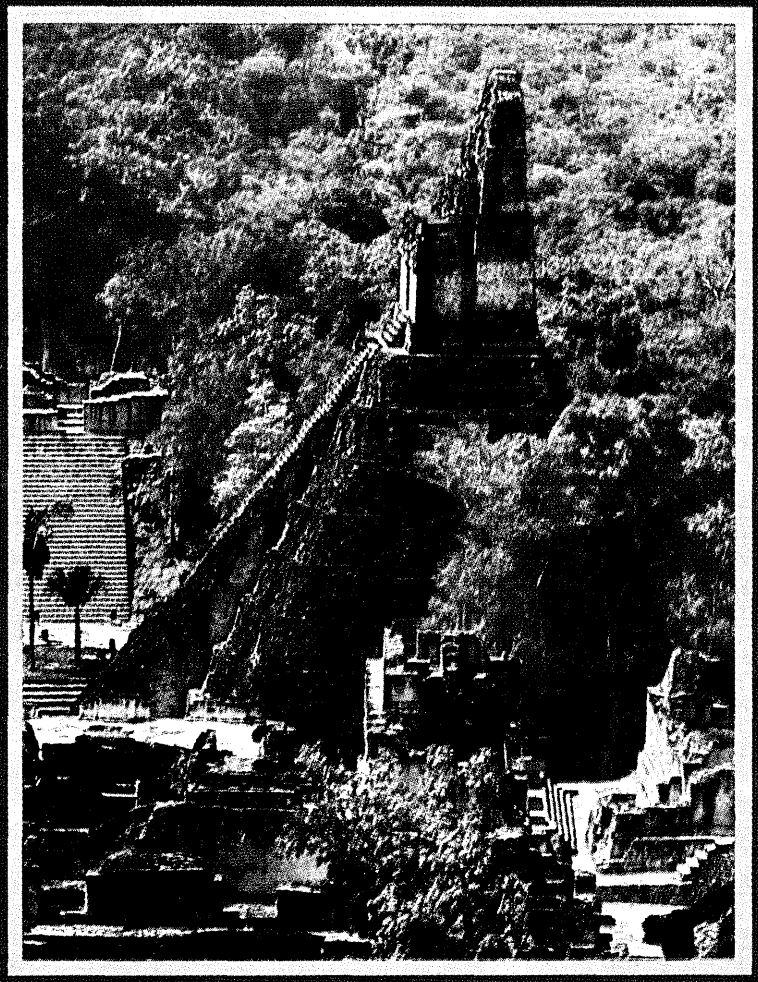
DATAMATION 70®

August 15

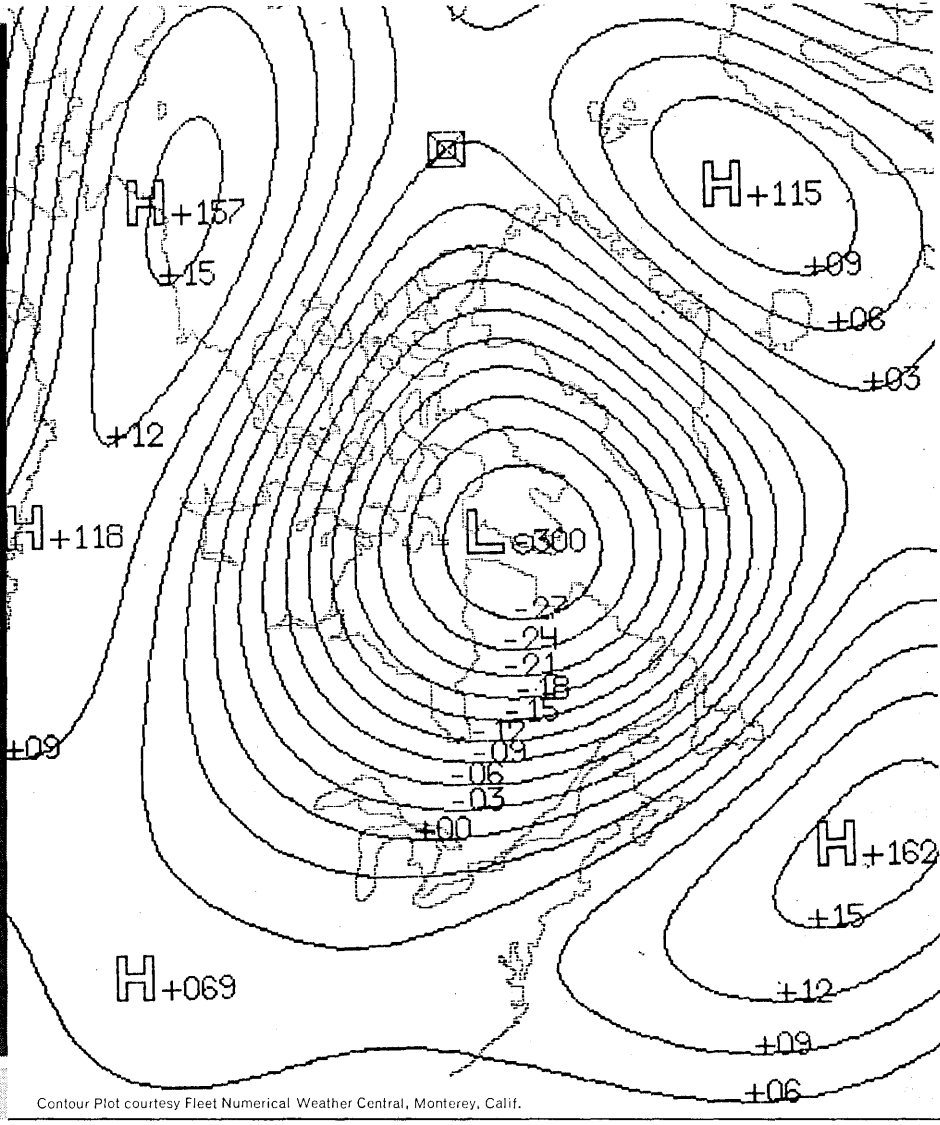
The Mayas made your computer possible...



Katun can make it work.

The ancient Mayas were the most superb computational experts of their time. Over 2,000 years ago they invented —for the first time in the Western World—the concept of zero (the mathematical principle on which modern electronic computers are based), and they were surprisingly precise in their measurement of time. From this heritage of innovation and precision, the men and women of KATUN Computer Management now offer you a complete resource of professional experts in managing your data processing activities. What Katun's professional computer management can do for your business (that you can't do for yourself) is just this: KATUN changes your computer from a costly problem to a competitive advantage. How? KATUN eliminates the communication gap that exists between your management and your computer. KATUN eliminates your costly computer personnel turnover problem. KATUN eliminates your re-education problems. KATUN eliminates your computer quality-control problems. The result? Vastly improved computer utilization (and customer satisfaction) at less cost. And the end of the talent drain computers place on your executives. For details on our total resource capabilities write to KATUN, 680 Beach St., San Francisco, Calif. 94109 or phone (415) 771-9444. □ *Photo Above: At Tikal, the oldest and largest center of the ancient Maya civilization, in Peten, Guatemala, Temple I towers 15 stories tall over the surrounding jungle. It was built by hand, of limestone about 700 A.D. It was in ceremonial centers such as this that the Mayas developed a time counting system—from which the name KATUN derives—that was more accurate than the calendar we use today.*

KATUN
CORPORATION



Contour Plot courtesy Fleet Numerical Weather Central, Monterey, Calif.

Go from data to plot in 1/5 the time.

Compared with conventional plotters, Statos 5 needs less CPU time. Because our digital printer/plotter requires less sorting and connecting. The job gets done with 20 per cent less core, since the memory isn't forced to hold the whole plot to start plotting. And Statos produces the plot 10 to 15 times faster too.

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Complex plots show off our ability. One way: the plotting time is the same for any given size plot regardless of contour density or total line length. Including any number of double width lines.

One more pertinent item. The world isn't all black and white. Depending on individual needs, Statos 5 can deliver gray with a variable dot density that produces up to five shades or an optional Z-axis intensity modulator that delivers up to eight shades of gray. All in precise registration.

Software? No problem. Choose from several complete packages. In short, any way you program the facts, Statos 5 will save you time.

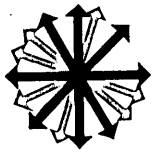
For the full story on the Statos 5 electrostatic printer/plotter, call or write: 611 Hansen Way, Palo Alto, Calif. 94303. Phone (415) 326-4000.

Statos 5— a great idea whose time has come

varian graphics and data systems division

AUGUST 15, 1970

volume 16 number 9



GENERAL

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The program chairman for ACM's 25th annual conference defines this year's September meeting, mainly concerned with outlining data processing requirements of end users for the coming decade.

25 Earth Resources

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30 Finance Sector

Stock-transfer problems have received most of the attention lately, but all types of financial institutions are looking for improvements. Long-range communications and terminals, for example, will be of increasing importance during the coming decade of international expansion.

31 Medical Sector

The main questions about the use of computers in medicine have not yet even been asked. For example, in medical research is it best to use individual machines, preprocessing systems, or centralized computers?

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When Computicket folded, it left California's Department of Parks and Recreation with a massive reservations problem that was really camp. Twenty-five firms are expected to bid to take over the job.

The Association of Independent Software Companies moves forward in its efforts to establish business standards but some critics don't like the aims or the methods.

About Our Cover
Breaking the problem down into manageable chunks is ACM's game as it takes on the whole world in three days of probing during the September convention in New York. Our many-faceted cover design is by R. L. Thompson.

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volume 16 number 9

DATAMATION®

This issue 105,773 copies

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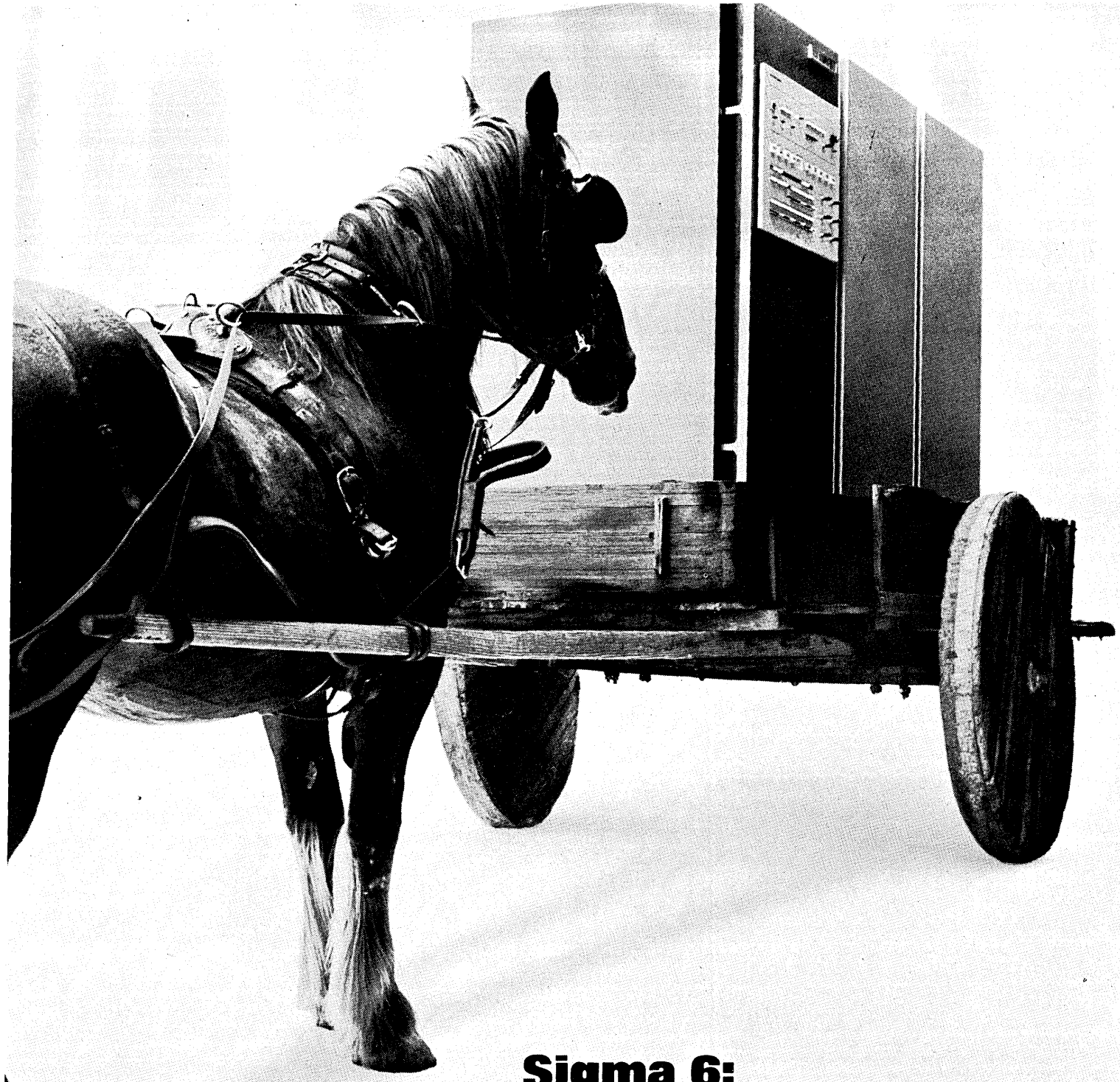

Sigma 6: first the software, then the computer.

Crazy.

Develop a lot of expensive software packages, put them out in the field, prove them in demanding user environments, then build a computer to run them on.

Who does that?

Us.

Sigma 6 is our business computer. Designed for high-throughput commercial batch work, together with remote job entry, and interactive time sharing.

Sigma 6 uses all the software developed for Sigma 5 and 7. Including operating systems for batch only or concurrent batch and time sharing; powerful Cobol and Fortran compilers; several systems for structuring and manipulating files and large data bases. Plus mathematical and simulation packages.

To run these systems efficiently we gave Sigma 6 byte-string decimal arithmetic (as well as floating point), memory mapping, dual-access memory, an independent input/output processor, and many other high-performance hardware features.

We also gave it an astonishingly low price.

We went into business backwards and came out ahead.

XDS

Xerox Data Systems
El Segundo, California

CIRCLE 45 ON READER CARD

900 History

Memory Bank.

The information contained in these volumes has taken man thousands of years to develop and compile. And every day more is being added. The storage capacity of this memory system is theoretically unlimited. But what about its access time?

When the ability to retrieve must be measured in nanoseconds, that's where we come in. Memory systems are an important part of our business. And our leadership in this field is measurable through our combined technical knowledge, our production experience—and our reputation for product quality.

Two fast examples:

The cycle time of our Nanomemory® 2600 is 600 ns. Access time is 300 ns. Capacity from 16K words by 18 bits to 8K words by 36 bits. (As usual, K is 1024). Our Nanomemory 3650 has a full cycle time of 650 ns and an access time of 350 ns with capacity of 16K, 32K, 64K and 128K words by 8 to 76 bits.

To evaluate these and other examples of our systems line, you should also know more about such unique features as the field replacement benefits that result from plug-in stacks. And you'll want to be briefed on the low power and low component-count requirement of our advanced system design concepts.

Or you may want to talk with us about standardized or customized cores for your own systems.

Or stacks for virtually any digital storage application.

The history of EM's experience in memory systems is massive. And you don't need a library card to check it out. Just call or write.

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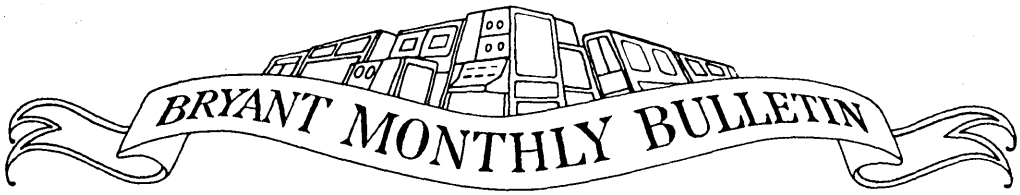


Bryant develops a line of mini-controllers compatible with leading mini-computers.

A mini-controller for maxi-results.

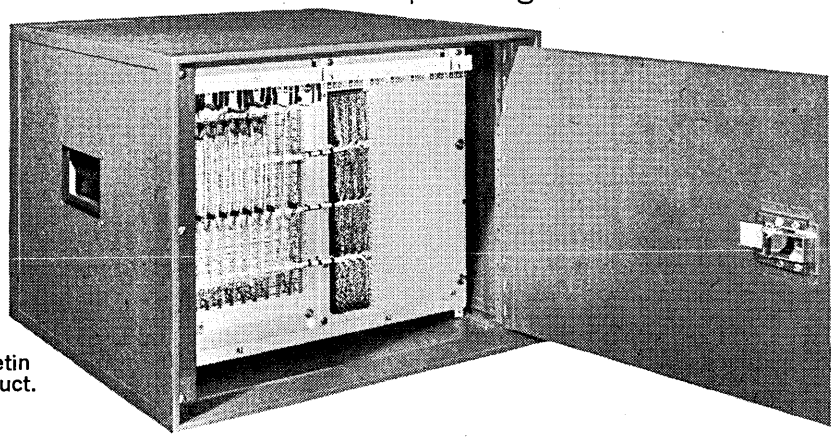
That's the way our new Bryant Series 720 works out. It's a compact, low-cost controller that is instantly compatible with your mini-computer (either the MAC 16 or Interdata 3).

