division of George Litho then loads the tape into its Singer MS 6020 Micrographic System 16.

In less than 2 seconds, each page is set in the desired multi-column format, displayed on a CRT and photographed on 35 mm microfilm, ready for conversion into offset printing plates. There is no cut and paste.



The presses roll at 9:30 PM



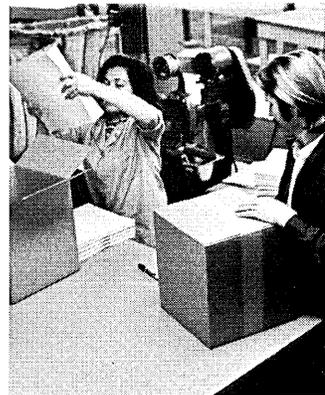
drop shipment is on its way. By 5:30 AM the trucks are loading another edition.

It's all over. Till 8 PM that night.

The Singer MS 6020 Micrographic System 16 offers you full input capabilities to establish, update and maintain directories, parts lists, catalog data of any kind.

And one of the best advantages of the system isn't the system at all: it's the Singer people who support it. As James C. Nicholson of Comgraphics puts it: "I've never seen such supplier cooperation. They bend over backwards to give you a system that works."

Singer COM systems. We're ready to help you step into computerized photo composition. For complete information, write: Singer Micrographic Systems, Binghamton, New York 13902.



Midnight. The drop shipments begin.

Computer Output Microfilm Systems by SINGER

Literature

Data Communications

Twelve-page catalog describes vendor's entire line of test instruments and subsystems for data communications. Among the products described are test/monitor systems, modular data test sets, combination test sets, field portable packs, voice-frequency instruments, and militarized test sets. DIGITECH DATA INDUSTRIES, INC., Ridgefield, Conn. For copy:
CIRCLE 200 ON READER CARD

Interface Manual

Sixteen-page technical bulletin provides the basic technical information needed to interface vendor's Matrix electrostatic printers, plotters, and printer/plotter units with any computer. It explains that electrostatic writing is accomplished by programming the voltage applied to a stationary linear array of conducting nibs which produce an invisible charge on the surface of dielectrically coated paper. VERSATEC, INC., Cupertino, Calif. For copy:
CIRCLE 201 ON READER CARD

Documentation Guidelines

Brochure describes "Documentation Guidelines for On-Line Computer Control Projects," an encyclopedia

designed to reduce the costs and minimize the time for computer control projects. It covers all phases of on-line projects from initial feasibility study to post-installation audit and tells what, when, and how to document completed tasks. PROFIMATICS, INC., Woodland Hills, Calif. For copy:
CIRCLE 202 ON READER CARD

Self-Learning Course

A self-learning course on "Managing Data Processing" is described in a flier and a letter. Consisting of a workbook and audio cassettes, the course includes case studies and problems of a simulated dp department. The course can be taken by individuals or groups, on or off the job, and is designed for new or seasoned dp managers. SCIENTIFIC MANAGEMENT TRAINING SYSTEMS, Princeton, N.J. For copy:
CIRCLE 203 ON READER CARD

Data Transmission System

Eight-page brochure describes vendor's new multipurpose data transmission system, explaining how the multichannel system can adapt to a variety of configurations in providing full-duplex transmission of low-speed digital information over four-wire voice-fre-

quency lines. TELE-DYNAMICS DIV., AMBAC INDUSTRIES, Fort Washington, Pa. For copy:
CIRCLE 204 ON READER CARD

Digital Cassettes

Four-page brochure describes a series of digital cassette recorders and memories for point-of-sale equipment, data capture, peripheral storage, data communications, and key-to-tape applications. Seven units are described. TELEX COMMUNICATIONS DIV., Minneapolis, Minn. For copy:
CIRCLE 205 ON READER CARD

Associative Processor

A 30-page booklet describing Staran associative array processors and their ability to solve large data base problems says that the processors can perform several hundred million operations per second, making them equivalent to thousands of small, conventional digital computers operating at once. It lists as potential applications: weather forecasting, communications, transportation reservations, data management, airborne command and control, ballistic missile defense, intelligence data processing, surveillance and control, and electronic warfare. GOOD-YEAR AEROSPACE CORP., Akron, Ohio. For copy:
CIRCLE 206 ON READER CARD

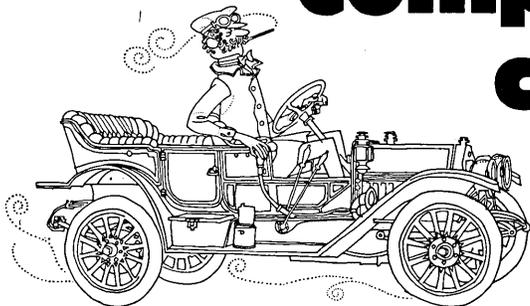
DP Bibliography

Brochure describes the "Quarterly Bibliography of Computers and Data Processing" as "a research service to help you: keep up to date with the literature of the computer field; find the right information to solve any edp problem, fast; and organize your edp library into a real asset for your research and planning staff." The bibliography is organized alphabetically into more than 180 subject classifications and includes cumulative listing from 1968 to the present from more than 70 periodicals, conference reports, and books. APPLIED COMPUTER RESEARCH, Phoenix, Ariz. For copy:
CIRCLE 207 ON READER CARD

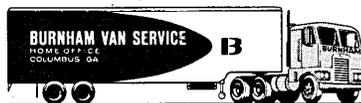
Telecommunications

Brochure describes the advantages of using standardized software modules to control computerized telecommunications systems. The modular packages perform such functions as message switching, network control, and inquiry/response and are compatible with most computers and the standard equipment used in public and private telecommunications networks. INCO-TEL, LTD., New York, N.Y. For copy:
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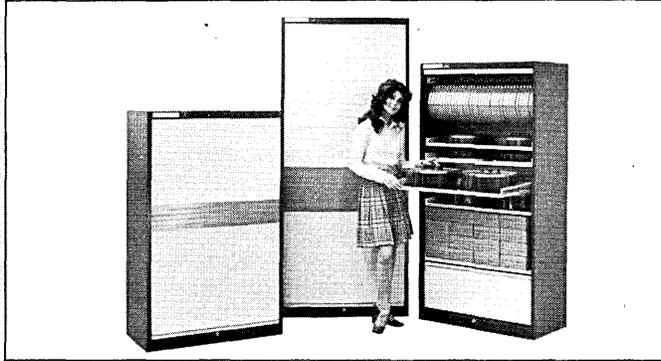
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CIRCLE 80 ON READER CARD

Any media storage cabinet you buy now may be obsolete before it is delivered...

before you buy, find out about the improved storage efficiency and cost advantages of new optimedia™ cabinets

Two years ago we decided that it didn't make much sense to keep designing cabinets that were locked-in to the storage of cards only or tape only or one type of disk pack. So we studied the total media storage problem from all angles and came up with what we believe is the ideal solution, optimedia™ coordinated cabinets can store all types and sizes



of data processing media. They can store them in virtually any combination you desire, and — when your storage requirements change, optimedia cabinets can adapt to the changes. They're sort of a "living" storage system that won't become obsolete or leave you with excess capacity for one medium and not enough for another.

optimedia™ coordinated cabinets have other benefits such as "Action Level" storage that lets you place all media at the most convenient retrieval height, smooth operating roll up doors that open all the way leaving the entire inside fully accessible, and up to 20% extra storage capacity when compared to other cabinets with the same outside dimensions.

So . . . hold up that purchase requisition until you can hear the full story on optimedia™ coordinated cabinets. That way you may avoid buying something that's obsolete before it's delivered.

For the complete story on optimedia™ coordinated cabinets, call your local Wright Line office. You'll find it listed in the yellow pages in all major cities or contact us by writing direct or circling the readers' service number. Wright Line, a Division of Barry Wright Corporation, 160 Gold Star Boulevard, Worcester, Massachusetts 01606.

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MEDIA MANAGEMENT SYSTEMS



CIRCLE 110 ON READER CARD

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SYSTEMS ANALYSTS responsible for synthesis of advanced air traffic control and airport ground control concepts including design reduction from conceptual level to development of algorithms and simulations for proof-of-concept as well as specification preparation for system implementation. System analysis and software background are required.

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SYSTEM PROGRAMMERS with degrees in Math or EE; at least one year's experience in system programming on IBM 360 and Honeywell 6000 and some knowledge of OS 360 and GCOS 6000. In addition, analysts are needed with system and testing experience and with familiarity of FORTRAN, COBOL or JOVIAL.

SYSTEMS ENGINEER/SOFTWARE SPECIALISTS with advanced degrees in Computer Science, EE, Physics, or Math. Experience preferred on large-scale ADP and military command and control systems.

SENIOR SOFTWARE SPECIALISTS with advanced degrees and experience in the design and implementation of multiprogramming systems on minicomputers. A knowledge of data structure, file system design and familiarity with Data General hardware is helpful.

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CIRCLE 410 ON READER CARD

literature

Mini Reference Manual

Seven chapters and an appendix in an 88-page reference manual for the Micro 1600 minicomputer describe design features, system description, microcommand repertoire, control panel operation, micro assembler program, input/output information, physical characteristics, and system power. MICRODATA CORP., Santa Ana, Calif. For copy:

CIRCLE 214 ON READER CARD

Telemetry Equipment

Catalog of data communications equipment includes analog and digital data acquisition and reduction equipment and gives examples of typical systems. Sections cover signal conditioning equipment, FM multiplexing and demultiplexing equipment, manual and computer programmable PCM demodulation equipment, test and calibration equipment, and FM accessories and modular assemblies. DATA-CONTROL SYSTEMS, INC., Danbury, Conn. For copy:

CIRCLE 209 ON READER CARD

2400 BPS Data Set

Six-page brochure describes vendor's 26C data set as "particularly well suited for one-way or two-way data communications between computers, business machines, and other applications requiring high accuracy." It processes serial digital data at speeds of 150, 300, 600, 1200, and 2400 bits per second over a standard 3002 unconditioned voice-grade telephone circuit. GTE LENKURT INC., San Carlos, Calif. For copy:

CIRCLE 210 ON READER CARD

Multiplex System

Complete engineering data, installation and maintenance information for this vendor's type 36A Multiplex System are contained in a 20-page booklet divided into sections covering operation, engineering considerations, installation procedures, alignment and maintenance. GTE LENKURT INC., San Carlos, Calif. For copy:

CIRCLE 212 ON READER CARD

Disc Formatter

Technical specifications and a functional description of a new disc formatter designed for use with vendor's disc drives are contained in a brochure aimed at system designers. Interface description, format structure, and ordering information also are included. PERTEC CORP., Los Angeles, Calif. For copy:

CIRCLE 213 ON READER CARD

From any angle, it's easy to see why Key OEMs are choosing Interdyne's digital cassette drive.

Servo-controlled capstan drive means hundreds of millions of repeatable start/stop cycles with no mechanical adjustments.

Three precision, direct drive motors - no belts or clutches anywhere. That spells reliability and low maintenance.

Two compact circuit cards can plug into transport or be located up to 6 feet away.

Rigid, heavy duty castings and one moving mechanical part contribute to a calculated MTBF of over 7500 hours.

Pressure pad by-pass*, precise guiding and repeatable tape tension yield error rates of less than 1 in 10⁸ bits.

Meets or exceeds ANSI/ECMA-34 standards. Complete interchangeability of cassettes and drives.

The little gem weighs 2 lbs. 6 ozs., uses 16 watts and is 4 1/4" x 5 1/4" x 5".

OEMs can't afford a mistake when choosing a digital tape cassette drive. They know that the rent stops on their system when even the smallest peripheral is down.

INTERDYNE's drive, along with scores of others, has been evaluated by the largest makers of point-of-sale recorders, remote terminals and digital systems. And time after time the IC 2500 has been rated tops for performance and reliability. Frankly, we're not surprised. The IC 2500 is a classic in simplicity. You

won't find the usual, complex assortment of mechanical levers, banging solenoids and belts. Just a DC capstan motor and a pair of reel motors to precisely control tape velocity and tension.

A velocity controlled servo capstan drive system achieves gentle, precise tape handling, just like the big reel-to-reel machines. We've even gone them one better by replacing the digital tachometer with an ingenious back-EMF sensing servo circuit.*

The IC 2500 handles data synchronously

up to 9600 bits per second, or incrementally to 30 char./sec. And try this spec on the other guys: Bi-directional Write/Read at either of 2 remotely programmed speeds between 2 ips and 12 ips with optional 40 ips search.

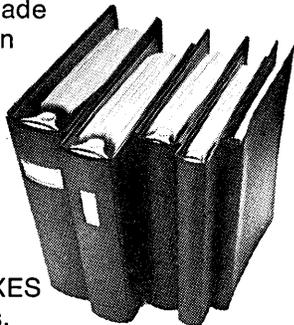
The word is spreading fast. From any angle the IC 2500 reflects simplicity and performance. Find out more today.

INTERDYNE

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* Patents pending

In business, records are made to last. So are Boorum & Pease products. Since 1842, our products have been holding business records, helping companies everywhere to keep things straight. In order to meet your needs, we've kept ahead of the game. Developed and delivered the kind of information storage and retrieval products that have made us leaders in the field.

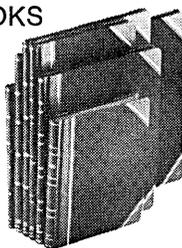


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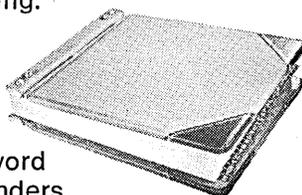
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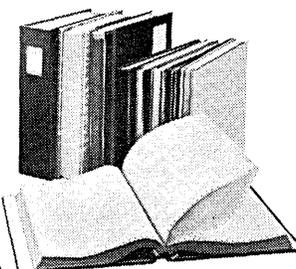
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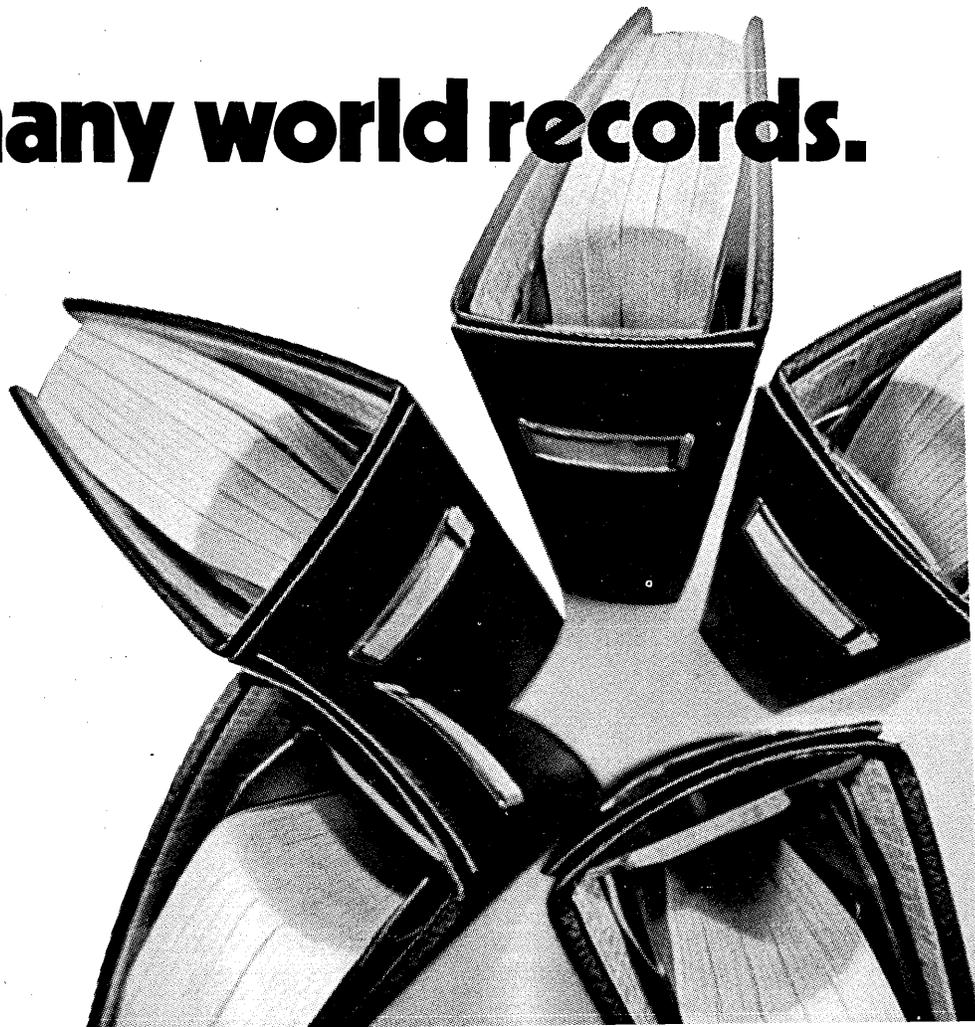
These are just a few of the products which have made us world record holders. Quality products backed by experience. New products for new needs. Boorum & Pease has got what it takes to serve you best. See your office products dealer or write us for more information. Boorum & Pease, 84 Hudson Avenue, Brooklyn, N.Y. 11201. Tel. (212) 875-8818.