But that's only part of the story. The 720 is instantly expandable from 0.6 million bits to 70 million bits, depending on which of the 8 different Bryant storage memory systems you utilize. Incidentally, only Bryant can offer this wide range of storage expandability.

Hold it, there's more. A fully expanded system can interface two computers with up to eight storage units and two computers can operate off one storage system simultaneously. (And they're available in cabinets or can be rack mounted in your equipment.)

But this is only the beginning. Two more mini-controller systems (compatible with the PDP-8 and SEL-810A mini-computers) will be available later this year. And by 1971, Bryant will have systems to interface with most of the major mini-computers on the market.

If you're interested in maxi-results, why don't you drop us a line. Bryant Computer Products, 850 Ladd Road, Walled Lake, Michigan 48088.



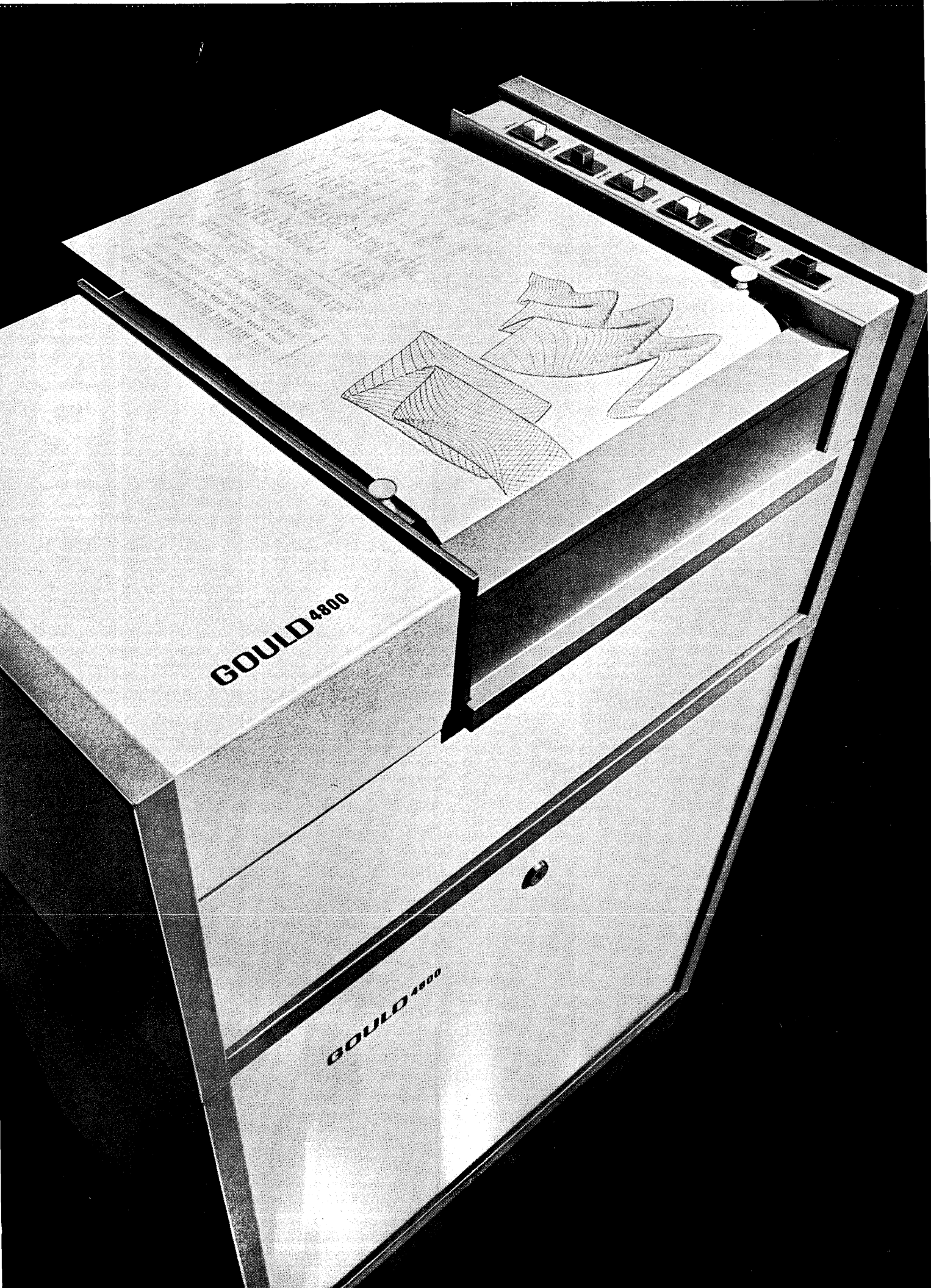
Watch for next month's Bryant Bulletin and another new Bryant product.

BRYANT COMPUTER PRODUCTS

A UNIT OF XLO® EX-CELL-O CORPORATION

CALENDAR

DATE	EVENT/SPONSOR	LOCATION	CONTACT	COST
Aug. 25-28	Western Electronic Show & Convention (WESCON)	Los Angeles	Don Larson, WESCON 3600 Wilshire Blvd. Los Angeles, Calif.	$3 registration
Aug. 30- Sept. 2	AIME Computer Electronic & Magnetic Materials Conference	New York City	AIME 345 E. 47th St. New York, N.Y. 10017	Unknown
Aug. 31	ACM Annual Urban Symposium	New York City	P. R. DeCicco Brooklyn Polytechnic 333 Jay St. New York, N.Y. 10017	$28 $13, students $2, late registration
Sept. 1-3	ACM 25th National Conference	New York City	Sam Matsa, IBM 410 E. 62nd St. New York, N.Y. 10017	$50, members $75, others
Sept. 14-15	SMIS Annual Conference	Washington, D.C.	John McCarthy, Jr. P.O. Box 16 Ben Franklin Sta. Washington, D.C. 20044	$150
Sept. 14-16	Canadian IPS Computer Show	Montreal, Canada	Int'l. Trade Shows 481 University Ave. Toronto 2, Canada	Invitation Card or $2 fee
Sept. 14-17	Photo-optical Instrumentation Eng. Society Symposium	Anaheim, Calif.	SPIE P.O. Box 288 Redondo Beach, Calif.	$60, members $65, others
Sept. 17-18	ACM 4th Annual Interface Symposium	Irvine, Calif.	Chuck Paul Univ. of Cal. Ext. Irvine, Calif. 92664	$35, including Univ. housing, facilities
Sept. 20-24	NRMA 12th Annual EDP Conference	Miami, Fla.	NRMA 100 W. 31st St. New York, N.Y. 10001	$125, members $150, others
Oct. 5-8	CBEMA DP Conference	Toronto, Canada	Canada Presentation, Ltd. 74 Victoria St. Toronto 210, Canada	No fee
Oct. 5-9	BETA Computer 70 Int'l. Exhibition	London, England	BETA 109 Kingsway London, W.C.2, England	Seminars, $16.80 each
Oct. 11-15	ASIS 33rd Annual Meeting	Philadelphia	Amer. Soc. Info. Sci. 2011 Eye St. Washington, D.C. 20006	$45, members $60, others
Oct. 12-13	IEEE, ACM Annual Microprogramming Workshop	Buffalo, N.Y.	W. Y. Stevens, IBM Box 390 Poughkeepsie, N.Y. 12602	Unknown
Oct. 12-17	Dept. of Commerce Computers and Peripheral Exhibit	Tokyo	U.S. Dept. of Commerce BIC-936 Washington, D.C. 20230	Exhibitor's fee: $975
Oct. 13-15	IFT, ISA, EIA Int'l. Telemetering Conference	Los Angeles	Int'l. Telem. Fndn. 19730 Ventura Blvd. Woodland Hills, Calif.	$15, lectures & proceedings; exhibits free
Oct. 14-16	AFIP Int'l. Conf., Management Information Systems	Copenhagen, Denmark	Danish EDP Council 1 Vesterbrogade DK1620 Copenhagen V, Denmark	Unknown
Oct. 26-30	BEMA 12th Annual Expo and Conference	New York City	BEMA 1828 L. St. Washington, D.C. 20036	Conference sessions, $30 each


GOULD 4800
GOULD 4800

This is the fastest printer around.

It also produces both alphanumerics and graphics.

And printout is 132 columns wide on an 11 x 8-1/2 format!
The practical continuous speed of the standard line printer is 600 lines per minute. But the new Gould 4800-II will deliver 4800 lines per minute. And it'll produce both alphanumerics and graphics — simultaneously — directly from any source of digital input as data transmission by telemetry, radio microwave, and/or land line.

There's a new character generator, too. With an ultimate capability of three 128 character fonts with dot matrices up to 15 x 15.* And because it has a 132 character buffer, you don't have to burden your computer's memory banks. The input control lines are built-in, too. Which makes it comparatively simple to interface the 4800 with almost any computer you have in mind.

The 4800 provides programmed control for a variety of output forms . . . line and letter spacing, paragraphing, columns and so forth. Plus a convenient capability to translate bit mode input into generalized graphics.

But speed and versatility are just part of our story. Because it's electrostatic, the 4800 is infinitely quieter than line printers. Because it has fewer moving parts, it's more reliable. And because it's a lot simpler, it's priced well below printers that can't come close to the performance.

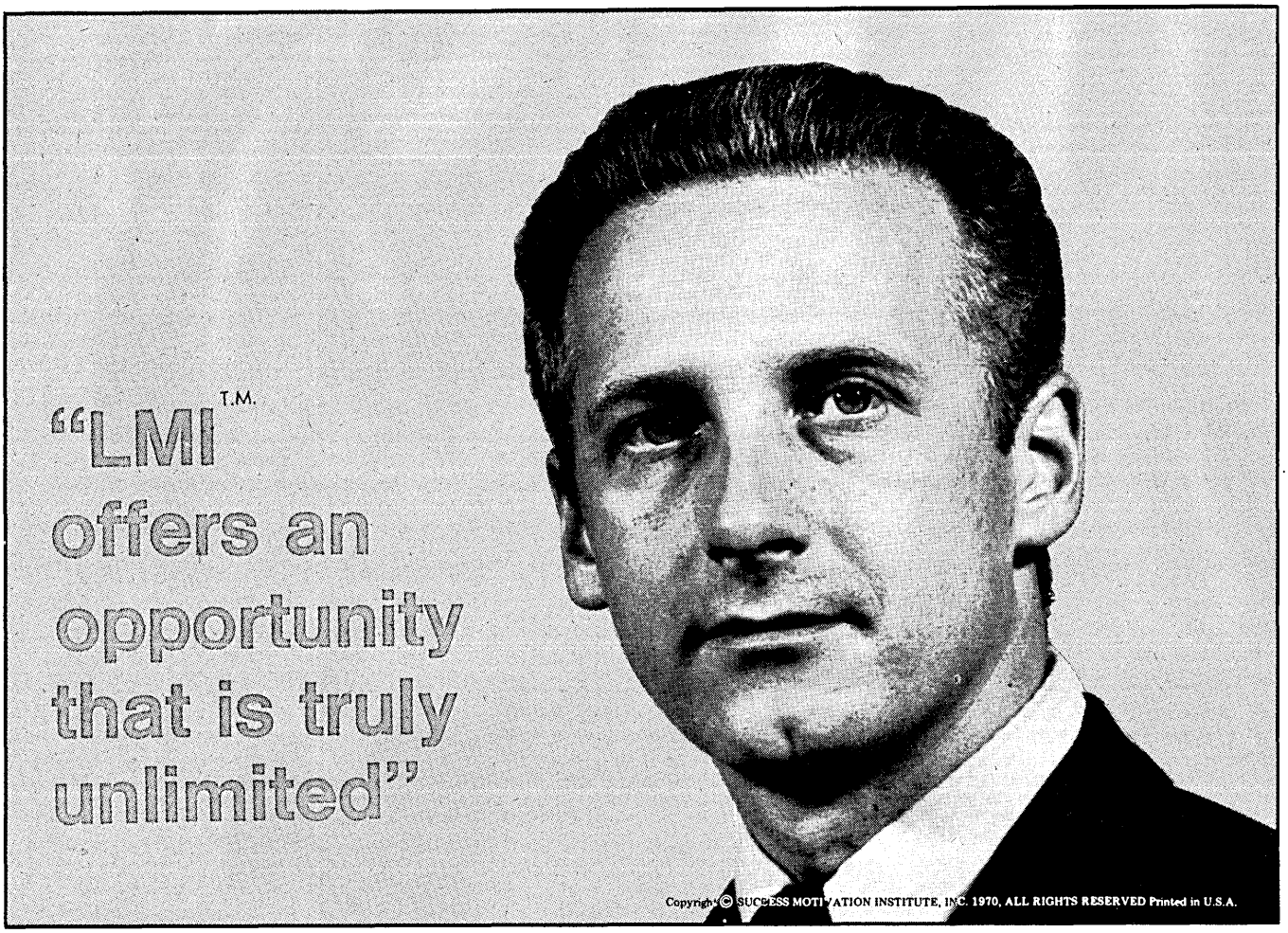
So there you have it: the Gould 4800 electrostatic hardcopy printer. Isn't it time we talked? Graphics Division, Gould Inc., 3631 Perkins Avenue, Cleveland, Ohio 44114.

*Supplied standard with unit: One 64 character font with 5 x 7 dot matrix.

GOULD **CLEVITE**

The Gould 4800. The next generation of high-speed printers.

CIRCLE 25 ON READER CARD



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LETTERS

Kill the cat

Sir:
The otherwise excellent article on "Automation and the Library of Congress: 1970" in the June issue repeatedly refers to the "2,741" computer terminals being used by the Legislative Reference Service. Shouldn't this be IBM *model* 2741 terminals?

How did an error of this significance manage to get by everyone and into print? I'm curious.
EARLE C. BOWERS
New York, New York

Ed. reply: That's what the authors would like to know.

Hard to digest

Sir:
I just ran across the letter from Alan Pritchard in the June issue which comments on Fred Gruenberger's reply to Mr. Pritchard's letter (March, p. 226).

Mr. Pritchard's sweeping generalizations about abstracting and digesting are rather disturbing to me. He assumes that he can put a fence arbitrarily around some subject matter (which he has not defined for us) and make judgments about ten random abstracting services, based upon the number of published items arbitrarily included in a survey. These figures are all for 1966—four years ago.

Who is the audience Mr. Pritchard is weeping for? Of the ten digesting and abstracting services he lists, probably no two will appeal to the same audience. We at *Data Processing Digest* have wrestled with the problem of defining our audience for the past 15 years, since we began publication in April 1955. We have made the decision that we must be discriminating in our selection of literature, that we must narrowly define our readership as data processing, middle and top management, and that we must make our digests easy to read and our publication a pleasure to look at. Our change in format with the April issue also makes the Digest easier to handle. Material which is abstracted and then presented in a manner which repels rather than attracts (such as the many KWIK indexes) simply won't do the job—that is, getting people to read it. No matter how much information you cram into an abstracting service, it does no good at all if it can't be read easily, or if it lies in a file because it is too bulky to bother looking into.

Mr. Pritchard seems to be so enamoured with statistics and size that he fails to consider the whole point of abstracting—to make it easy to find useful information, and to read it.
MARGARET MILLIGAN
Los Angeles, California

Knot likely

Sir:
In re. Dr. Andrew Gabor's letter (June, p. 41) and Earl Masterson's design principles (April, p. 220), may I add one I learned from Earl at Univac in 1951? It is: "You can't push with a rope."
WILLIAM P. STEAGALL
Santa Monica, California

Con-census

Sir:
Congratulations on your series of articles on privacy in the May issue. You should be particularly proud of the article by Phil Hirsch, "The World's Biggest Data Bank." The dangers about which he speaks are very easily overlooked by a basically optimistic citizenry which feels, for the most part correctly, that nobody would want to hurt him, or would be able to do so simply by giving a few answers to the Census Bureau.

Rather than reiterate the many arguments about this subject, let me suggest a fairly radical (but eventually imperative) proposal: for the 1980 (and all future) censuses, *no* detailed information will be made available to *anyone* outside the government, nor to *anyone* in the government outside the Census Bureau.

This proscription would hold for university researchers as well as commercial establishments. The basic argument that would be made against this proposal is: 1) that the census information is useful to commerce; and 2) that the government, which already has the information, has a responsibility to promote commerce and should, therefore, provide such information (with proper safeguards, of course). While I can easily accept the two premises, the conclusion does not logically follow. To use a reductio not-so absurdum argument, there are many things the government has the resources to do, which would be useful to commerce, which the government *still* doesn't do. For example: 1) the government could outlaw labor unions—thus undoubtedly lowering wages, permitting both a raising of profits and a marginal lowering of prices; 2) corporate taxes could be drastically reduced to the same effect; 3) the various regulatory agencies could be formally recognized as industry associations (although I'm not sure that the effect would be much different from the present situation). Many more examples could be given.

The point is simply this: there are many things the government could do to promote commerce that it does not do. Thus the argument that the government should release census information because it has that information and that information is useful, is invalid. The question is really: how much will the government's action hurt one group while it helps another. If we are beginning to realize, as evidenced by your series of articles, that the release of census information hurts, and in some cases can hurt a lot of people, we should stop temporizing.

We must start convincing our Representatives and Senators *now* that this situation *will* be critical by the time the next decade is upon us.
MICHAEL R. LEAVITT
Evanston, Illinois

Addressed area

Sir:
Your Editor's Readout of the June issue covered three major areas which the computer industry must address. These are opening the doors of opportunity to the underprivileged, involving young people in the profession and use of computers, and telling the public at large what we are up to.

The first two of these have been addressed by the New York City Chapter of the ACM during the past couple of years. The third is being addressed by the ACM 70 conference. In 1968, the New York City Chapter assisted an antipoverty computer training project on the upper west side of Manhattan. Twenty-two of

the 24 people who completed the courses were actually placed in jobs in our industry. This is one of the few examples of training of the underprivileged in our field where proper stress has been placed on finding employment.

There is an annual computer contest conducted by the New York City Chapter and open to all high school students in the city. The quality and breadth of many of the projects has been excellent and even somewhat surprising.

At the ACM 70 conference at the New York Hilton on September 1-3 there will be a town hall where the general public can ask what computer systems and computer people are up to. They can also see, feel, and even touch some special public service exhibits being specially prepared for their information. A career guidance session will be conducted for people who think they may want to enter the computer field. This is under the joint sponsorship of the ACM New York City Chapter and the ACM Accreditation Committee.

The main thrust of this conference to establish a meaningful dialog between the computer professionals and our users—the business community, the young, and the public at large.

PAUL D. OYER
New York, New York

How fetching

Sir:

I read with interest McIntyre's and Graham's words on ILLIAC IV in your April issue (p. 60, 68).

As one of the people involved in Burroughs' portion of the design of ILLIAC IV, I feel dismayed at the rather pessimistic figures given by Mr. Graham for the speed of the machine. His times are based on two fetches and one store with every operation. As McIntyre states, both the A and the S registers in each processing element allow intermediate results to be saved without a store to memory or the subsequent fetch. A small sampling of programs written for the ILLIAC IV shows less than one-half a fetch from memory for each operation, and less than one-fourth of a store. This reduces Graham's allowance for memory operations to 25% of his assumed value, and actually ILLIAC IV runs twice as fast as he shows in Table 2, for addition and multiplication.

Graham's final point, that user skill will be required to make efficient use of ILLIAC IV or STAR, is valid. The next step is to develop software methods and system improvements which will make the power of array processing more easily available to a broader range of users.

GEORGE H. BARNES
Paoli, Pennsylvania

Tape type

Sir:

After reading your June articles on keyboard data entry, I thought you might be interested in our key tape history.

In July 1966, we received delivery of two NCR 735-101 Key Tape Units (in Mr. Robert F. Carey's articles he states that NCR did not enter into an agreement with MDS until the fall of 1966). These units were probably the first units to be leased by NCR to a customer.

In September 1966, we installed a H-120 computer with the magnetic tapes from the NCR 735's as the only means of input (no cards or paper tape). We feel that our installation might be the first all magnetic tape installation in the U.S. and would appreciate any information regarding an earlier all magnetic tape installation.

ROBERT BUFFORD
Sunline, Inc.
St. Louis, Missouri

Late tape date

Sir:

I read with a great deal of interest the articles on keyboard data entry and was pleasantly surprised to find that at least one of the contributors, Mr. Stender, recognized the IBM MT/ST as a keyboard entry device for input to computers (June, p. 60).

However, I was disappointed to find that he dated its entry into the market as 1968 when the IBM 2495 tape cartridge reader was announced. The fact is that hundreds of MT/ST's were in use for this application prior to this date. The first application was in the medical records field in 1965, and since then the device has been applied in numerous industries and application areas, including bibliographies, scientific abstracts, publishing, order and policy writing, hospital admissions, file conversions, personnel records, etc.

Entry to the computer was accomplished through a conversion device offered by other manufacturers.

A. J. CONRAD
IBM Corporation
Austin, Texas

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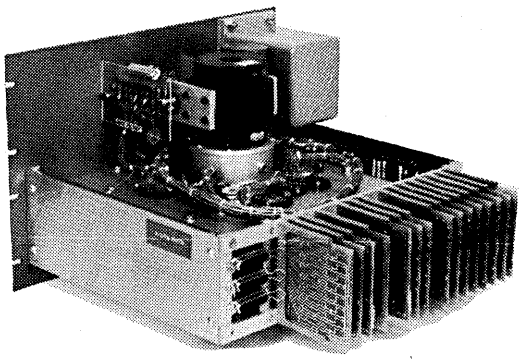

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CIRCLE 61 ON READER CARD

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Dirty tape causes data dropouts. And dropouts can make a computer see things that aren't there. That costs you money. And that's enough to make anyone see red.

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It's a special formulation that starts cleaner. Every inch of every reel is tested and certified in the cleanest of white-room conditions. (We think statistical testing leaves too many blind spots.) And it stays cleaner, longer.

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Help your computer see things as they really are. Write RCA Magnetic Products, 201 E. 50th St., New York 10022.

Our tape keeps the DT's away.

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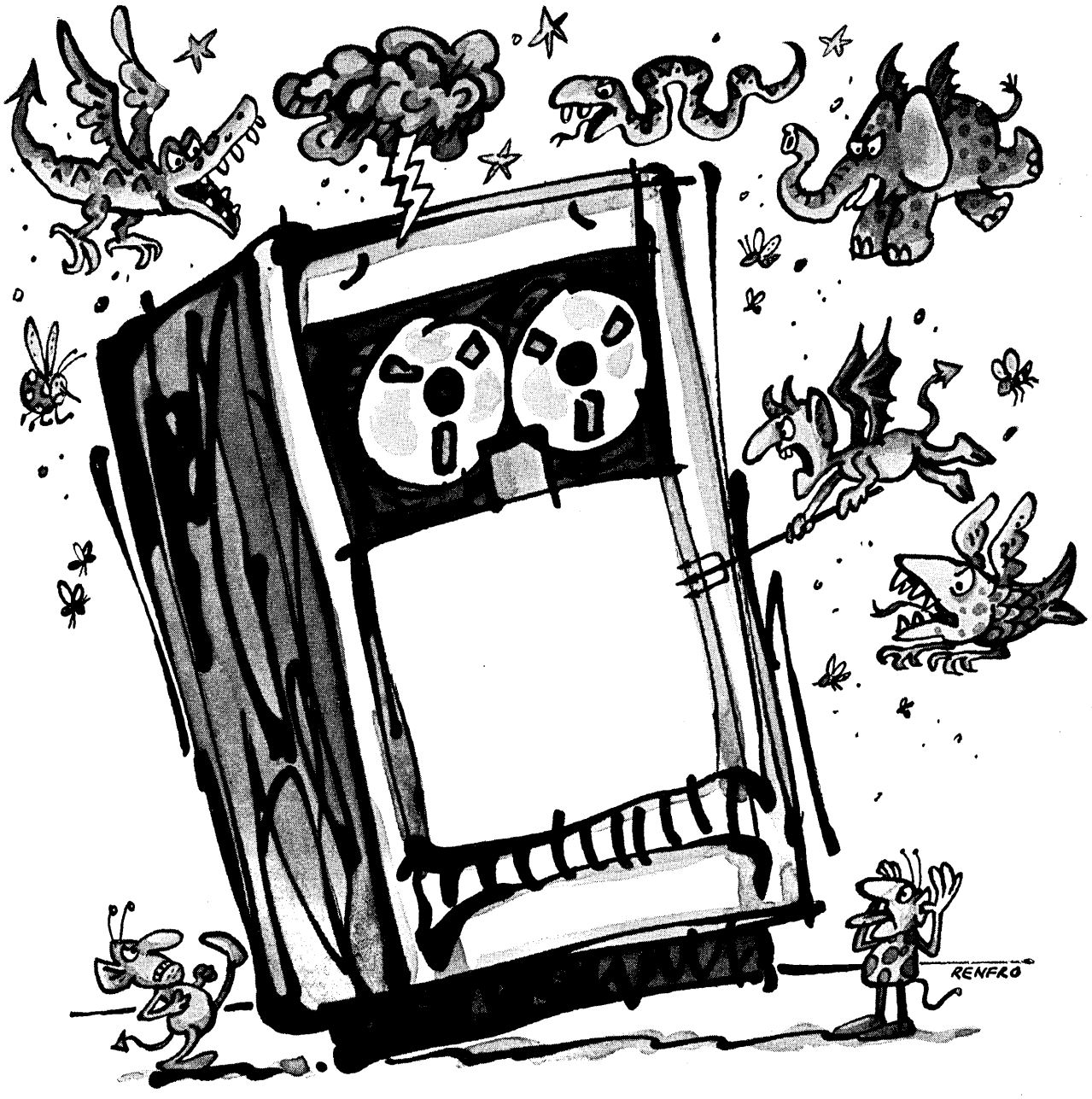
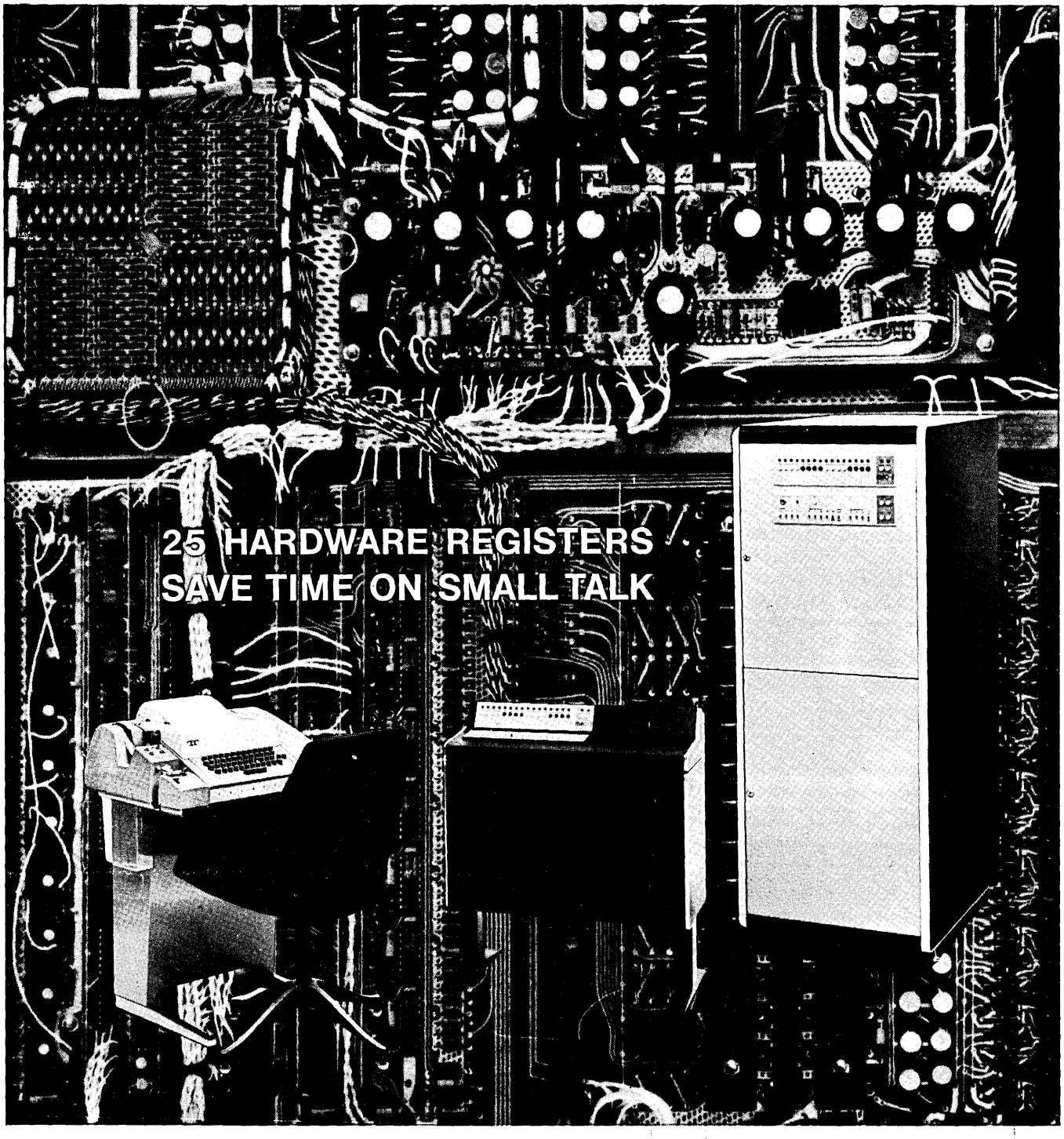


CIRCLE 69 ON READER CARD



Tempo I's standard hardware priority interrupt system responds in 2.3 microseconds. Coupled with a 325 nanosecond access time, Tempo delivers speed that really means something. But, that's not all. For a basic price of $15,600, you get a real system that includes: 4K of memory, 900 nanosecond cycle time, 14 hardware registers (eight general purpose), register to register operation, hand-shaking I/O, 4 hardware priority interrupts, 14 addressing modes, more than 100 hardware instructions, complete software packages including USA Standard Fortran IV and a macro assembler, plus an ASR 33 teletype. Tempo I is available in a handsome console or a 60″ high rack with room for over 12 peripheral controllers.

Now, let's talk about expansion options: memory growth in 4K increments to 65K, parity, multiple/divide, power fail/restart, program load, up to 25 hardware registers, multi-program feature, instruction trap, program flags, high rate I/O, additional interrupts and more. Then there is a whole range of peripherals to choose from. And, if that isn't enough, we can talk about our multi-processor configuration.

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LOOK AHEAD

IBM: ORDERS UP, STAFF DOWN?

"Fantastic" is the report on the firm orders for IBM's new 370s: as of July 20, over $200 million worth of 155s and $70-+million in 165s. More than $120 million of these orders is supposed to be from leasing companies, but that may include Leasco's $60 million order for its time-sharing business.

(We're not sure how this good news coincides with the the rumor that the firm has an "involuntary resignation drive" going: managers have quotas of firings to fill. In the down economy, receivables also are getting to be a big headache in White Plains.)

Meanwhile, many 360/85 orders for late '71, '72 deliveries are being traded for 165s. Not many 85s are leased, but McDonnell Automation reportedly has three under three-year contracts from a lessor, and if it doesn't renew, that lessor could have a hard time recouping on the machines...Rumors are that leasing companies may be angered to the point of another suit because of the high purchase-to-lease ratio on everything announced since the Model 25.

INCREDIBLE VIATRON WANTS CREDIBILITY

First order for new president Roger Phillips is "to resore credibility in Viatron." He denies an emphasis on "credit," but it's clear that founders Dr. Edward Bennett and Dr. Joseph Spiegel, now almost completely out of the company, had increasingly poor luck in bridging the dollar gap. Reportedly West Coast sources weren't obliging when asked for money recently; apparently the rest of the country had also been canvassed. At writing, speculation centers on how Viatron will solve its problems. Will Phillips and chairman Pearson Hunt restore the confidence of investors and customers? Invite merger? Or sell out?

FIXED FEES FOLLOW PROGRAM PRODUCTS?

IBM effectively created a second category of priced software by announcing four applications that its systems engineers would program for System/3 users at a fixed fee. The fixed fees were named, applicable to all within specs, just like selling a package. Ken Whittle, SE regional manager, told an ACM-NY gathering that this could be extended to other computers when IBM could accurately predict SE costs. Software firms aren't upset, feeling this approach could be used only for the simplest of applications programs on current and future small systems. Perhaps it'll be a boon to the small user who fears monthly licensed program costs.

$69K DOCUMENT SCANNER TO HIT MARKET

A price breakthrough in alphanumeric OCR is claimed by a new firm, OCR Systems Inc., Horsham, Pa., another offshooot from Philcoland. The Model 1000 (Varian 620/i-based) is a $56K-69K document scanner that will read any OCR font — via a mix of digital logic and software in a stored program recognition system. Low cost is attributed mostly to use of available MSI circuitry. Pres. Jimmie Neill, who worked on Philco's postal OCR projects, says the stand-alone system covers a majority of applications needs with its ability to read up to three lines/document and thus competes with the

Our competitors are jealous of our figure.

98.2% up-time.

We installed our first KeyProcessing System nearly a year ago. On January 1 of this year we had 20 installations. And by the end of April, we had 55.

In those four months, our systems logged 28,347 hours of high-speed data preparation (that's 396,858 keystation hours), with only 513.7 hours of down-time.

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It's the result of proven components, a completely debugged system, and a policy of establishing service facilities within minutes of each installation.

Our customers are more than just satisfied. They're elated.

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more powerful, expensive IBM 1287 (over $200K). First delivery by the 11-man firm will be year-end.

A $500K funding by Radonics, venture-capital firm, should carry the company well into '71. Contracts are being negotiated for marketing and maintenance services.