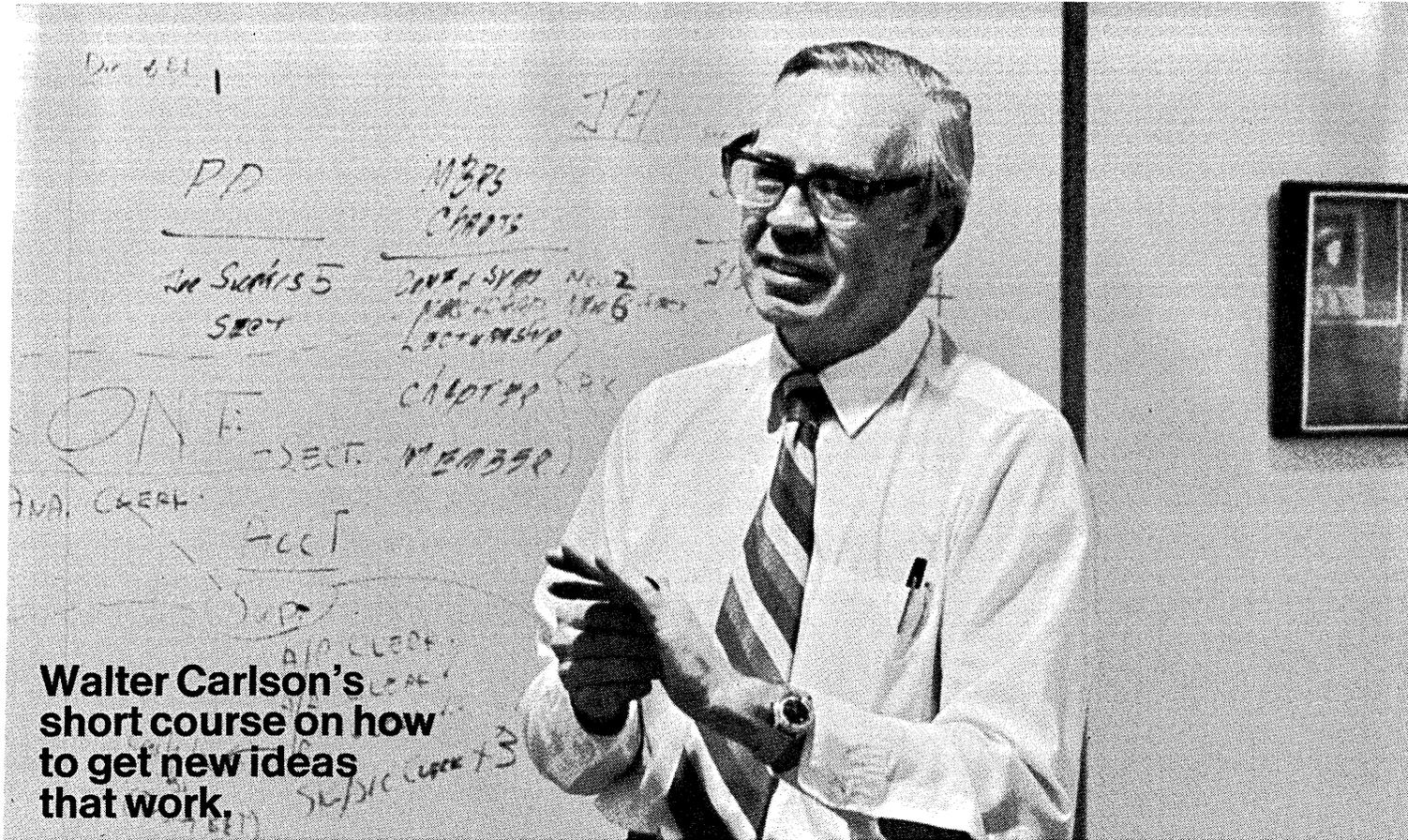
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Walter Carlson's short course on how to get new ideas that work.

Start with ACM 72.

Walter Carlson is President of ACM through this May. In a long career in the information business he's formed some pretty savvy conclusions on what it takes to bring fresh thinking into organizations.

"We're going through a tough period," says Walter. "Every company I know is running lean and hard—looking for ideas to build on and expecting more from its computer people. The best way I can think of to get new ideas and sharpen skills is to attend—or send people to—an ACM technical conference, where people exchange ideas face-to-face.

"ACM 72 will be held August 14-16 in Boston. John Donovan has built a superb technical program. We'll have tutorial sessions to bring anyone up-to-speed who doesn't feel comfortable with a specialized topic. Plus debates, mini-tutorials, workshops, joint sessions and a number of other innovations that bring people together on the nitty-gritty of this business.

"This will be the Silver Anniversary Conference for ACM. In addition to our program on current technologies, we'll have the people who formed ACM 25 years ago talking about the ideas that created our industry. Some

of the original concepts discarded long ago are coming back now. Microprogramming, for example. It should be a great conference."

If you're an ACM member, plan to be at ACM 72. If you're not a member, join us there and convert part of your admission fee to annual dues. If you're a data processing executive who's looking for new ideas, send some of your people and encourage them to join ACM.

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DATA GENERAL ENTERS THE MINIPERIPHERAL WAR.

Data General, the world's number 2 minicomputer company, is in the peripheral business.

We've just introduced a new line of compact, fixed-head discs — the Novadiscs.

They're the ruggedest, most reliable mini discs on the market.

When we designed the Novadiscs, we recognized that the critical requirement — beyond price, speed, size, and capacity — was reliability.

Most minicomputer discs simply can't stand up to the kind of hard use that minicomputer mainframes take.

So we made sure the Novadiscs have the guts to go anywhere our computers go — including the tough on-line industrial applications in which modern minicomputers work.

Plug a Novadisc into a Nova-line computer, and you get a dramatically extended mainframe, with up to 800,000 16-bit words of high-speed memory in a single tough, compact package.

We built reliability right into the guts of the Novadiscs.

Instead of trying to fly the read-write heads on a fragile 30- or 40-gram air bearing, we designed an air bearing that exerts 2 pounds of force on the head, and can stand up to 4 pounds. So the heads aren't disturbed by the bumps and jolts that make other discs crash.

When they're not flying, the heads are secured, outside the disc pack cylinder. So you don't risk a crash every time you move the unit across the room — or across the country.

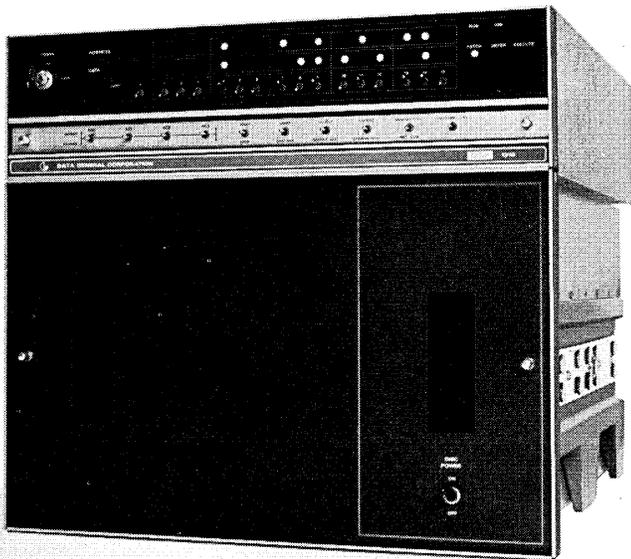
The Novadisc recording medium is an industry-standard, 10-surface disc pack. The motor, drive spindle, drive belt, and air filters are the same ones used on big, mass-produced disc drives.

Some of those parts are over-engineered for our requirements. They're also a lot less expensive and more reliable than anything else on the market.

Of course, the Novadiscs have all the other right specs, too.

Price. A Novadisc with storage capacity of 128K 16-bit words costs \$5,200,

ROUND 1: A NEW DISC WITH GUTS.



256K is \$6,750, 512K is \$9,250, and the 768K Novadisc costs \$12,560. Quantity discounts are available.

Size. Including power supply, the Novadiscs are only 12¼ inches high in a 19-inch rack.

Speed. Average latency time is 8.4 milliseconds, and data transfer rate is 2 million bits per second.

Software. Novadiscs are compatible with our device-independent Disc Operating System, which handles user I/O and provides interrupt-driven buffered service for peripherals.

DOS in turn supports a relocatable assembler, editor, linking loader, Extended ALGOL, Extended FORTRAN, and Extended Timesharing BASIC.

Peripherals. You can add mag tape, other DOS-compatible discs, A/D and D/A, communications equipment, CRT's, plotters, printers, card readers, paper tape equipment.

In the last three years, we've shipped over 2,500 Nova-line minicomputers and systems.

We've made a reputation for making some pretty pushy claims — and for living up to them.

Now we're in the peripheral business. And just as pushy as ever.

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What's inside is out



What's out? The IBM compatible digital tape transport that OEMs have always wanted. A compact design that's easy to buy, easy to interface, easy to custom install. Period. No bells and whistles to up the price. A rugged transport casting for reliability and precise tracking. Easiest tape threading. Motion control and dual-density 800/1600 cpi Read/Write electronics. Plug-to-plug industry compatible. The price? Under \$2500. The word is out.

And what's out is in.

PI-1400

The OEM digital tape transport.
From Precision Instrument.

(For a complete system ask about our new PI-1400, a "ready-for-action" digital tape unit with formatter, data buffer, the works.)



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Look Ahead

(continued from page 8)

history, has thrown in the towel on punch card voting. Detroit voters in their August primary will be back to the lever.

VIA VIATRON

It had to happen: For awhile this spring, the most controversial company in the world (ITT) and the most controversial company in the computer industry (Viatron) were linked romantically. But spokesmen for ITT in corporate headquarters and also in the sprawling conglomerate's acquisition department deny any interest in acquiring Viatron. In fact, both say they'd never heard of the company.

On its part, Viatron says laconically that it is talking acquisition with two or three companies now. But in spite of its attractive \$40 million tax loss carry-forward, the company still labors away with a skeleton crew of 30 full-time employees in Bedford, Mass. Its president Robert Dockser reports that U.S. Leasing is now accepting Viatron equipment for lease and that the GSA has approved its System 21 equipment--a move that has already resulted in sales to the Navy, Air Force, and the AEC.

"On May 7 a year ago, when we went into Chapter 10, we started with less than \$1,000 in the bank," says Dockser. "Now we have more than \$400,000 in the bank. We still have a light assembly line running. We're a real company."

FABRI-TEK'S NEW CUSTOMER

Lyle Altman, exec vp at Fabri-Tek, says the \$1 million-plus of IBM 360 memory extensions which it's agreed to sell Control Data Corp. represents only a third of the Minneapolis memory firm's production of end-user devices. Altman said a story in this column last month might have suggested Fabri-Tek was leaving the end-user market. That isn't so. It's CDC that is entering. Fabri-Tek, meanwhile, has been granted a boost in its line of bank credit for more than \$7 million to finance end-user leases.

FAIRCHILD UPGRADING 360/67 MEMORIES

First increment of a two-megabyte bipolar memory system for the 360/67 will be delivered this month to Wayne State Univ. in Detroit by Fairchild Semiconductor, which becomes the latest entrant in the add-on memory business. Fairchild's Rex Rice says several customers are interested in taking their 67s up to four megabytes, and Fairchild can accommodate them up to twice that. He says the price is less than half IBM's standard price on the 67, and performance can be improved by up to 20%. Plus, there's a factor of four on space saved. For now, the semiconductor house is limiting itself to the 67 market, which consists of fewer than 70 U.S. installations.

RUMORS AND RAW RANDOM DATA

Lockheed Electronics Corp. received a long-sought contract from General Motors Research for some \$1 million worth of core memory extensions for GM's 360/67. This leads some observers to speculate GM will delay, maybe indefinitely, taking delivery of the CDC Star which was to have replaced the 67, among other things...Varian Data Machines is getting set to introduce a totally new family of minis featuring architecture that may lead to some dramatic price breakthroughs. Mid-June is thought to be the announcement date...A tribute to complication: IBM has extended its free-trial period for program packages to 60 days from 30, in the case of complex programs for larger machines. When new programs are announced, the company will also announce whether the price includes the longer trial.

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A message from F.T. Cary, Chairman, Office and Computer Equipment Industry Payroll Savings Plan, 1972.

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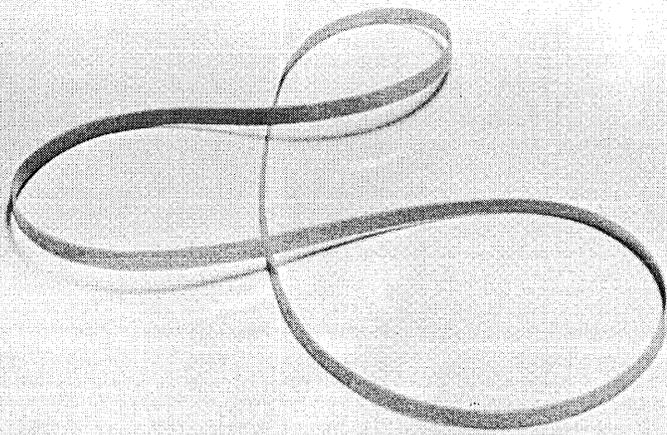
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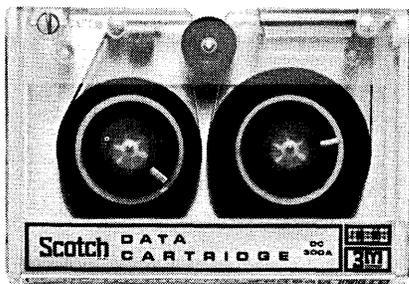
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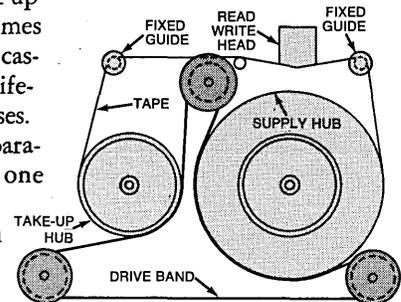
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DATAMATION

People

MISS PENNY KANICLIDES will be one of 40 "giants of accomplishment from America's great fields of endeavor" who will receive the Golden Plate Award presented by the American Academy of Achievement in Salt Lake City this July. Better looking than your average giant, blonde, sun-bronzed Miss Kaniclides, at 34, is president of her own financial information service company, Telstat Systems, Inc., NYC.



Penny Kaniclides

Starting as a mathematician, she began her career in the infancy of the industry (as well as her own, it would appear) as computer programming supervisor for the Foster Wheeler Corp., then as computer applications analyst at Control Data Corp. She joined Standard and Poor's in 1965 where she founded their computer division and became the first woman vp of the 110-year-old company. At S&P she originated and directed their computerized financial information services, then resigned to start her own competitive firm.

Launched less than three years ago with 12 clients, Telstat now has 150 users, for whom it provides daily comprehensive information on more than 15,000 securities—and 30 full-time, 30 part-time employees running a 24-hour operation in the plush headquarters on 58th St. Among their customers are some of the nation's largest banks, insurance companies, and brokerage houses.

In addition to magnetic tapes on daily stock transactions, Telstat provides time-shared computer services to financial analysts, a system for pricing municipal and unlisted corporate bonds, and is presently tailoring a number of other data services.

Miss Kaniclides' success is due not only to her knowledge of technology and her talent for innovation—but also to her realistic approach. "It's hard to have outside interests or a social life, but if you make the decision to become an entrepreneur you have to sacrifice certain things," she says.

"He is undoubtedly better informed about computer science in the U.S. than anyone else in the Soviet Union; in fact, probably better informed than most U.S. computer scientists." This compliment by a prominent U.S. computer scientist was paid recently to Dr. ANDREI PETROVICH ERSHOV who is in the U.S. this month to address a session at the Spring Joint Computer Conference in Atlantic City. Ershov, 40, is one of Russia's most prominent computer scientists and is well known in Western Europe and the U.S., which he visited extensively in 1965 and 1970. He is Information Division head at the Computing Center of the Siberian Division of the Academy of Sciences of the USSR in Novosibirsk. His recent election as a Corresponding Member of the USSR Academy of Sciences was significant because he is the first Russian computer scientist to be so honored for accomplishments in programming. (Other soviet computer scientists have been members for some time, but were elected for accomplish-

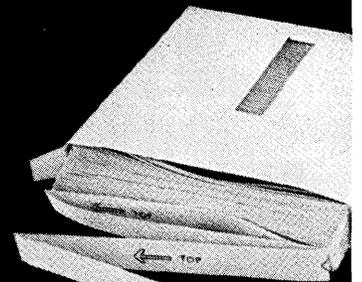


Andrei Ershov

ment to be so honored for accomplishments in programming. (Other soviet computer scientists have been members for some time, but were elected for accomplish-

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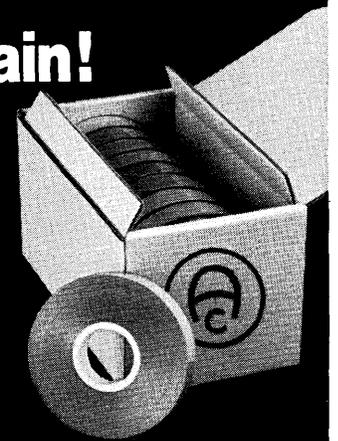


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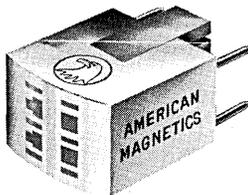
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people

ments in other than computer sciences.)