AMPEX TO GROW MOS MEMORIES

Long rumored to be entering the semiconductor memory market by acquisition or a joint venture, Ampex Computer Products division has decided to go the systems route. This fall it will announce an MOS memory system (100K or below) built with components supplied by Intersil and Intel.

Still considering making its own components, Ampex has formed a semiconductor engineering group headed by ex-IBMer Dick Woelkers and has small assembly work contracts it will fulfill in Hong Kong and Taiwan. For the moment, though, Ampex wants to stay clear of the semiconductor cost competition race.

BERKELEY COMPUTER TRANSFUSED & PRODUCING

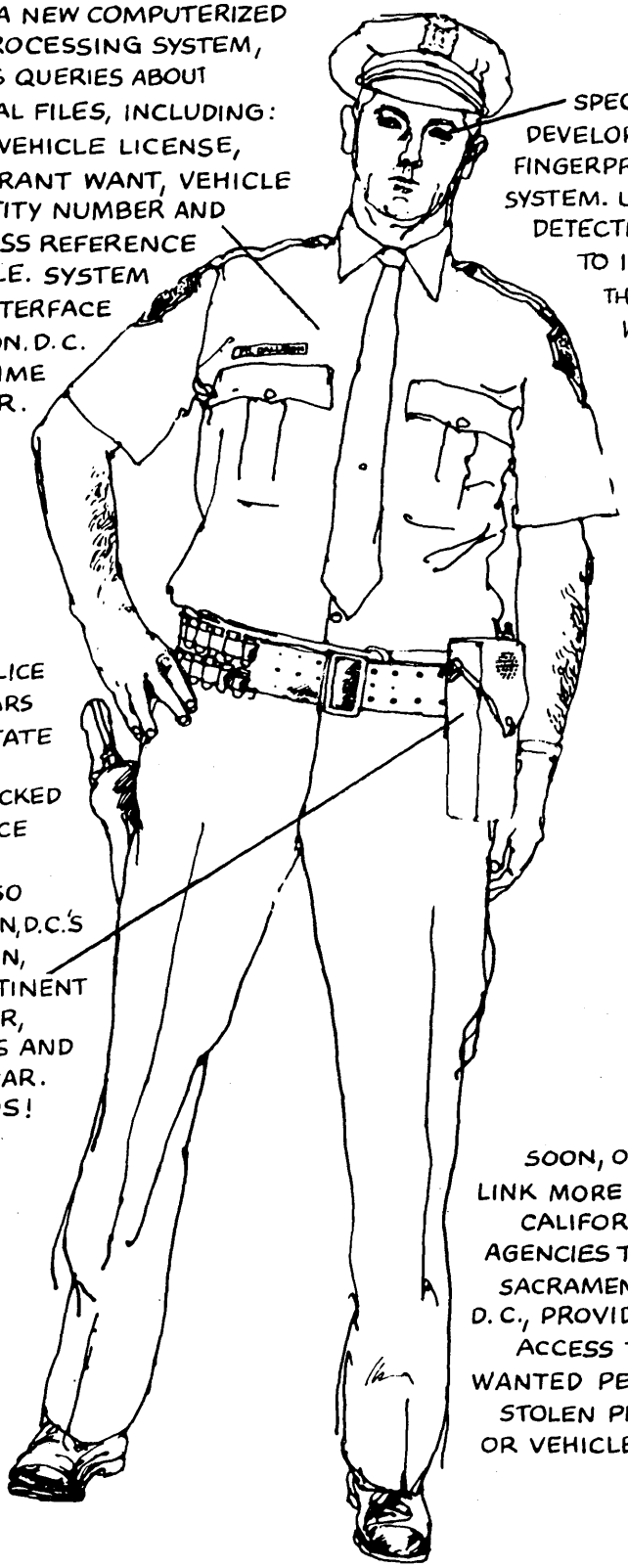
Berkeley Computer, which has used up a $2 million commitment from Data Processing Financial & General, is being kept alive with $1 million from the Univ. of California and is scratching for more. The first Model 500 time-sharing system is up and running for its own use and for tests by potential customers. Dr. Melvin Pirtle, president, expects to wholesale time on the 500 next month and to have the bigger 1000 ready by year-end.

TWA WIGGLES THUMBS WITH RESERVATIONS

TWA says it'll decide on the fate of the Burroughs equipment (B-8300s and 3000 terminals) in its overdue reservations project before the end of '70. Thumbs down means TWA will go to IBM's PARS, but it's unclear what happens to the 8300s, since TWA has them under long-term contracts with a leasing firm. Meanwhile, IBM is studying the situation there; a 360/65 is due in the Rockleigh, N.J., center next month.

RUMORS AND RAW RANDOM DATA

Telex is expected to have its version of the 3330 disc drive ready for delivery before IBM begins delivering its 3330 in August '71. At the same time, it may announce a new version of its 5314 (360 compatible) disc drive with twice the capacity and half the access time...In a mad effort to beat off the IBM 370/165, Univac's 1110 announcement has been unslipped — from year-end back to fall, probably September...The SHARE user group's first "product organization affiliates" are Boole & Babbage and Management Science Systems...In September Computer Machinery Corp. will unveil an off-line print station. DataPrint will consist of a DEC PDP-11 computer and up to two tape units and two IBM 1403 printers. Rental starts at $2K/mo. Deliveries — late December. IBM will carry the lease on the printer and provide warranty and upkeep...NARS, where are you? When contacted recently, this firm, which said it was launching a national reservations system back in '68, had dwindled to an answering service in Orlando, Fla. — now no number.



OUR NETWORK ALLOWS AN UNDERMANNED POLICE FORCE TO PROTECT LARGE POPULATION AREAS. IN SECONDS, ALERT, A NEW COMPUTERIZED TELEPROCESSING SYSTEM, ANSWERS QUERIES ABOUT SEVERAL FILES, INCLUDING: NAME, VEHICLE LICENSE, WARRANT WANT, VEHICLE IDENTITY NUMBER AND CROSS REFERENCE INDEX FILE. SYSTEM CAN ALSO INTERFACE WITH FBI'S, WASHINGTON. D.C. NATIONAL CRIME INFORMATION CENTER.

SPECIALISTS ARE DEVELOPING A COMPUTERIZED FINGERPRINT CLASSIFICATION SYSTEM. USING OUR NETWORK, DETECTIVES WILL BE ABLE TO IDENTIFY "SCENE OF THE CRIME" FINGERPRINTS WITHIN SECONDS.

OUR NETWORK LETS POLICE CHECK OUT SUSPICIOUS CARS BY RADIO. OUT-OF-STATE LICENSES ARE CALLED TO HEADQUARTERS AND CHECKED THROUGH THE STATE POLICE COMPUTER SYSTEM. IF NECESSARY, THEY ARE ALSO RUN THROUGH WASHINGTON, D.C.'S SYSTEM. IF A CAR IS STOLEN, COMPUTER TRANSMITS PERTINENT FACTS, VIA TELETYPEWRITER, BACK TO HEADQUARTERS AND THEN TO WAITING PATROL CAR. ALL WITHIN 15 SECONDS!

SOON, OUR NETWORK WILL LINK MORE THAN 450 CALIFORNIA LAW ENFORCEMENT AGENCIES TO CRIME FILES IN SACRAMENTO AND WASHINGTON D. C., PROVIDING INSTANT ACCESS TO INFORMATION ON WANTED PERSONS, LOST OR STOLEN PROPERTY, FIREARMS OR VEHICLES.

.Data communications helps enforce the law and protects the public.

Next time you're moving information, remember—no one knows more about moving it than the people who run the world's largest communications network.

ACM 70 has many facets but the central point is an attempt to determine the users' needs for the next decade

What Is ACM 70?

by R. W. Bemer

The ACM 70 Conference could have been the 25th annual ritual of a society spawned and nurtured by the electronic computer, dominated by technocentric interests, a little bit insolvent, and not caring how its machine influenced society—just as long as they were free to have fun with it, parse yet another programming language, argue about computational accuracy with the fervor of an early tabulator of angels on the head of a pin, and maintain a lovely insularity from people who did not talk their own jargon. This will not be so, however, thanks to the mass awakening to a new set of values that most people are experiencing.

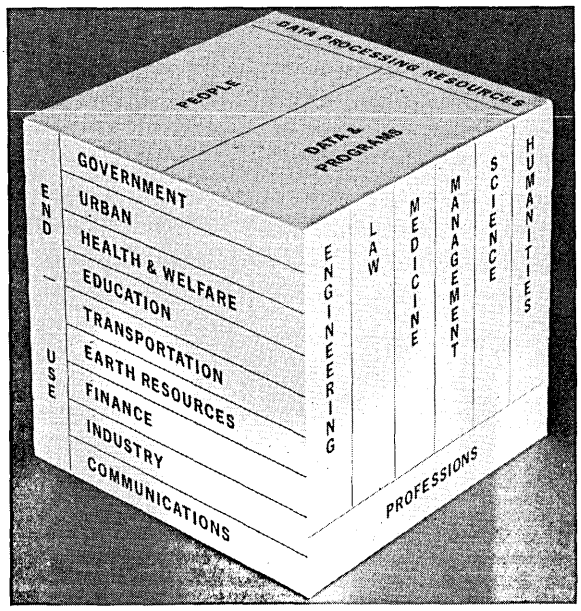
Without meaning to downgrade the value of efforts 1 through 24, let us see what effort 25 is about. Surely the main characteristic is that it is about many things, and they are:

It's a model of an activity. The structure of ACM 70 is shown in the figure at the right.

The activity is to enumerate the information processing requirements of the several end-users and professions for the next decade, and plan the optimum way to allocate resources and development in order to meet those requirements. Note that the intersections of sectors from each face are usually meaningful in some degree (i.e., *management data* in *transportation*). Overlaps and even conflicts can exist, but these have been worked out cooperatively.

This activity can be ACM 70. It can also be ACM 71 and 72. It can be a national computer year on the lines of the International Geophysical Year. It can be an international computer year activity. Each could grow from the other with the addition of time, effort, people and scope.

It's a conference. ACM 70 takes place Sept. 1-3, at the New York Hilton Hotel. It will undoubtedly be attended by many members of ACM. However, unless the planners are all dreaming, it will be attended by a host of people who may never have heard of the ACM, but are nevertheless very much impacted by computers in their work. Special one-day registrations have



been provided for the convenience of working people –doctors, lawyers, Wall Street men, city planners, etc.

The chart below shows the conference schedule.

It's a plan. If we are to make best use of computer systems in the next decade we will have to have a good plan. Coming before any plan are the goals to be achieved. The ACM 70 goals are:

1. To consciously put computers in service to national goals, to increase public understanding of the role and potential of computer usage, and to accent the role of the computer as servant.

2. To develop strategies for the best future use of computer systems (technological, social, educational, political, legislative).

3. To conserve, and maximize utility of, those existing and future intellectual resources known as data and programs by finding how to utilize them on multiple equipments and in multiple applications.

4. To aid government, business and private decisions by opening up new and more complete data for those decisions, and to facilitate making of these decisions by reducing the information volume required (as opposed to data volume).

5. To plan a closed cycle for redistributing work assignments between people and computers, for re-education prior to change, so that our citizens can best fulfill their potential.

6. To ensure that public safety and welfare are considered adequately when computers are integrated directly into human activity.

7. To set up new and broad interdisciplinary information exchange paths among hitherto segregated organizations, and to foster their maximum involve-

CONFERENCE AT A GLANCE

SECTORS	PAGE	TUESDAY (SEPT. 1) 9:00 - 11:00	11:00 12:30	TUESDAY (SEPT. 1) 2:00 - 6:00	EVENG.	WEDNESDAY (SEPT. 2) 9:00 - 12:00	12:00 2:00	WEDNESDAY (SEPT. 2) 2:00 - 6:00	EVENG.	THURSDAY (SEPT. 3) 9:00 - 12:30	2:00 5:00
Communications	13	A Communication Aspects (1)	KEYNOTE ADDRESS		SPECIAL MEETINGS	B Communication Aspects (2)	CONFERENCE LUNCHEON		SPECIAL MEETINGS		GENERAL SESSION
Data & Programs	14	A * Program Classification									
Earth Resources	14			A User Requirements		B Sensor Acquisition		C Data Systems Requirements		D Earth Resource Management	
Education	18	A Computers in College & Library		B Computers for Instructions	C System Analysis	D Programmer & Operator Train.		E Comp. Science Education		F Computers & Cont'd. Education	
Engineering	25			A Management & Design Eng'g		B Computer Graphics in 70's		C Design Eng'g. 2:00 - 4:00 p.m.		D Production Engineering	
Finance	29					A Securities & Insurance		B Banking & Accounting			
Government	34			A Computers in Government							
Health & Welfare	35							A Computers in Health, Welfare			
Humanities	36	A Computerization in Liberal Arts									
Industry	38					A Computers in Industry (1)		B Computers in Industry (2)		C Computers in Industry (3)	
Law	40	* *								A National Crime Information Ctr.	
Management	41			A Administration & Education						B Information Syst. & Future Mgmt.	
Medicine	44					Computers & Practice of Med. Medical Research					
People	46	A Select. Computer Work Force		B Human Factors 4:30 - 6:00 p.m.				C Impact on the Public			
Science	48							A Scientific Appl. 4:00 - 6:00 p.m.		B Scientific Computer Syst.	
Transportation	51			A Computer Transp. 4:00 - 6:00 p.m.							
Urban	52	A Computers in Future Cities		B Urban Develpmt. 2:00 - 4:00 p.m.							

* This session has been rescheduled to 9:00 to 11:00, Thurs. Sept. 3.
** Legal Assistance via Computer session has been scheduled for this time.

ment on a national scale.

8. To plan the most economical and effective interaction between computing and other systems, such as communications.

Undoubtedly it will take more than ACM 70 to meet these goals, but this is the start.

It's finding where we are. Only the newest or most myopic participants will believe that the computer business knows where it is and is going. Government estimates of the number of computers expected to be in use by 1975 vary from 100,000 to 330,000 (just actual count, no mention of processing power—which can vary by factors of 50 without too much difficulty). Private census can barely enumerate existing usage, much less predict the proportion five years from now. Industries with slow growth rates can perhaps afford to react; with high growth rates we must plan ahead on a nationwide scale.

How are computers used?

On Dec. 20, 1968, the U.N. General Assembly asked the Secretary General to find out how computers were being used in the various countries, in order to apply them with maximum utility to the economic and social development of all peoples.

Accordingly the member countries were asked what amounted to "How *do* you use computers?" and to kindly reply by Oct. 15, 1969. Many countries did reply. Some of the most comprehensive returns were from the U.K., Japan, and Israel. Unfortunately missing was a response from the world's greatest and probably most knowledgeable user of computers. We may conjecture that either the State Department did not know how to contact a $14 billion yearly industry, or that the huge industry itself did not really know how those computers were used, at least in the sense of being able to make a coherent reply.

It's an affirmation of responsibility. To be repetitious, it is publicly obvious that much of the world's population has been shirking its social responsibilities consistently. Science is now under suspicion as being a definable subset of the shirkers. To our horror, the sub-subset of computer science has found that its baby is the handy focus of much antagonism. Call any business to complain of an error and the clerk is likely to answer: "Sorry. We have a computer now, and it doesn't work right." The answer is never that the computer works but that the humans who programmed it were at fault, or that the computer was integrated into human activities without sufficient attention to safeguards. Probably the sociologists and psychologists can explain the reaction in technical terms, but explaining does not solve the problem.

As the time rolled around to plan yet another conference, it was painful for the ACM management to face the situation, as it would be for any management. In the end, they bit the bullet, as they must. The road to health must start with inward determination.

It's a new look. Until now computer conferences have been characterizable as either vendors talking to vendors, or users talking to users. The new look is that the users have been asked to give the computer industry their best picture of their total information processing needs for the next decade.

In line with this, there have been no unsolicited or refereed papers for this conference. Nor will one hear papers on microprogramming, fast adders, or the like. The sector chairmen were selected for their knowledge of the user sector, not familiarity with computers necessarily. Thus they knew the body of competent and qualified people to turn to for an exposition of this nature.

If it should turn out that their needs cannot be enunciated well, then at least we have tried and opened a door. Contrariwise (in Alice in Wonderland terminology, which is very much like our own), the odds are high that there are users just panting for the chance to tell the computer industry—on a total and nationwide basis, mind you—what they believe should be produced.

It's a new direction. At the least, ACM 70 will pose questions that ACM 71 and 72 can try to answer, and give continuing purpose to those activities. Very likely, if the 1970 conference meets enough of its goals, the whole fabric of ACM can be rewoven. Like other professional societies, ACM needs periodic redefinition of its goals, membership growth consistent with industry growth, and means of giving good services to its members. However, ACM also needs to find better ways of serving the public. Carl Frey, executive director of the Engineers Joint Council, reminds us that organizations of this type are tax-exempt under statute 501(c)(3) only if the main thrust of their total activity is in the public interest, and not solely for the benefit of its members.

Mr. Frey also reports that the American Society of Association Executives evidences a growing feeling that there is also a collective responsibility owed society which may be impossible to fulfill by individual efforts of single societies. Much more cooperative effort is required, and ACM 70 is the very model of such a cooperative effort in solving a complex problem.

It's a hope. Surely the case can be made that computers yield more benefit than harm. The hope is that this excess can be increased and maximized.

When it can be demonstrated that computers are for people, then people will be for computers. To achieve this will require a very conscious effort. In the end, that's *really* what ACM 70 is. ■

(The following articles are a sample of the sector activities planned for ACM 70.)

Mr. Bemer is manager of systems and software engineering integration for General Electric and is program chairman for the ACM's 25th annual convention. He is noted for his contributions to such organizations as IFIP, ANSI, ECMA, and CODASYL and as an author, editor, and developer of computer techniques.

Satellites and other modern data collection systems may offer the key to more sensible management of the earth's resources, but their effectiveness depends on massive computer processing.

Earth Resources

by Tom Brewer

In the past 25 years the computer industry has had a great influence on the development of today's complex society. And now, as ever more complex and critical problems emerge, the computer industry finds itself critical to the solution of these problems.

That network of problems under the heading "Management of the Earth's Resources" (Fig. 1) will put increased emphasis on the requirements for the handling and processing of information. New and highly innovative responses will be required.

Today's dilemma can be simply stated: man's potential for consuming is infinite, and the earth's potential to provide is not. Thus the ultimate goal of earth resources management is achievement of a stable balance between man and his resources. This means that man can no longer live apart from his environment but must become an aware member. This implies a closed loop system as opposed to his present mode of open loop exploitation.

A few short statistical pronouncements attest to the open loop operation. It has been calculated that:

1. If everyone in the world consumed petroleum products at the same rate as each U.S. citizen does, the world's known resources would be exhausted in two years.

2. The U.S., with 5% of the world's population, consumes over 50% of the current output of the world's resources.

3. The resources we have consumed in this country since the start of World War II total up to more than the entire quantity consumed by the human race until that time.

Meanwhile, around the world there are programs under way to bring the developing nations toward a Western or U.S. status of industrialization and civilization—and consumption.

Should such development be somehow stopped?

As Russell E. Train, chairman of the President's Council on Environmental Quality, pointed out in a recent panel discussion on science, technology and the quality of life held by the American Institute of Aeronautics and Astronautics:

"Perhaps it is useless to question whether man should or should not modify his environment—he will because he cannot avoid doing so. The problem, and

our objective, must be to assure that the results of his actions are foreseen and are acceptable to mankind."

A review of some of the more concerted, large-scale efforts in the earth resources areas may help the computer community obtain insights into the activities it can jointly participate in with the earth resources community.

The National Academy of Sciences National Research Council conducted a summer study in 1967-68 on "Useful Applications of Earth-Oriented Satellites." Thirteen panels were convened: forestry, agriculture, and geography; geology; hydrology; meteorology; oceanography; sensors and data systems; systems for remote sensing; point-to-point communications; broadcasting; navigation and traffic control; economic analysis; geodesy and cartography.

Summaries consisted of: description of the field; state of the art; benefits; goals; postulated programs; and recommendations.

Data processing requirements were considered in some detail. Perhaps the quickest way to get a handle on these would be to paraphrase the Economic Analysis panel's enumeration under the functional categories divided into:

1. Collecting data from space.
2. Processing and distributing the data to user agencies.

Space-segment computation: satellite and sensor design; launch vehicle operation; ground system as used to track, monitor and control the satellite and sensor; system management and administration.

Processing, distribution, and segment computation: spectral-signature and ground truth analysis; ground system—as needed to read out imagery and other information collected; processing into format suitable to user agencies; system management and administration of the processing and distribution segment.

Both remote sensing satellites and surface-data collecting relay satellites were considered along with nonsatellite remote sensing—including sounding rockets and balloons, aircraft, buoys and ground-based platforms.

In 1969, NASA's Langley Research Center and Old Dominion University conducted a fellowship program on a "preliminary design of an operational earth resources survey system." The nature and significance of interdisciplinary approach to the earth resources problems were specifically brought out. The data needs were considered in terms of: kind of data; resolution and accuracy; and frequency of coverage.

An exhaustive enumeration of remote sensors was considered, tabulating them against such characteristics as operational spectral band, time of use (day/night), swath width of the field of view, ground resolution (from 500 nm), data base bandwidth, as well as weight, volume and power. Data acquisition

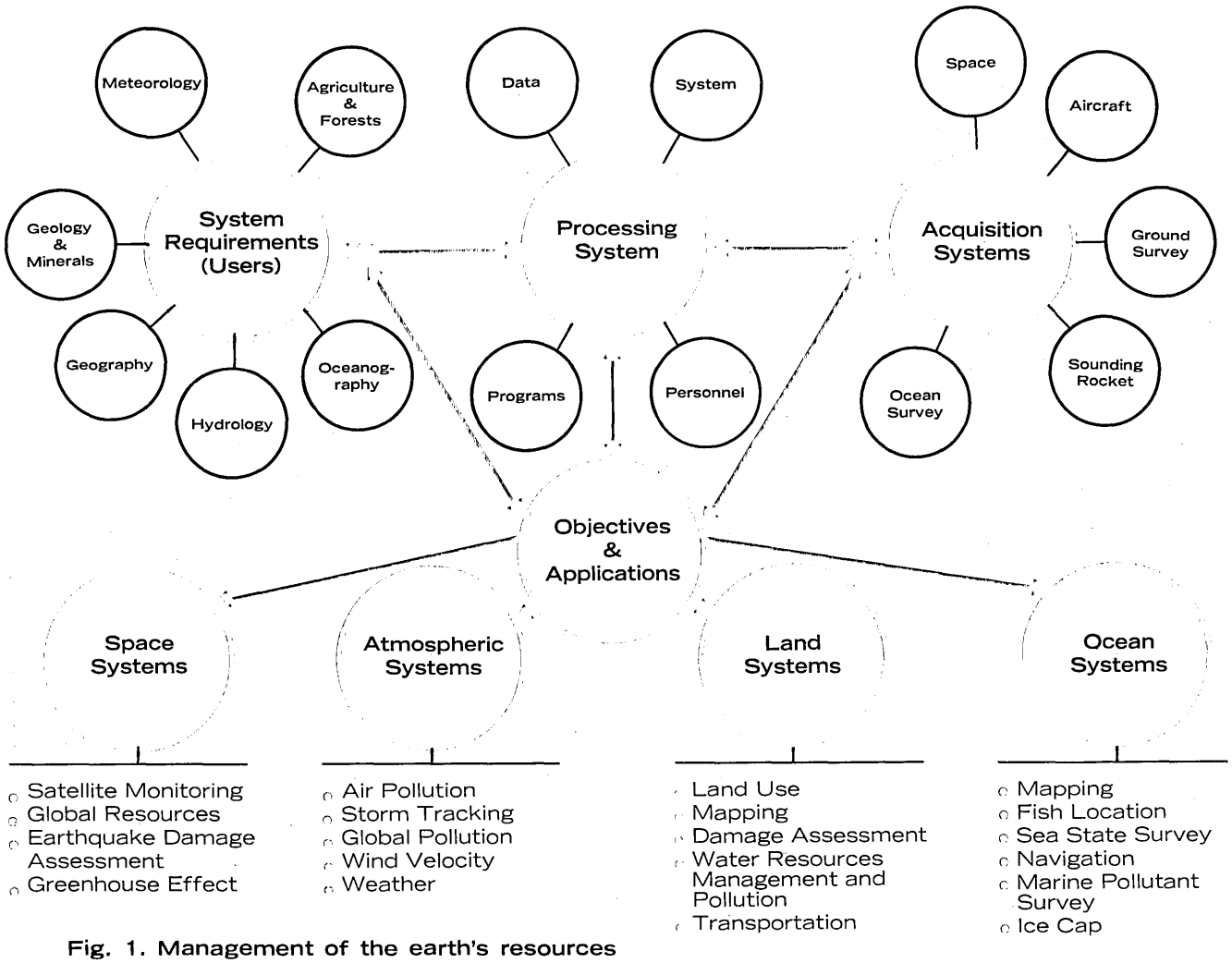


Fig. 1. Management of the earth's resources

and handling systems were investigated in some detail, including on-board processing and ground processing facilities. Administrative and organizational structure with the management types (a) private national enterprise, (b) single national government, (c) private international enterprise, (d) public international organization were studied.

The problem of data utilization was analyzed at some length, taking a number of representative existing and potential users. An Earth Resources Survey Agency was proposed to handle the data and information flow from the sensors to the users in an integral fashion. Where the Woods Hole study established broad user requirements and economic viability for an earth resources program, the Langley study proceeded to formulate the system design in more specific terms.

Princeton University conducted a conference last year on "aerospace methods for revealing and evaluating earth's resources." A number of papers considered various user requirements. Of specific interest to the computer community would be the papers dealing with user data processing requirements and ground data processing considerations.

This year the American Institute of Aeronautics and Astronautics held a technical meeting on "earth resources observations and information systems." Two full sessions were entitled:

1. Information, Data Processing, and Dissemination Requirements: What Has Been Done?
2. Operational National Data Processing Centers: Where, How Many, What Function?

The question of who should have the responsibility for an earth resources central data facility was explored.

Looking down

The variety of land uses is large, and the fact that most of them can be studied advantageously from space led to proposals of a conceptual observation system called the Global Land Use Satellite. The various federal departments, such as Interior, Agriculture, and Commerce, have been considering and coordinating similar efforts, thus leading to the Earth Resources Observations Satellite studies. To acquire the necessary research and development experience, NASA has under development the Earth Resources Technology Satellite. The first satellite in this program is scheduled to be launched in 1972.

Both U.S. government and industry have been exploring the underseas, particularly along the coastlines. The petroleum industry has already made the computer a significant tool in locating underwater oil and gas.

The Coast Guard is currently embarked on a long-range National Data Buoy system to take a multitude of ocean measurements. Last year the Office of Naval Research and NASA sponsored the Sea Robin Buoy program, which involved successful operation of a communication link between the underseas and a satellite.

Tektite II, a manned station for scientific exploration of the ocean bottom, is now in operation in the Virgin Islands. Tektite is a cooperative program of government, industry and universities. It has the dual role of collecting scientific information while developing the techniques and hardware for future more sophisticated use. In one aspect, ocean survey research being conducted aboard an oceanographic research vessel is being correlated with earth resources information provided by sensors aboard a research aircraft operating in the same area.

Oceanics program

The President's Commission on Marine Science, Engineering and Resources has recommended implementation during the 1970's of a broad oceanics program. Eventually, a network of satellites and ocean-probing sensor systems will work together. They will take inventory of what, where and how well forests and crops are growing, thus permitting regional, national or global predictions of crop yields, livestock inventory and patterns of fire, insect and disease damage, the condition of soil and its ability to be put to use.

They will note stream and river waterflow, excess surface water, pollution, ground water, and glacial action in order to better plan irrigation and flood control, develop and maintain water resources, and control erosion.

They will produce maps of population distribution and other cultural features—including air pollution, as well as detailed maps of the earth's features to help in planning land use, urban development, and transportation facilities.

Maps and data will also be produced for the sea state, currents, ice and other navigational hazards, bottom topography, pollutants, fish and other marine biology of interest to the sea food industry, shipping and marine ecology.

The presence of minerals and oil will be indicated along with other subsurface earth structures, making possible more knowledgeable exploration and conservation as well as earthquake and volcano predictions.

In order to effectively manage world resources, or anything else, one must have adequate information about it. This information has for centuries been gathered by man on the surface of the planet. In recent times, aerial observation has broadened the field of view, the amount, and the usefulness of the information. But even so, as the National Academy of Sciences' Research Council reported in a 1968 study on space applications, "maps and statistical summaries and analyses are published two to ten years after data are collected. Small scale maps are neither uniform nor current . . . 70 percent (of them) are deemed inadequate and the remaining 30 percent are obsolete."

Global information can be constructively put to use in three broad categories: dealing with emergencies; resource management; and planning and study. Each has its own requirements for timeliness and amount of information.

The tasks of developing a prototype and demonstrating the potential benefits of an earth resources operational satellite system are being undertaken in the NASA ERTS A and B Programs. Even with this scope of the mission, a data rate of about 10^9 bits per year is envisaged here as compared to less than 10^4 bits per year from the OGO satellite at the National Space Science Data Center or the total of 10^{12} bits per year at the NSSDC from all space science satellites.

(Continued on p. 28)

Who can say for sure just how much information is going to be generated? But, to generally characterize the problem, consider the following as reported by David W. Keller of General Electric's Space Systems Division in a paper presented last summer before the British Interplanetary Society.

"ERTS with a payload consisting of 5000-line tv cameras is capable of generating 25 million picture elements/frame every 25 seconds of operation, where 25 seconds represents the time to traverse nearly a hundred miles on the earth's surface. Assuming only five bit quantizing, a single tri-spectral frame represents more than 10^8 bits, about a full reel of digital tape. If digitized, this data would require more than one hundred thousand reels of digital tape per year for storage. The multi-spectral scanner system is capable of generating data at an equivalent rate.

"For comparison purposes, it is interesting to note that the Nimbus spacecraft now returns about 10^7 bits per orbit, while ERTS is capable of returning more than 10^{10} bits per orbit. This represents an increase of more than 3 orders of magnitude in data rate."

Recovery and reuse

How can man's impact on the world be controlled?

Obviously, man will not stop consuming. That's part of the life process. What he must do is complete the life process cycle (from which he seems to have strayed) so that his offal is a harmonious part of it.

With recovery, reconstitution, and reuse man must —and can—eliminate the situation where mountains of junked autos grow on our cities' outskirts while iron ore continues to be stripped at great rates from the earth; where unmanageable amounts of sewage, detergents, and other chemicals pollute water and disrupt its ecology; where corrosion-resistant plastic refuse litters the landscape.

The computer becomes a vital tool with which to exercise the mathematical models formulated by the environmentalists. The scope of this effort is immense and much cooperation between the diverse intra- and inter-national "parties" to the resources-environmental state of the earth will be required. At the global level, the United Nations plans to organize an International Conference on World Environment in 1972.

The success of any such international endeavor depends principally on the various nations participating in it and the U.S. and Russia play pivotal roles by virtue of their overwhelming technical/economic dominance.

And so the computer industry and the space industry, each of which has significantly helped develop the other, will form a team whose purpose is to help man understand how to live permanently and harmoniously with the earth. Satellites offer the promise of being able to see what is happening around the globe and computer machinery offers the promise of being able to process the vast amounts of information thus generated so that it can be put to good use.

A critical role for the computer as part of an earth management system will be that of scientific soothsayer. Thus, if a decision were made to—for example—irrigate thousands of square miles of desert to create a new agricultural area the computer will predict such things as the effects of this undertaking on: climate, population, pollution, water resources, and international trade.

We have presented a number of future activities and areas of major effort. You can readily understand the requirements and needs for such massive data acquisition. It should be obvious as well that such vast data volumes call for new techniques of collection, processing, storage and retrieval, data extraction and editing, and specific application of these data. In fact a whole new dimension of data management systems will be the challenge of tomorrow. Such a challenge can only be addressed to the computer industry for there and there alone lie the talents, expertise and resources needed to meet it.

This "data eruption" can only be brought under reasonable control through a proper combination of computer hardware and software, acting as a "digestor," providing the much needed output—properly formatted, ready for use, and most significantly "on time"—in order to have a "real-time" effect.

In order to meet the challenge, new capabilities and techniques will be required. It is very difficult today to be sure what they will be. Today's effort can only be concerned with generic requirements, upon which we must expand and add details for tomorrow. Such generic requirements might include these areas:

1. Data filtering techniques/data enhancement.
2. Application of hybrid techniques.
3. Process-type vs. general-purpose computers.
4. The need for "simulation" as a diagnostic.
5. Improved correlation/elimination matching schemes to separate the necessities from niceties.
6. Complete evaluation of the role of on-board computers in the loop.
7. Man's interactive, closed-loop role in the process.
8. The needs for multipath/multicycle processing to meet the diverse turnaround time requirement.
9. High-flexibility systems, readily adaptable to change.

These are only a few areas that we must look into. How many even more important ones there are is yet to be determined.

It has been said that the computer industry had the most significant role in what man has achieved in the "Scientific Sixties." There should be no doubt that it will be of even greater importance in what we might consider the "Survival Seventies." ■

Mr. Brewer is responsible for computer systems and simulators as manager of the Re-entry Physics and Systems Synthesis and Simulation Laboratory of GE's Missile and Space Division. His duties include application of hybrid systems to the management of earth resources. He has an MS in aeronautical engineering from Rensselaer Polytechnic Institute.

There are plenty of urban problems, but it is not at all obvious what computer people can do about them.

Urban Sector

by William R. Garrison

Computer technology is in various stages of adoption within most of the processes that fit into the rubric of urban conditions (or, more elegantly, urban systems), and the main theme of the Urban Sector Committee's program at ACM '70 will be assessments of its long- and short-run impacts upon those processes. The committee's assessments are within frameworks of the needs and the opportunities to improve the functioning of urban centers, the evolution of new urban institutions and processes, and the acceleration of desirable computer developments.