Ershov's interests include time-sharing systems and implementation of new languages. He's best known for his work on the ALPHA language, a variation of ALGOL-60 developed for the M-20, a tube machine which for many years was the work horse for soviet scientific and engineering computing. Recently, he has been involved in implementation of ALGOL-68, PL/1, and Simula-67, a Norwegian-developed language for simulation. When he described the work in an interview in late 1970, Ershov said each source language will be translated into the same "internal language" which will, in turn, be translated into machine code after an optimization phase. This is reminiscent of the UNCOL (Universal Computer Language) concept of the early SHARE days. Both projects aimed at machine independence. Ershov said he hoped to isolate the machine-dependent portion of the code in one section.

His address at a SJCC luncheon May 18 in the Granada Room of the Howard Johnson Motel is titled "The Aesthetics and Human Factors of Programming."

In a way, ANDREW HUSON has moved in a full circle in just over a year.

He had left the Santa Ana computer operation of Raytheon, where he was operation manager, to become president of ailing Data Technology Corp. in Palo Alto. Early this year Huson was back on South Fairview St. in the same Raytheon building he left a year earlier—only this time he has brought Data Technology along with him to occupy the facility that Raytheon had vacated.



Andrew S. Huson

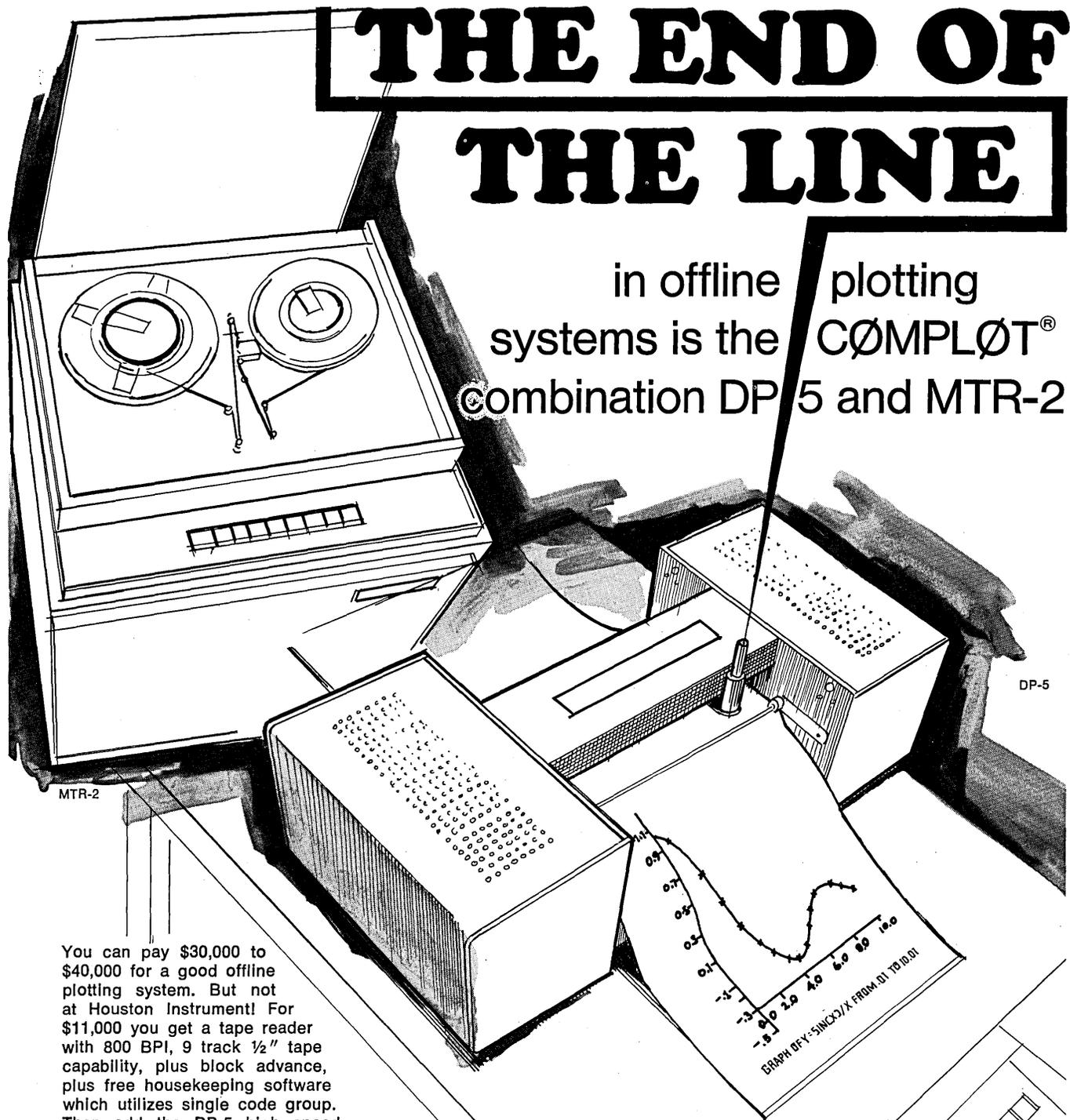
It's all part of a retrenchment at Data Tech, which ran into trouble in mid-'70 shortly after a merger binge. At one time the company had as many as 18 different product lines, including a minicomputer. Today, employment has been cut 20% to 500 people; two subsidiary companies have been dumped; and the product line has been trimmed to 11, including Raytheon's abandoned biax memory and its line of analog-to-digital and digital-to-analog converters, which accounted for about \$3 million in annual sales for Raytheon. (Data Technology last year reported \$14 million in revenue.) Its tape cassette facility will stay in San Jose.

Huson, who recently took on the added title of chief executive officer and chief operating officer, says Data Technology's only trouble was that it expanded in too many directions at once. Now, he says, "we have a very solid company."

Dr. DONALD B. RICE, 32, assistant director of the U.S. Office of Management and Budget, has been elected president of RAND Corp., the independent research organization that master-minds projects for many government agencies. He succeeds HENRY S. ROWEN, who announced his impending resignation last November . . . IBM alum ARTHUR SILVER has been named product development vp for ITEL'S ISS (Information Storage Systems, Inc.) In Cupertino, Calif. . . CHARLES F. SMITH has been elected president of Arcata Communications, the nation's largest nonutility telephone marketing and servicing organization, headquartered in Mountain View, Calif. Smith will continue to serve as a group vp for the parent company, Arcata National Corp. □

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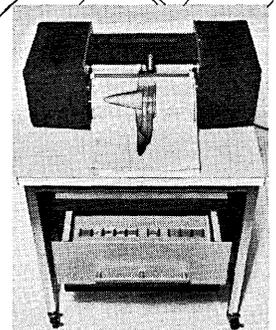
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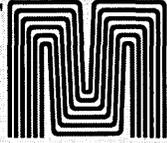
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Books

Approximate Calculation of Multiple Integrals
by A. H. Stroud
Prentice-Hall, Inc., 1971
389 pp. \$16.50

As most everyone knows, a multiple integral is a mathematical representation of successive summations of infinitesimals in two or more dimensions over a region, usually bounded, in space or hyperspace. Taken in three-dimensional Euclidean space, for example, it may sometimes be used as a means to determine volume of a solid of oddball configuration whose surfaces may be analytically expressed.

As in working with just everyday, backyard integration, a multiple integral may often be approximated by an equivalent summation of finite parts in which the sum represents the integral to some defined closeness, typically expressed as equal to or less than a stated error. Since digital computers, by the nature of their design, operate with number representations of finite length, the proper approximation is the sensible model for a computer program which calculates "the value" of the desired integral.

This, in most brief and rudimentary terms, is the content basis of Mr. Stroud's book. And a comprehensive work it is, as is indicated in the dust jacket subtitle.