No one would deny that there are urban problems. But finding solutions for urban problems and fitting computer technology into those solutions requires careful definitions of problems and alternative solutions. Indeed, without these careful definitions, one should not deal even casually with the propositions that computers are either deepening or solving urban problems.

One view of urban problems is that they represent a widening gap between expectations and reality. The thought is that in many quantitative ways our urban centers function better today than ever before. Yet our views of congestion, pollution, urban education systems, and so forth are more demanding. We expect more in a more affluent society with better communications.

Another view is that of urban problems as productivity problems. Public sector activities, many of them urban in character, have had alarmingly small productivity increases while productivity has been increasing in most other sectors of society. With services becoming more and more important, especially public services, in our total national economy, increased productivity is necessary to continuing development of the national economy. How may we increase the productivity of urban services?

Another problem is that of distributions rather than of gross quantities. Our nation is now more concerned about its minority groups, its poor, its aged, and its otherwise disadvantaged. How may we more evenly distribute the resources available in an urban society? Too, we are concerned about the quality of services at the micro level. Of what use is it to the urban dweller to lessen the nation's solid waste disposal problem when his garbage cans are still banged; of what use is it to solve the financial crisis of bus mass transit if service is limited to major arterial routes, if service is irregular, and if drivers are surly?

Structuring these and other problems in some detail and in ways that are suitable for computer technology assessment is one major task for the Urban Sector Committee. There are many starting places for structuring urban processes. One is to structure the role of information processes within urban activities. This involves analysis of the kinds, qualities, and quantities of information used within existing information aspects of decision systems and the analysis of the use of the computer to improve the information bases for current decisions. It also requires analysis of long-run impacts upon the kind of decision processes used and the kinds of decisions being made.

Another, and related, tactic is to structure urban decision and control processes. Examples include the control of traffic and dispatch of police equipment. Computers are beginning to assist dispatching and control, and assessment includes the questions of how well they assist now and might in the future.

In addition to the points of departure which are represented by identification of problems and the structuring of urban systems, the committee is concerned with how computer technology has been adopted and the tactics and strategy of affecting the pace and character of adoption. There is much action now. The '70 Census is providing a new information base suitable for computer-based information systems. Many public and private organizations are in the process of assessing their information requirements and their requirements for computer-based information systems. Much of the committee's concern is with the status of these activities.

The committee's main questions, then, grow out of the coupling of the process of computer technology transfer with systems views of the city and its problems. What are the problems of and prospects for urban development? Is the die already cast? Are there opportunities and pitfalls? Will computer technology assist in gilding our present urban communities or might it help us find new, alternative futures for our cities? ■

Dr. Garrison is a professor of environmental engineering at the University of Pittsburgh. He was previously university coordinator for urban studies at the University of Illinois and has taken part in many government studies of urban and regional development problems. His PhD is from Northwestern University.

All types of financial institutions have plans for networks that will require improvements in long-range communications and terminal devices.

Finance Sector

by Gerald M. Lowrie

The financial industries—the commercial banks, mutual savings banks and savings and loan associations, the consumer finance companies, credit unions, the insurance industry, and the securities community—are all characterized by certain common needs as they face the 1970's.

They are all in a service-oriented business offering somewhat related financial services to similar customer profiles. Their competitive success depends largely on their responsiveness to their customers' needs.

All of them in the last decade have experienced tremendous growth; within the same period they have advanced from the most primitive applications of data processing to some of the most sophisticated uses of computers in evidence today. They have built tremendous hardware resources for the future but are now faced with the attendant requirements of better software and better support personnel.

They are all involved in nationwide if not global expansion and are highly dependent on data communications and terminal devices and on the efficiency of the common carriers' long-rang planning.

They are all faced with the need to develop better information bases to be more responsive to their customers' total financial needs, and are all committed to the parallel requirement to safeguard access to such information.

And perhaps more than any other segment of the industry, this group has an absolute requirement for accuracy, reliability and timeliness in its record-keeping. This places an added burden on its planners and requires equipping to meet peak rather than average workloads.

Stock transfer troubles

The securities industry has been one area where those who plan for the future have been particularly hard pressed. The last decade saw a huge increase in trading on the stock market both by new investors and institutions. While data processing addressed many of the problems posed by this increase in volume, it was only part of an equation for which solution is still being sought. Skilled personnel are still needed to support data processing operations, and standardization—such as common numbering systems and standard machine-processable formats for stock certificates—is being sought ardently. The rationale of centralizing the stock clearing operation has now been made abundantly clear and is being pursued with zeal.

Insurance companies are also faced with the necessity to "tool up" for the expanded and integrated insurance services which are planned for the future. These companies have a tremendous need not only for dependable and speedy communications (to access information on a nationwide basis), but also for low-cost storage media both on- and off-line to support their growing information files.

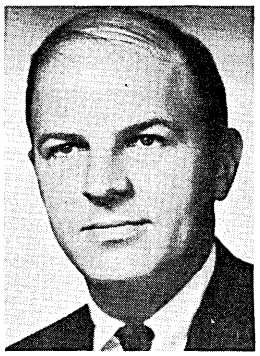
The consumer finance companies have long recognized that one of the prime ingredients of success for their service package is the ease with which their customers can gain credit and, in this mobile age, this has involved the development of nationwide information networks and terminal systems. This industry in fact has been the first in the financial sector to have seen some of its members develop central systems tying together all branch offices in the states in which they operate, and we can expect growing flexibility in this area and increasing data base sophistication.

The savings institutions have made perhaps the greatest strides of any industry toward implementing on-line systems. The data bases created to process the transaction workload are now being used as a basis for planning MIS, management science applications and so forth. If these institutions' goal of expanding their service offerings is realized, many of the same needs for improved nationwide data transmission facilities will be evident.

The credit unions are also working toward unification of systems. Back in 1961 the credit unions in Michigan set up a corporation to process the accounting for all unions in that state and since then a number of state and even multistate groups have followed their lead. Now the question of whether one universal system would better serve the needs of over 20 million credit union members is being investigated and the credit unions are showing interest in on-line systems, audio response units, and audio-visual data communications. The credit unions are a good example of an industry where the customer expects the same service from the smallest as from the largest group, although most unions are too small to support

their own data processing facilities.

Similar customer expectation is also typical in the commercial banking industry. The small bank's customers expect their bank to be just as responsive and provide just as wide a range of services as the large banks. In the past these needs have been met largely through correspondent servicing. But the future will probably be characterized by electronic umbilical cords linking the small banks to the larger banks and thus enabling them to "pass along" the services of the larger organizations. (This type of link will obviously demand greater edp sophistication on the part of the small banker.) Banks are also seeking greater standardization, broader applications of management science (for example, its wider use for loan evaluation), and central file systems with simple access devices. Evolving changes in the methods of transacting business—that is, in the payments system—will result in increased dependency on data communications in the future. The likelihood of a direct transfer of funds being instigated at the point of a transaction puts increased emphasis on such factors as the need for customer interactive terminal devices and methods of personal identification. ■



Mr. Lowrie is deputy manager and director of automation and payments systems planning for the American Bankers Association. He was previously with IBM for 11 years with a primary responsibility for studying long-range needs of financial institutions. As a systems engineer, he directed the installation of the first computers in several Kansas City banks.

It's time for the serious questions to be asked about medical use of computers, and they should be initiated by the physicians.

Medical Sector

by Michael G. Saunders

Perhaps of all the professions, medicine is starting to be looked at most critically, not only from without but also from within. The enormous increases in costs of patient care, the abysmal absence of medical services in one area, futuristic facilities in another, and the huge financial demands necessary for improved medical research all cast doubt on our sense of priorities.

Medicine from its earliest days has tried to serve humanity to the best of its ability and the interface of the patient and physician has worked at the best level of medical knowledge of its era. Now technology has passed this human-human interface and is creating problems that must profoundly affect the future practice of medicine and medical research. The attitudes toward the problems vary from those of activists trying to make tomorrow come today, through mild curiosity, to almost fanatical resistance to change.

Fortunately, an increasing number of physicians are becoming deeply aware of the problems and are seeking answers. In this search the computer has been variously described as the ultimate saviour or the ultimate destroyer of all that medicine considers sacred. These two extremes demonstrate the simple fact that medicine has not examined in any depth the functional capabilities of the computer in the very human-oriented environment of medicine.

At the beginning of the last decade the computer

enthusiast was describing the computer in a dial-a-diagnosis system, in the mid-decade putting all medical knowledge on huge regional computers, and at the end of the decade he had found he had not got very far. In the meantime, the physician plodded along as before except that some medical research workers found they now had a tool that opened a hundred new doors.

Welcome, friend

To those in medicine who use computers, it becomes increasingly obvious that the computer is no enemy but may well be an assistant of unrivaled ability. It is not yet known with any level of certainty if this is true or, if it is true, how the computer is usable. Even those medical research workers knowing the use of the computer have yet to define the most suitable system to cover their requirements. Controversy, at this more knowledgeable level, exists between use of the hard-wired special-purpose device, the stand-alone, or the centralized time-shared system.

Unfortunately, only the active physician can know the problems he faces and he has not yet defined these with the exactitude that computer technology demands nor has he been asked to. Many nonmedical persons claim that they know the answers but few have worked in the emergency ward on a Saturday night, or had of necessity, not desire, to see 20 patients in one afternoon or watched a patient die from no discoverable cause.

To date, the computer systems have been devised by the manufacturer. The pattern of design has been partly from the scientist and partly from the business world. Too little has come from the professional man who works as a human with humans. The time has now come when the computer scientist must start to examine in depth the way the physician works and the physician must ask of the computer scientist how he can be helped. This is no trivial challenge, although it has been treated this way in the past. Nor will the solutions come from making the computer slavishly follow the physician's ways. The physician will have to change from his loose, qualitative approach to a more exact one. The computer scientist will have to change his rigid, quantitative requirements and adapt to the inexactitudes of the biological sciences.

Although it is not difficult to express one's ideas on what should happen—as many have done before—to turn ideas into practice is a problem of a different magnitude. Excellent research work has been and is being done on computer-assisted diagnosis, on-line analysis of normal and abnormal tissue reactivity, automation of laboratory procedures, pattern recognition of cellular structures and so on. But these are isolated projects with end results fitting often clumsily and expensively into existing frameworks of medical procedures. The medical research worker is not having his computer requirements analysed so that economical long-term implementation programs can be followed. The practicing physician is not asking why he does what he does, nor is he being asked this by the analysts whose function is to probe for reasons.

It is of interest that the first moves to ask how the computer can help the professions are coming from the computer scientists rather than from the professions to the scientists. It seems that this represents an acceptance of responsibility by the computer scientist of his potential role in the community although doubtless some will regard it as empire building.

The start is hopefully with ACM 70 at round tables discussing the state of the computer art—for it is that—in the practice of medicine and the state of computer science in medical research. From there it must continue into communication between the disciplines and their subdivisions. The tasks ahead are difficult for the answers to be sought now involve fundamental principles—not superficialities—and few care to ask or be asked at such levels. However, the questions must be asked for change must come if medicine is not to remain static or even retrogress in the new world of advancing technology. Hopefully, answers to the questions will give insights into the place of the computer in the real world of the sick human being.

It is hoped that dialogue will be established between the human-oriented physician and the scientist of the information processing technologies so that positive action for change will occur and the cliches and superficialities of judgment of the past will go. In medicine it is the sick who are ultimately the end users of the systems, not the physician or the computer scientist. Yet in the final analysis no one really knows how to make the changes or even how to start to look for them. No miracles are likely to occur but dialogue cannot help but be fruitful, for the intellects, the ideals and the hopes do exist amongst the physicians and the computer scientists. ■

Dr. Saunders is director of the computer department for health sciences at the University of Manitoba, Winnipeg, Canada. He has also been director of the electro-encephalograph department of the Winnipeg General Hospital and continues his affiliation there and with Children's Hospital. He received his MD from the University of Manchester and also has an MS from there in medical electronics.

ACM 70 will consider MIS, management education for dp, and the problems and responsibilities of managers

Management Sector

by Charles H. Kriebel

"Machines should work. People should think." There is considerable evidence to suggest that IBM's corporate motto will describe the nature of the challenge to the partnership between management and computer systems during the 1970's.

Ten years ago the computer was viewed by most managers as a "superclerk," with an economic potential primarily to reduce administrative data processing costs within organizations. Today, a wide array of computer applications to management decision, planning and control functions exist in industry. In the transition to computer-based information systems many corporations have reorganized the management hierarchy, changing lines of authority, departmental boundaries, interpersonal relations and the administrative structure.

Today's managers are required to "think more" in utilizing new problem solving skills as computer systems encompass a larger share of administrative chores. The trends of the 1960's are expected to continue into the 1970's; however, modern perspectives on the evolution between management and computer systems indicate that new problems and priorities will challenge further progress.

As computer technology becomes more complex and the average investment in personnel and equipment continues to increase, the relative efficiency and utilization of system resources has become a major issue in many organizations. For example, a recent survey of managers indicates several problems of increasing concern in data processing administration, such as: the establishment of operating policies and the interaction with higher management; the measurement and evaluation of equipment performance; techniques for dealing with operating systems; customer/user support; and general operations management for an installation, including the planning and budgeting of operations. The "administration of computer system resources" will be the focus of a session at ACM 70 in which key problems and issues will be reviewed by a panel of installation managers, representing small as well as very large configurations.

A fundamental barrier to the implementation of advanced management applications of computers in recent years has been the requirement for educating the user. Experience indicates that too often managers do not understand the technology or its potential and are reluctant to involve themselves in new developments. A major goal for the coming decade is to improve communications between management users and system professionals. "Management education in data processing" will be the theme of a session at ACM 70 that will seek answers to such questions as: What does top management need to know about the computer? What are the educational requirements for management sciences in the 70's? What techniques are preferred for training managers?

Management information systems or the acronym MIS has become a popular phrase in discussions concerning information processing support of management activities. In spite of current large investments in computer systems, the advanced "state-of-the-art" MIS is a vision of the future for most organizations today. The problems and issues facing MIS today and a critical look at the advances likely over the next decade will be the concern of another session at ACM 70. A distinguished panel of industry professionals will provide a mature and pragmatic view for the 1970's on the planning, development and control of MIS projects; MIS technology; data base design; impact of MIS on organizations; and the service organization's role in MIS development.

The United States and several Western nations have visibly matured into a post industrial phase of economic development and growth. Before the year 2000 the post industrial corporation will be a multinational organization, operating in a high technology environment and dependent upon a broad array of service industries. Prodded to some degree by computer-allied technology and expanding responsibilities, today's manager has replaced the crude stereotype of "businessman" with a new sense of "professionalism." The final session on management at ACM 70 investigates the problems, responsibilities, and requirements of professional managers in a post-industrial society. To gain insight into the important issues, the discussion will coordinate four key perspectives: management practice, management science, behavioral science, and computer systems. ■

Dr. Kriebel is an associate professor at the graduate school of industrial administration, Carnegie-Mellon University. He has been a national lecturer for the ACM, a consultant to many organizations, and is widely known for his work with management information systems. His doctorate is in industrial management from MIT; He also has an MA in statistics and a BS in economics from the University of Pennsylvania.

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PERSPECTIVE

an interpretive review of significant developments

UK Administration Seen Favoring Computing in the Private Sector

It may be early autumn before the full impact of the dramatic change in government in Britain is felt by the computer industry. But on evidence of political utterances before the June 18 elections, the incoming Conservative administration promises major changes in government-industry relations.

For computer people, interest focuses on policies adopted by the Ministry of Technology. This vast department, spawned by the ousted Labor government, controls about $12 billion spent on developments in computers, aerospace and nuclear energy — including allocation of funds between government and private industry research and development units.

The Ministry's direct interests in computing range from a near $50 million stake in Britain's biggest manufacturer, ICL, to its advisory role over most procurements made in the public sector. Under Prime Minister Edward Heath, the Conservatives should redirect much spending from government-owned r&d centers into private industry. This can only mean a rigorous overhaul for the data processing industry.

How the minister thinks

A guide to these changes can be gleaned from a look at Geoffrey Rippon, the new Minister of Technology, who will be influencing future policies. He is a highly successful barrister well acquainted with the pressures of industrial groups bidding for government attention. In the previous Conservative administration in 1960 he held office in the then Ministry of Aviation, which at that time controlled the bulk of public money directed for electronic developments. Out of office, Rippon was on the boards of Cubbitts Construction Systems, a major building company that opted early for computer design in large construction projects, and the Fairey Company, an engineering group with interests ranging from aerospace to nuclear engineering. His commitment to growth of private industry is in little doubt. His department likely will move away from any tendency to isolationism. Past Conservative governments have been cooperative with U.S. manufacturers willing to invest in manufacturing bases in the U.K. to supply the British and European markets.

So it seems almost certain that entrenched corporations such as IBM, Honeywell, NCR, Burroughs, and DEC can expect better treatment when bidding for markets in the public sector. Already there is some indication the new administration will look less favorably on the development of supercomputers by ICL, leaning instead to U.S. companies.

IBM, seen by many Conservatives as an operation to emulate rather than gaze upon with alarm and envy, intriguingly enough has as its U.K. chairman Lord Cromer, a former governor of the Bank of England and one of Europe's most respected financial brains. His well-publicized analyses of the economy that favored a change of government is evidence enough of IBM's security under the new administration.