The work is divided into two parts. Chapters one through six present the theory of approximation of multiple integrals. It is a no-nonsense presentation which puts the math to it. There is very little gentle leading by the hand, and those not well versed and in practice with this end of the world of mathematics will be well advised to bone up first. Even then, a copious supply of paper and sharp pencils is recommended for progressing with Stroud through chapter and verse.

Chapters seven through nine, the first of the second part of the book, present lists and tables of formulas. These chapters may be used by those either so proficient or so lazy as to skip the theoretical discussions at the beginning.

Chapter ten lists FORTRAN programs for evaluation of multiple integrals over several of the regions discussed in the book. These provide a variety of different and practically useful formulas. It is suggested that it is not difficult to program other formulas of interest, using these programs as guides and examples.

A good deal of the heavy work in approximation of multiple integrals has been done by the Russians, as is amply indicated by the bibliography of

this book. Works on the subject in English are not plentiful, and this one presents material not found elsewhere, some of it quite new.

Not everyone involved in daily use of computers makes use of the approximate calculation of multiple integrals, and this book is apt to find little application in the bank or insurance company installations. It is, quite manifestly, a book for heavyweights. It exists out in that vanishing no-man's land between the applied mathematician and the computer professional working in engineering/scientific applications, to coin a whole set of new cliches.

This should be a valuable addition to the libraries of anyone involved with, or even on the fringes of, problems involving multiple integration. Even if the owner does not use it often, it is bound to impress visitors.

—Jackson Granholm

Book Briefs

Introduction to Computer-Aided Manufacturing in Electronics

by Douglas A. Cassell
John Wiley & Sons, Inc.,
New York, N.Y., 1972
248 pp. \$12.95

This book begins with an overview of present manual and automatic methods of manufacturing, then discusses digital computer design with emphasis on the use of minicomputers, and covers the techniques for computerization of manufacturing operations and the integration of computerized systems into existing systems and corporate structures. Although special attention is given to CAM in the electronics industry, it is claimed that the book is a practical guide for managers and engineers concerned with any form of automated manufacturing, production, and inventory control.

Introduction to Computer Organization and Data Structures

by Harold S. Stone
McGraw-Hill Book Co., New York,
N.Y., 1972
321 pp. \$13.50

Intended as a first exposure to several concepts in computer science—including assembly language programming, computer organization, data structures, control of I/O devices, and sorting and searching algorithms—this text is suitable for college undergraduates with minor mathematical background. Early chapters concentrate on assembly language to familiarize the reader with details of computers that are hidden by procedure-oriented languages and executive programs. The programming examples are primarily oriented to the IBM System/360-370 and the Hewlett-Packard 2116 mini. □