R&D for independents

Independent software companies may receive a large chunk of r&d work, a cost turnabout from practices of the past six years when larger and larger portions of the budget were channeled into government labs. Many were given these jobs as their natural workload declined with the slump in the defense budget.

One example is the Atomic Energy Authority's research center at Harwell. This is one of Europe's biggest, whose role in recent years has been whittled down to maintenance and support for Britain's H-bomb stock, Polaris fleet, and other missile devices. But like all good bomb-making research labs, Harwell nurtures its nuclear physicists with 360s as others plug in desk calculators, and uses PDP-8s like confetti.

Incentives to export may be the government's tactic to accelerate ICL's path to economic buoyancy and possible independence, likely including more encouragement for trading with Eastern Europe. For some reason there appears to be a better understanding in trade terms between Communist countries and a full-blooded free enterprise British government than with the type of socialism of a Labor administration.

Other developments to expect:

The new Ministry of Technology may spur development of time-sharing services by striking a better relationship between the industry and the Post Office, with the Post Office investing more in data communications services.

More tax incentives for purchasing of capital equipment in modernization schemes.

More use of specialists from the software industry in government as policy advisers.

Stronger effort to achieve cooperation between European manufacturers.

Unloading of government-held equity in ICL back into the hands of investors.

— Pearce Wright

Reservations Mess in California: a New Broom or an Old One?

What do you do when a computerized system you were depending on is turned off suddenly in the middle of your busiest season?

You scramble. You grit your teeth. You apologize to customers. You hire extra people to handle growing mounds of paper work. You fall behind *and* you look around for another system. At least that's what California's Dept. of Parks and Recreation

(Continued on p. 36)

did. The department was handed a mess last April when Computicket, which was operating a computerized reservations system for its campsites and other facilities, was abruptly folded by Computer Sciences Corp. (May, p. 181). The mess won't be completely cleaned up till summer's end. It's a safe bet they don't want a repeat performance.

Announcement of an award for a new system is expected imminently. Forty-two companies expressed an interest in the job when Computicket folded, and some 25 of these were expected to have submitted proposals by the July 24 deadline. Undoubtedly one of the things the state is looking at hardest is the staying power of the bidding firms.

Seeking damages

The state requires contractors to provide information on their financial status and, if they are an affiliate or subsidiary, on that of their parent company. Possibly this won't be necessary for one contender, the Infonet Div. of Computer Sciences Corp. The state should have sufficient financial data on CSC. They are planning to seek damages from CSC against a $150,000 performance bond based on losses incurred as a result of Computicket's folding. The amount will not be determinable until the camping season ends. Presumably it will include salaries of the 23 extra people the department had to hire to manually handle the reservations after Computicket shut down. These supplemented some 12-18 regular department staffers who were diverted to this work.

It was work the department had never before handled. Ray Chapman, department information officer, explained they had not had a central reservations operation before they went to Computicket. Each camp handled its own reservations, largely by mail. They were totally unprepared and unequipped to manually handle a centralized system at department headquarters. They had to get going fast on a crash basis. In mid-July they were running three weeks behind even with the extra help.

The department hopes to get its new computerized system, which will handle 6,600 campsites at 87 campgrounds plus Hearst castle tours, going on a test basis in mid-December and for real by January 2.

Bids are based on a percentage of sales, which can vary depending upon origin of sale (department terminal or contractor's), and a flat fee charged for each reservation. The department realized some $2½ million in reservations revenues in 1969. The rate at which revenues were coming in during the first three months of this year under Computicket indicated they should have gone considerably ahead of this in 1970. Whether they still will or not is yet to be determined.

An oft-leveled criticism of the Computicket system was the location of terminals in supermarkets. Alternatives being suggested included: gas stations, Photomats (the little yellow booths for quickie film developing), state offices such as employment offices, travel agencies, and banks. Some bidders were closely guarding their ideas for terminal location as the big "secret" of their system.

Leonard Elfenbein, vp of Telemax, who sees his company's proposal as having "an excellent chance," would place terminals with the company's existing customers, those hotels and motels that wouldn't be considered competitive to campgrounds, and National Car Rental which also rents camping equipment. They also are considering banks. They're not in any banks yet but they expect to be soon, providing credit card checks. Elfenbein said Telemax could put the parks system "largely on existing equipment," adding only a few terminals and "a little custom programming." He felt they could come up with a lower percentage charge than Computicket, which he thought was around 7%, because they wouldn't have to carry retail outlets. Telemax's interest in camp reservations isn't limited to the state of California. They currently are talking a similar system to Campgrounds of America, Billings, Mont.

Another company which is looking beyond California boundaries in considering the campsite reservations field is Atar Computer Systems, which, at this writing, wasn't committed to bidding on the California system but was giving it serious consideration. Lee Amaya, vp/operations, said if they did go for the "state thing," they wouldn't stop there but would go on to propose similar systems for national parks and others.

The Park Dept.'s problem attracted a number of companies who were looking to get into the reservations field anyway but hadn't yet taken the plunge. One such was General Analytic Data Systems, Los Angeles, a subsidiary of Republic Corp. James D. Woods, program director, said they had developed and had just begun to market an on-line MIS for hotels which they call MAITRE when they heard of the parks dilemma. He thinks the system could handle the campsite reservations.

Intranet Computing Corp., Los Angeles, had been studying an application of their IBIS (Intranet Business Information System) to hotel and theater reservations and planned to propose this to the state.

A David among Goliaths

A 2½ year old, four-man Anaheim, Calif., software firm, Pro-Comp Computer Products, Inc., ambitiously proposed what it described as "the unique combination" for the state parks. They declined to describe it further.

Two bidders viewed the parks situation as an inventory problem rather than a reservations system. One was Computing and Software, Inc., which was planning to bid on the basis of an existing communication network they feel could handle the parks system and said terminal location was "proprietary to our proposal." C&C Computer Systems, Inc., San Diego, was going to bid the parks job on the basis of an inventory system they felt could be redesigned for the purpose.

And there were, of course, a number of contenders like Telemax who already are firmly committed to the reservations field. Considering proposing but not yet committed by mid-July were such formidable contenders as Ticketron, American Express Reservations, Inc., Reservations World, and International Reservations. International Reservations, in fact, was considering submitting multiproposals.

Lesser known Realtronics of Denver, Inc., which has a reservation system it calls RSVP already installed

and operating in Aspen and Snowmass, Colo., proposed this system for the parks.

When they get through studying all proposals, the parks people may feel as if they'd been plowing through alphabet soup, but at least they'll have had a wide range of choice; and if they're ever faced with another shutdown, they'll have reserves waiting in the wings.

— Edith Myers

AISC and You Shall Receive Is Theme of Software Independents

The 11-member Association of Independent Software Companies (there were 11 when it started two years ago; some have dropped out, some in) enters its third year with a new president and excellent prospects for increased membership, but amid continued criticism of its aims and methods. The aims have hardly changed since the association was formed: to push for patent protection; to fight what it considers would be SDC's privileged position with the Air Force when SDC becomes a for-profit company; and to establish business and ethical standards that will help users select and deal with software firms. (Oct. 1968, p. 175.)

Software patents are becoming less rare these days (see Aug. 1, p. 63), and there are those who contend that too much emphasis and energy has been exerted on the matter by the association, claiming that copyright and trade secret laws already in existence are sufficient to protect program creators. Perhaps this emphasis was due in part to the fact that Dick Jones, former president of Applied Data Research, was the first president of the association, and ADR now holds two of the patents that have been granted.

The new pres

Herb Bright, president of Computation Planning, Inc., and the new president of AISC, subscribes to the copyright and trade secret route, although he said that pressure for patents will continue. In a release issued by the association, "Bright indicated that his first efforts as president would be to expand AISC membership, establish a headquarters, and secure a full-time executive director to support work toward the association's objectives. These are to promote business in the interests of profit-seeking companies supplying services and software to electronic data processing."

One of the criticisms of the AISC had been that it had no executive director to oversee the day-to-day activities, but that has been at least partially remedied with the recent appointment of an "almost full-time" executive director who will need his best to reconcile the disagreements in approach held by the various participants in the organization.

The disagreement over the association's opposition to SDC's going public has resulted in at least two resignations from AISC, and they happened to be by the two most eminent (in size) members — Computing and Software, and Computer Applications, Inc., whose current president, Howard Morrison, was one of the founders of the group. He thought that the purpose of the association should be to establish professional standards and standard contract procedures for software companies, and with the patent protection and SDC developments, he felt the AISC was spending time on the wrong issues. He also felt the association did not represent a broad enough spectrum of the software industry (Computer Sciences Corp. and, of course, SDC, also are not members). With certainly more than 1,500 software houses managing to stay afloat in the U.S., that is probably not a baseless assertion.

Bright admits that membership of one or more of the really big ones not yet in the fold (Planning Research Corp. is a member) would probably give the organization more clout in its dealings with users and the Congress, but insists that present company representation is more than adequate to give AISC the influence it needs to bring about its ends (that's plural).

However, Morrison's objections are re-enforced by Ken Kolence, of Boole and Babbage, who also cites the need for contractual protection in, for instance, the sale of a program to a multiple-machine company that replicates the program without additional fees. He thinks there should be an association to improve and protect the "economic and legal environment" of the software industry and he hopes the AISC will fill the bill. If not, he suggests, perhaps another attempt to form a more effective organization should be made.

IBM excluded

Some criticism has been leveled at the AISC's initial (and current) exclusion of the major mainframers from membership. Unbundling has put most of the computer manufacturers into the software business, and it is felt that participation in the establishment of procedures and practices by such software houses as IBM, CDC and Burroughs could not help but have a salutary effect on the business health of all. Former president Jones and Dave Ferguson, of Programmatics, both of whom have instituted lawsuits against IBM (ADR, without Jones, continues the litigation), have no objection to the "autonomous" software arms of the hardware manufacturers being included in the association.

Whatever the reservations by members and outsiders, the AISC goes on. It does not have any specific action pending at the present time to forestall SDC's plans but the matter continues to be one of "deep concern," and the executive council will consider further moves.

Efforts to establish professional and contractual standards will also continue, although they have lagged, as all standards efforts seem to lag, because of lack of agreement on just what the standards should be. Although the AISC is not officially involved, Herb Bright is a member of the National Council of Patent Law Association, which has two groups studying the question of whether there is a need for changes in software legal protection laws, and if so, just what those changes should be.

And what should be is probably what the AISC is all about.

— Aubrey Dahl

"With seven 2314's on line to a 360 time-sharing system, BASF disk-packs give the reliability essential to our business"

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Mr. Stone is one of many EDP professionals who are determining, on the job, (in this case with a coupled System/360 50/65 installation) that BASF Disk-Packs actually do offer substantial long-term advantages over other units. Reason? Very simply, greater care and precision in assembly and coating for better performance and surface characteristics.

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CIRCLE 8 ON READER CARD

W. Porter Stone,
president of
U.S. Time-Sharing, Inc.

You can't touch the hardware yet but it sure sounds great.

The Gemini

by R. A. McLaughlin, Associate Editor

The president of Computer Operations, Inc., announced his company's maxi computer line with the preface that "this must be the worst time in the last 50 years to launch an enterprise." From an economic, state-of-the-market standpoint he may be right, but from a technical standpoint he may be quite wrong—for the Gemini Systems he introduced appear to have all the things that were hoped for but absent in the just-announced IBM 370 Series machines. Things like terminal administration, variable micrologic, and multiprocessing are all here. Or make that almost here, because the introduction of the Gemini Generation, unlike that of the 370, was not accompanied by the unveiling of hardware, only the unveiling of concepts and the offer to sell.

Unlike almost any other computer company, the Costa Mesa, Calif., firm's first offer to sell was for very big machines, not for starter sets. The smallest configuration mentioned was the equivalent of multiple 360/50s, and the size went up from there to models whose only competition will come from the IBM 360/195 and the Control Data 7600. Prices for "little" models did not even begin before $3 million and the top was not reached before $10 million. Professing that "economy comes through scale," COI has started at the top.

It is immediately apparent that the Gemini will not look like the 370. Any similarities come not from molding around a 360 computer line—if anything, the Gemini's ancestors live at CDC, not IBM—but because some design goals for the 70's seem to have become clear, and among these are massive on-line memory, the need for a relatively small and exceptionally fast semiconductor buffer memory to interface with core, redundancy for reliability, and flexible and capacious communications channels.

Finally, enough core?

The Gemini have this and more. Core sizes start at 2 million bytes and go to 16 million, five times the top offered for the 370 and much larger than any memory installed anywhere in the world today. Although the core has a nominal cycle time of 2.5 mikes, it is interfaced to the 1,000,000 instruction/second central processor through either an 8K or 16K byte associative semiconductor memory running at 160 or 260 nsec cycles. The effective core *size* is greater, too, due to the use of 1K byte pages and virtual addressing of more than a billion bytes.

The Gemini configurations include a minimum of four processors of various types. There is a 128-bit word size central processor; a peripheral processor that provides up to eight selector channels; a communications processor that either connects up to 1,024 terminal devices operating at rates to 9600 baud or up to 16 high speed channels at up to 480,000 baud each; and the memory processor. The peripheral processor, cpu, and communications processors can be paired, providing automatically for doubling all the numbers given.

One of the best learned lessons of the 60's was that any new hardware would have to be compatible with earlier hardware at the program level. The Gemini architects claim that it will be able to run multiple IBM 360 OS jobs alongside multiple DOS jobs alongside multiple Gemini-coded jobs. It is no secret that this sort of compatibility is best handled through emulation at the hardware level, and Gemini provides for this too. In addition, after the 1500 "essentially different" instructions in the machine's set are used up, there is still writable microcode space left over for up to 256 user-defined instructions.

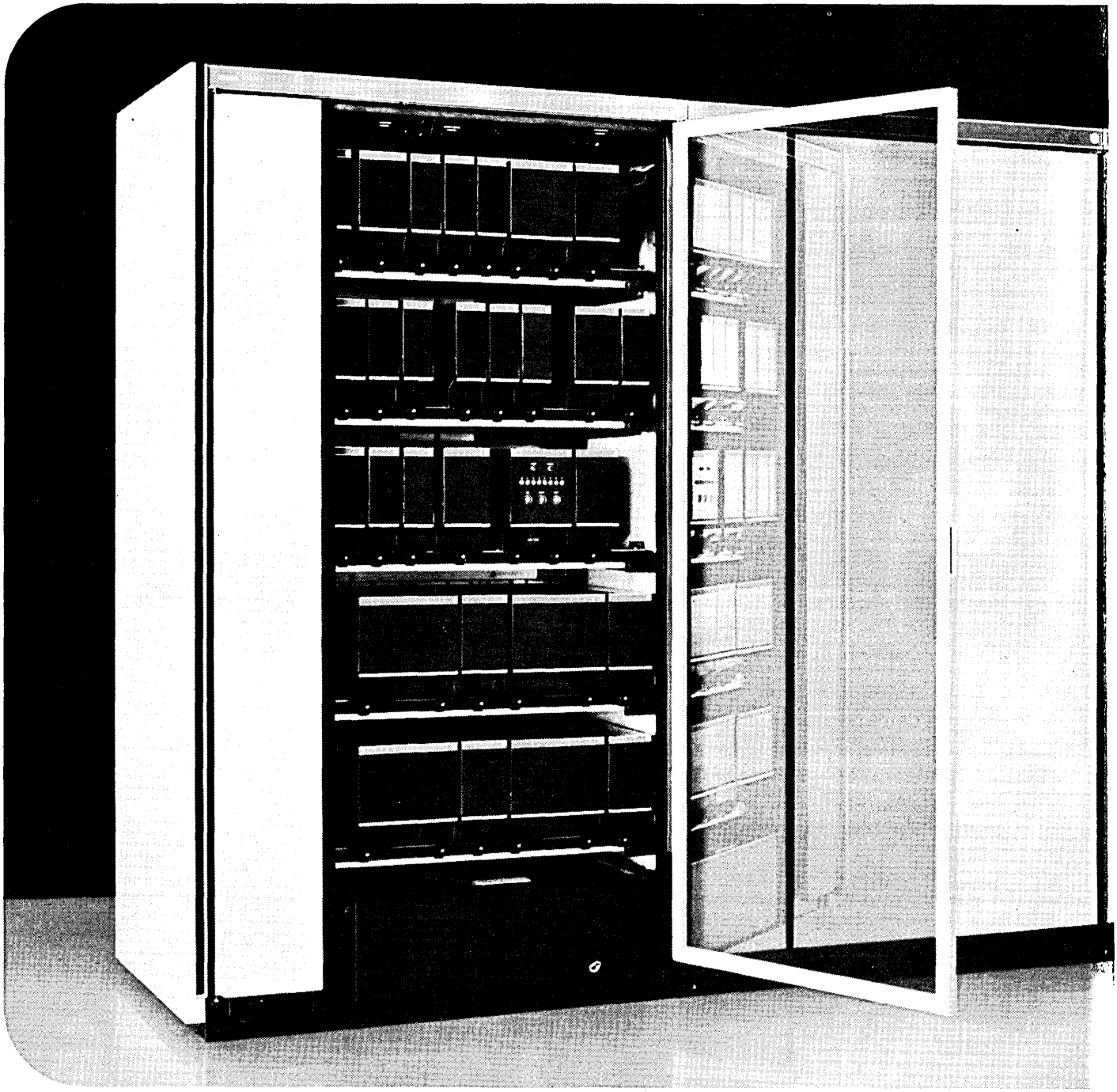
There are more tricks, too. The whole shebang is memory processor driven, a la the GE 600 series, and every logic box is asynchronous. The logical arrangement is described as a two-dimensional pipeline, wherein the instructions and data are taken apart by four units in the cpu—a microprogram control unit, instruction unit, operand unit, and execution unit.