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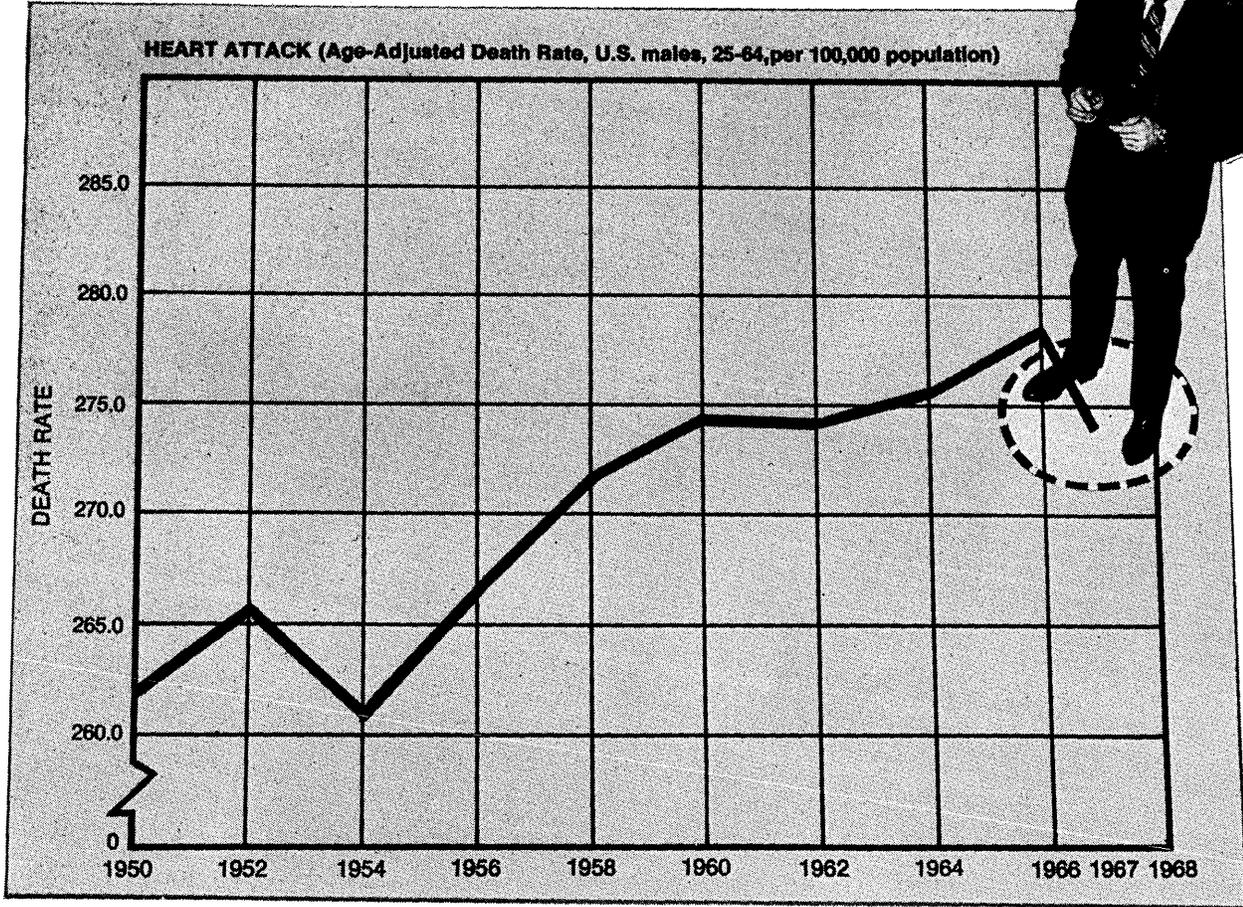
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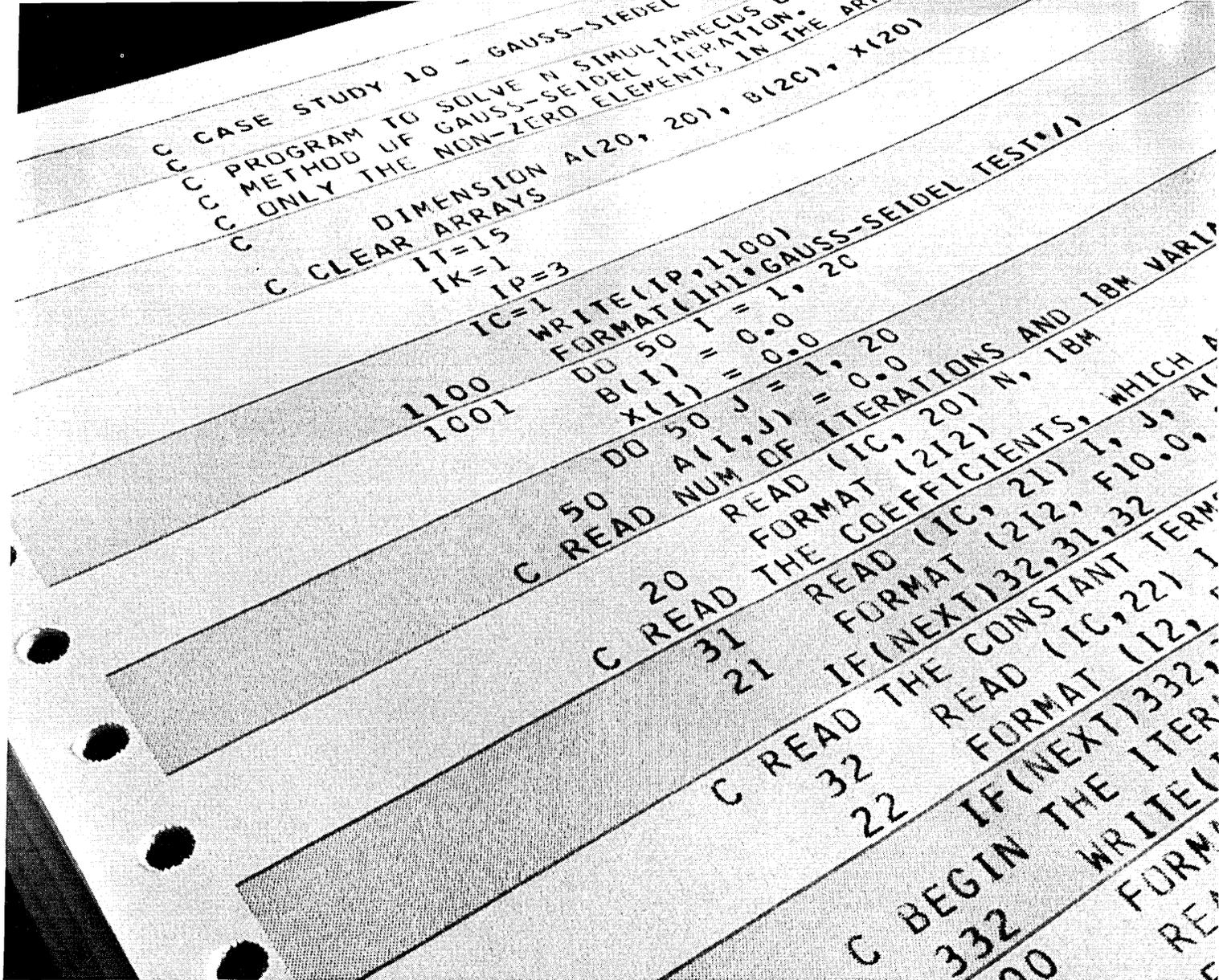
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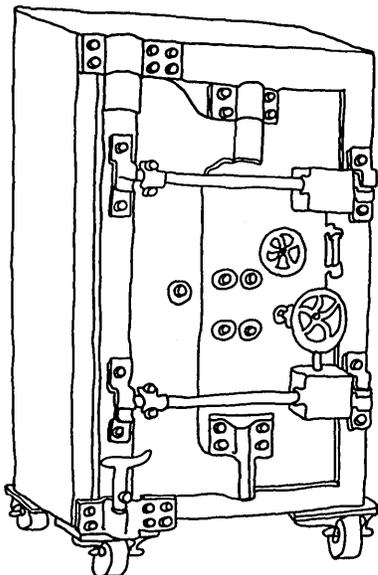
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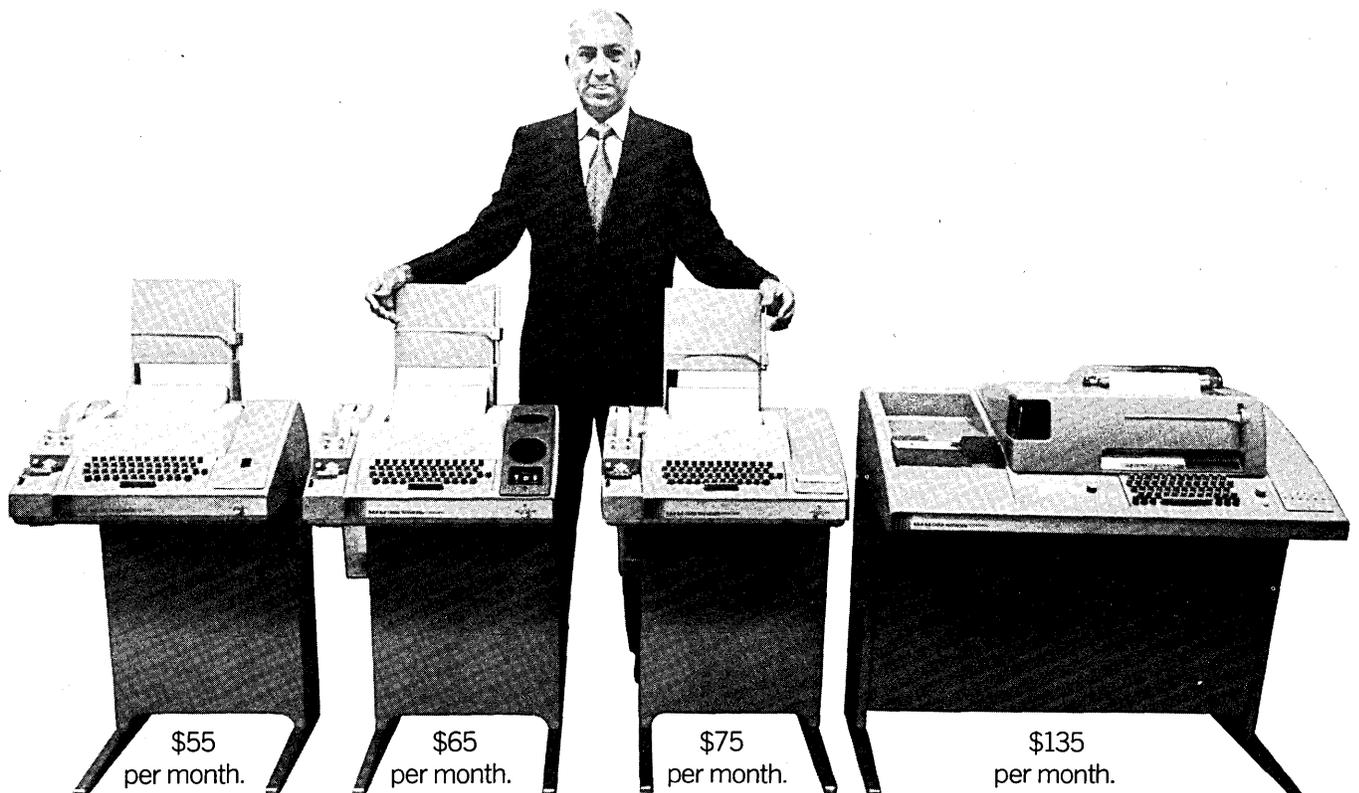
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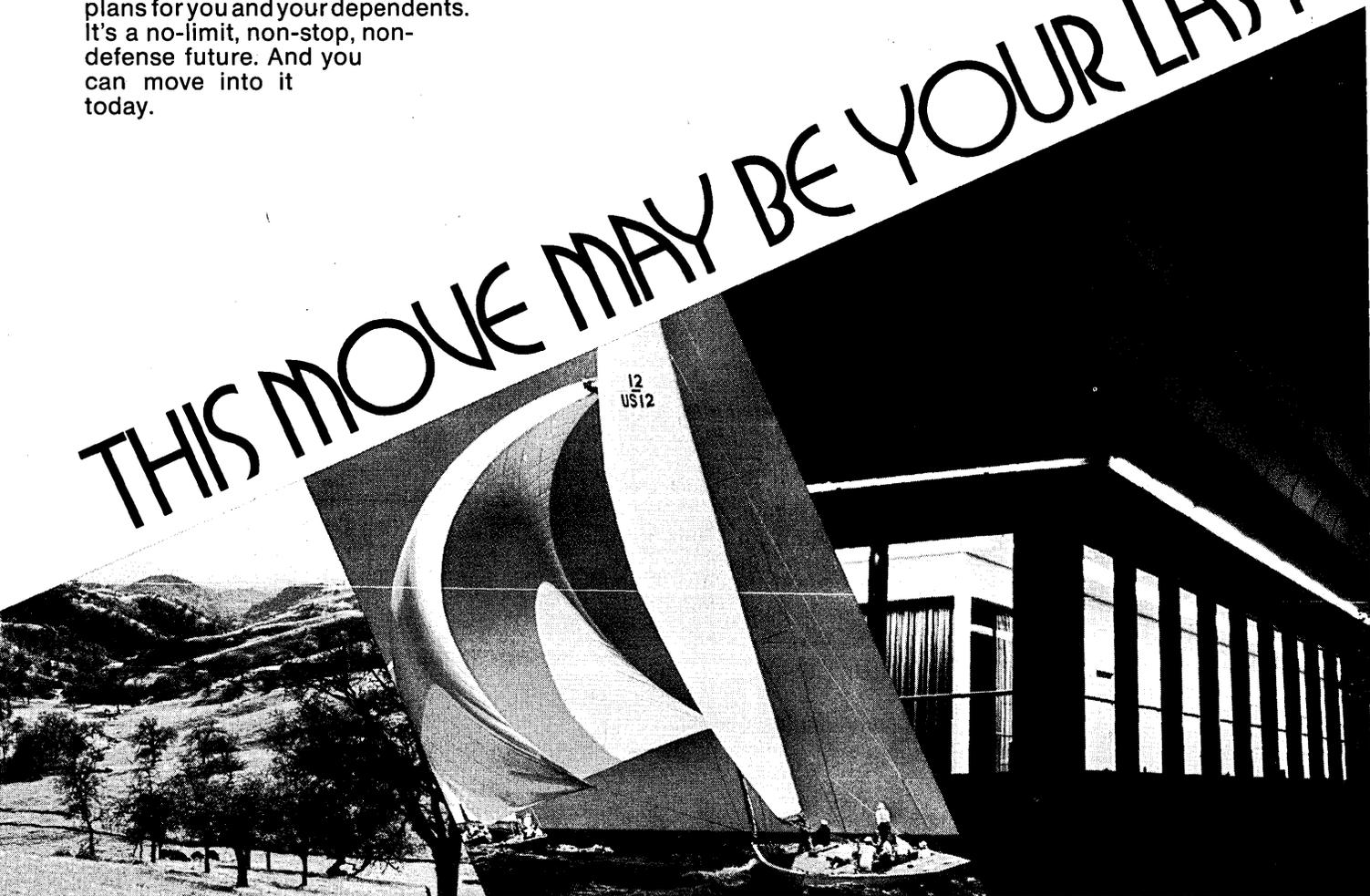
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The Forum

Quitting Time

Recently the U.S. Civil Service Commission rejected accusations that government programmers were overpaid with the comment that the government still loses many programmers to higher-paying private industry. More recently, the state of Missouri has gone to facilities management with the claim that they can't pay programmers enough to keep them around.

I think both of these may be instances of the widespread delusion that computer people usually change jobs primarily for more money—a delusion that, interestingly enough, has been refuted by various writers in DATAMATION since at least 1962, without having made a dent in the minds of data processing management.

Let's construct a scenario for a typical programmer, whom we'll call Al Gol. Al is fed up with his job at the Kludge Korporation, because of some problems of his own personality, his boss' personality, failure of management to grant him the recognition he may deserve, various irksome administrative restrictions, etc. He looks around for a job and, unless he is really desperate, does not quit until he has found one that pays more money, because to switch for the same or less would look bad on his resume.

Al resigns from Kludge and has to explain, formally or informally, why he is getting out. This is a sensitive time: his boss feels, perhaps subconsciously, that Kludge has failed Al, and feels some kind of guilt himself. The last thing he wants is for Al to tell him that he is quitting because his boss is an s.o.b., because Kludge has failed him, etc.

On his part, Al wants to get out as painlessly as possible and, in this sensitive situation, is not about to tell his boss that he is an s.o.b. He is not even going to complain about Kludge, for fear that that might result in a

less-than-glowing reference next time around. Al is going to get more money, right? So what is more natural, what can get him off the hook more easily, than to give as **the** reason for resignation that he has a chance to make more money elsewhere. In a capitalist society, this is not only understandable, it is laudable. Al concerned breathe a sigh of relief, and Al goes on to his new job. No one is forced to analyze the situation as it really exists, and Al will go on to other jobs while Kludge will continue to lose other programmers.

Just as "more money" is an acceptable reason for leaving, "desire for greater challenge and responsibility" is an acceptable reason for Al's asking you to hire him. To mention money as the prime dissatisfaction in one's present job to a prospective employer is damaging. To say "my boss is an s.o.b.," or "I couldn't handle the job" is even worse. So the magic phrase "greater responsibility" comes to mind.

The upshot? Kludge thinks it offers challenge, responsibility, and adventure to new computerites. It also thinks it can't quite manage to pay anyone what he's worth. The first thought leads to unrealistic smugness, the second to inflated industry salaries, neither one beneficial to the employer, or ultimately, to the programmer himself.

There may be no way to get truthful letters of resignation, or honest reasons for wanting to leave in a resume—but employers should learn to accept this game-playing for what it is, and not to base company policies on it.

—TDC Kuch

Mr. Kuch is head of the planning and development unit, adp management staff, of the National Cancer Institute.

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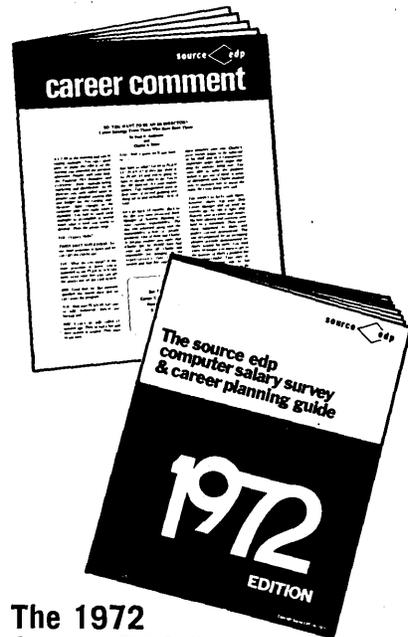
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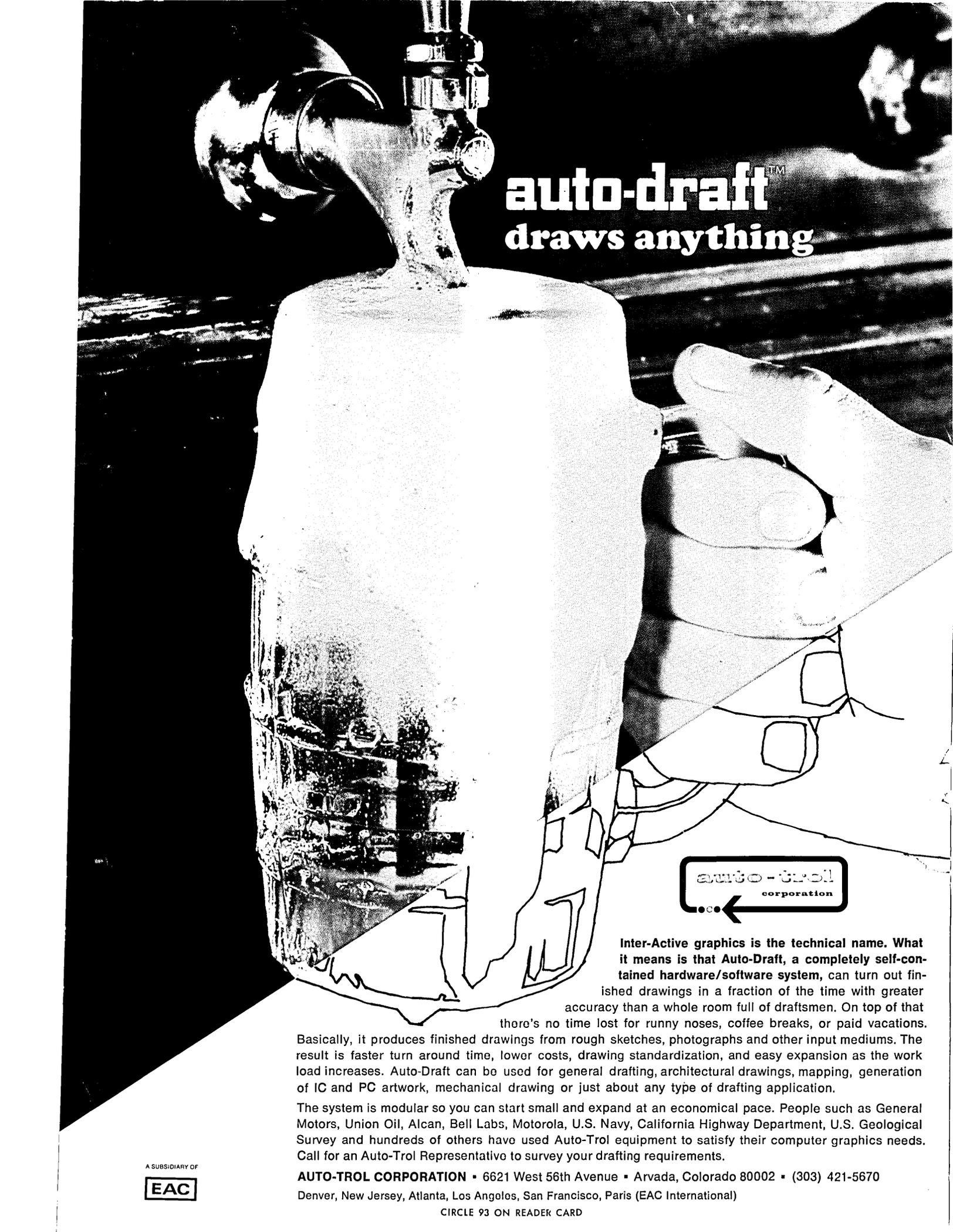
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