Conversion relief

Trick number 30 or 40 is "what happened to the assembler?" Some hardware, which we will not need to identify, has been delivered without a good operating system and accompanying application software. No problem here. The software libraries you already have (ain't emulation grand?). The operating system comes with it; called the Gemini Operational Control Program, it performs resource management, failure diagnostics and recovery, and Gemini Program Language (GPL) translation. GPL, in a move like others we have seen for the 70's, starts with PL/I as a base and works in language processors, the "assembler," its version of a job control language, and everything else as subsets.

Some big new machines have been dropped on an unsuspecting marketplace with all the logic for doing great things and only first-attempt peripherals to do them through. The Gemini's peripherals and peripheral controllers are completely compatible with those of the 360 series. They *are* the 360 series peripherals and controllers. This is a good deal since IBM peripherals, though not cheap, are pretty good. Afraid of cpu vs peripheral compatibility problems and intervendor haggling? Fear not. Each Gemini comes with four live-in on-site field engineers.

It all begins to sound like magic and would be easier to accept if there were a piece of hardware to touch and poke at, but there is not. The prototype comes in mid '71; first deliveries at the end of '71. Meanwhile, the numbers surely look impressive. ■



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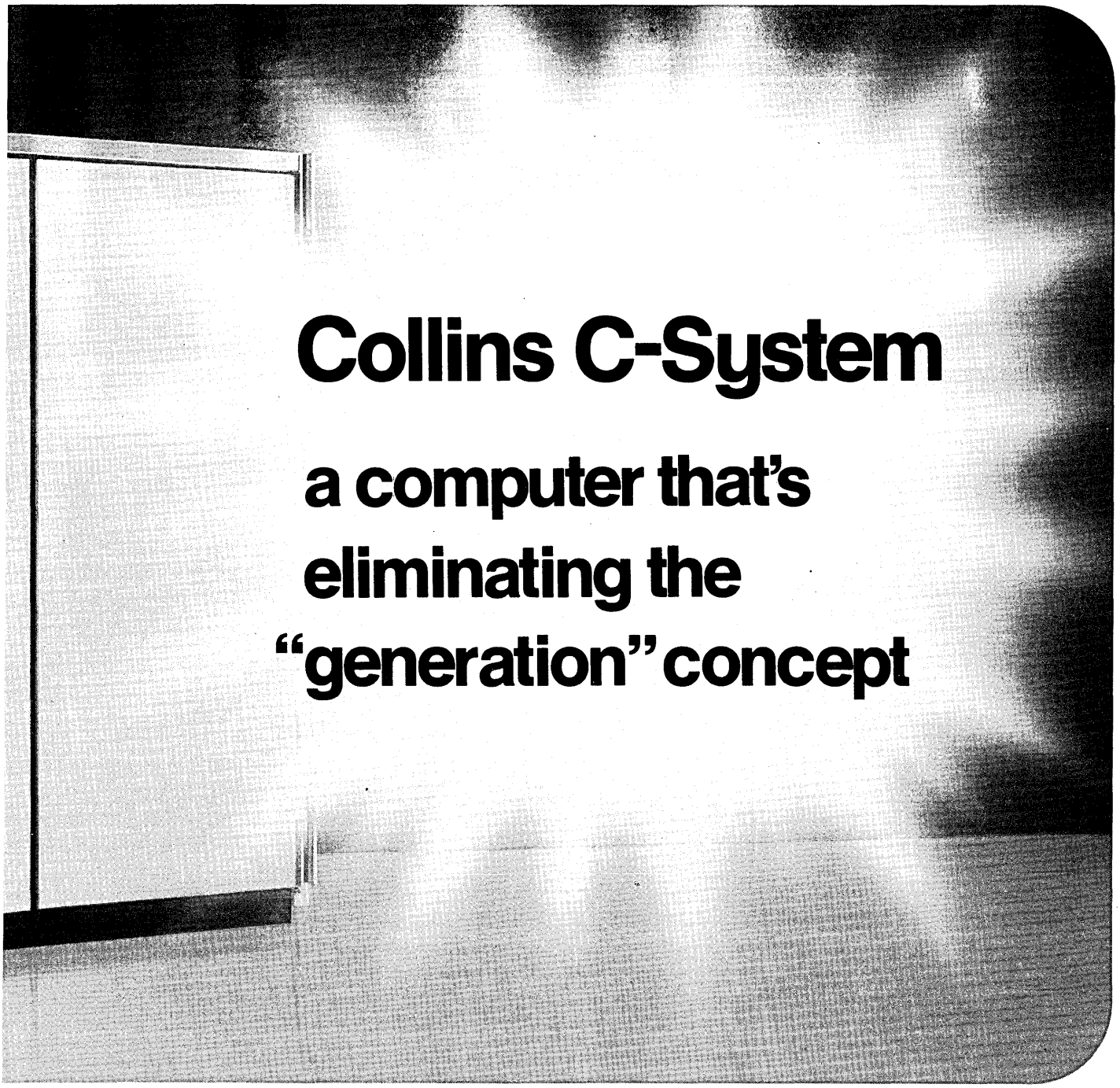

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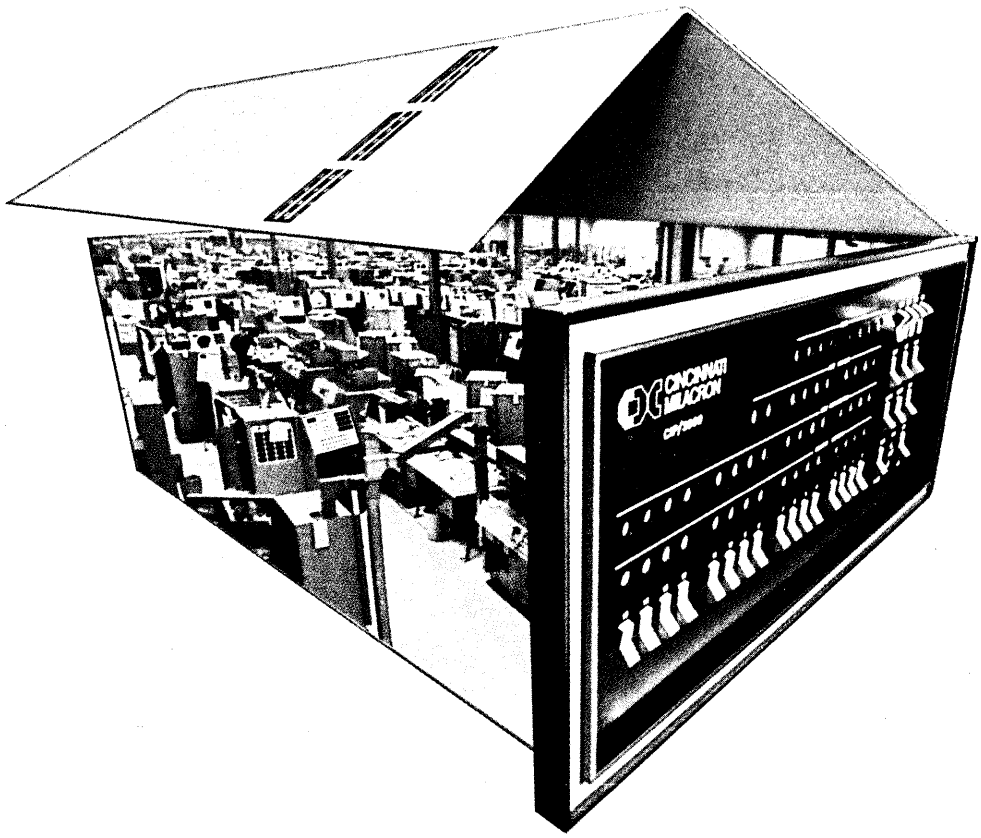
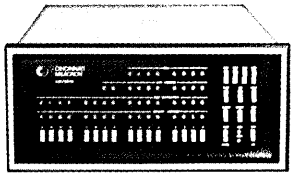


Not the only reason.



CINCINNATI MILACRON

Machine Tools/Process Controls/
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NASA information is tapped for industry by this operational retrieval system

WESRAC System

by David T. Komoto

The Technology Utilization Program of the National Aeronautics and Space Administration is designed to disseminate information on new knowledge resulting from NASA aerospace activities to the business, scientific, and engineering communities; to other government agencies; and to interested public and private organizations. In 1962, NASA undertook a program to provide comprehensive bibliographic services covering the world's aerospace literature.

The NASA information bank is maintained by the NASA Scientific and Technical Information Facility at College Park, Maryland. The facility compiles report literature in a publication entitled *Scientific and Technical Aerospace Reports* (STAR). NASA also supports a publication put out by the American Institute of Aeronautics and Astronautics—the *International Aerospace Abstracts* (IAA). There is an arrangement between NASA and the AIAA by which the IAA is issued in coordination with STAR without overlap or duplication. IAA's worldwide coverage of scientific journals, books, and open meetings complements STAR's worldwide coverage of the report literature.

Following a policy of decentralization, NASA has made the data bank available on tapes to most NASA research centers, a number of major NASA contractors, and several university contractors participating in NASA's Technology Utilization Program. Update tapes are sent either on a biweekly or monthly basis, depending on necessity.

The University of Southern California and NASA have established WESRAC—Western Research Application Center. WESRAC is a nonprofit organization funded by NASA. It coordinates the mass of technology contained in the NASA Information Bank with the needs of industry by using the resources of the university.

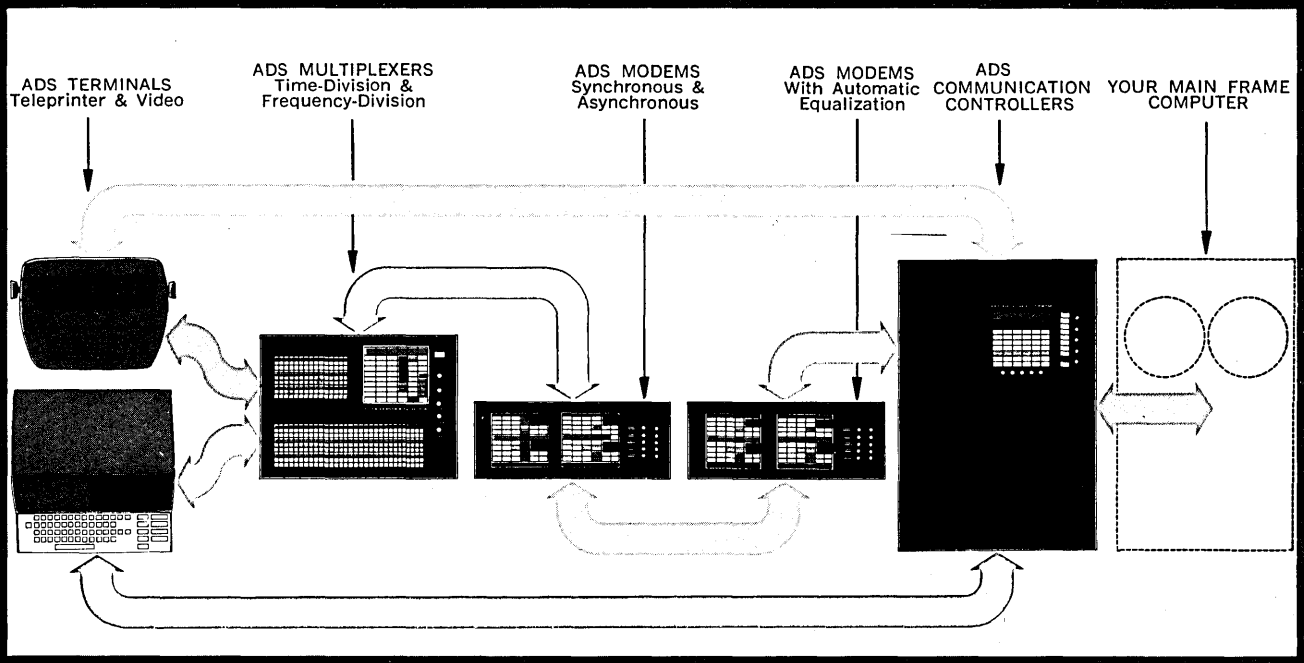
WESRAC maintains computer magnetic tapes, document abstracts, and reproductions of documents on microfiche. This material is updated monthly by the central NASA Scientific and Technical Information Facility. All search and reporting operations are carried out independently by WESRAC at USC. WESRAC is organized to implement NASA's Technology Utilization Program in the West. Fig. 1 (p. 45) is a functional flow chart of the information system.

	S	E	P	
B	0	1	1	SYNTHESIS=PO%1H
A	1	1	0	
8	0	0	0	SYNTHESIS
4	0	1	1	SΘE=P
2	1	0	1	YΘS=O
1	0	1	1	NΘI=%
				TΘS=1
				HΘ=H

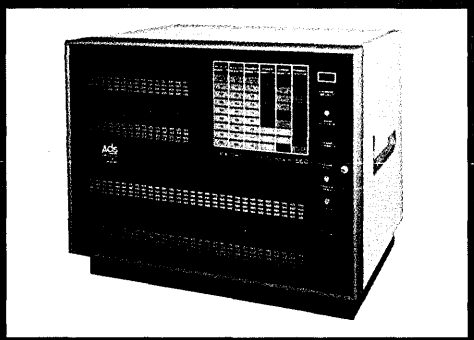
Table 1. Term Encoding Routine

Computer operations at WESRAC's are oriented around magnetic tapes. WESRAC's current magnetic tapes contain summaries, called citations, of 500,000 items, which include scientific breakthroughs in fields of 34 subject categories ranging alphabetically from aerodynamics to thermodynamics. Computer tapes

Ads = Total Data Communication Systems



THE ADS-660 DATA DISTRIBUTION SYSTEM WITH "DATA-PAK" for the optimum multiplexing of 300/135/110 baud terminals. The low cost ADS-660, *improved* with the added feature of "Efficiency-Data-Pak," handles several 300-baud remote terminals plus a large number of 110 and 135 baud terminals. It feeds a modem for transmission at 2000 to 9600 bps. Full, continuous front panel diagnostics, multi-drop capability, modular for system growth, off-the-shelf immediate delivery!



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CIRCLE 81 ON READER CARD

contain citations in chronological sequence, and the elements of a citation are composed of accession number, report number, availability, price, and key words. Title, author, and source are also given.

These citations are indexed by the key words (there is an average of 15 terms) which represent the major concepts of the document, enabling a computer to search through and pull out a citation if it pertains to a given topic.

File organization. The WESRAC tape file consists of a large number of paired blocks—a coded term block and an information block. Each information block is preceded by the coded term block (Fig. 2).

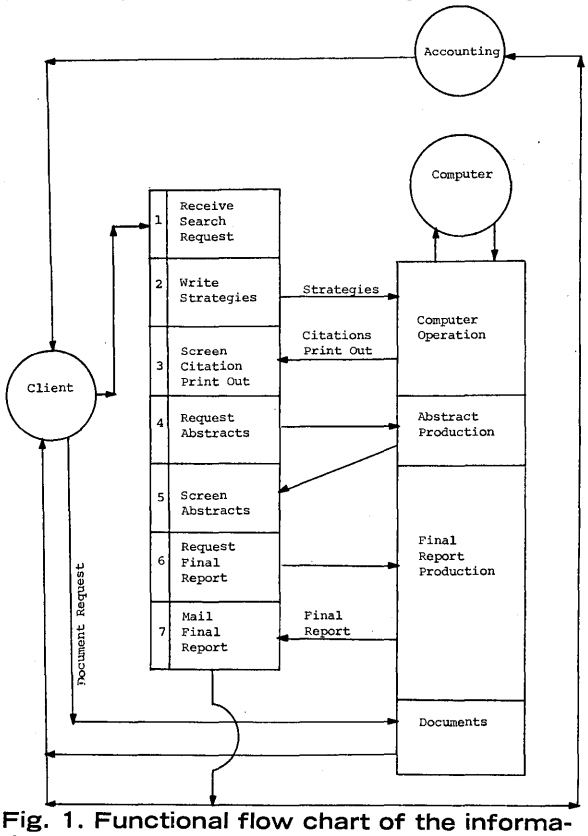

Fig. 1. Functional flow chart of the information system

The coded term block consists of five-character codes which correspond to indexing terms on a one-to-one basis. The method of encoding from variable-length alphabetic terms to five-character codes is described below. These codes represent a major improvement in search speed. Because of the difficulties in searching variable length data fields, it is advantageous to use a fixed length data segment when the comparison of two indexing terms is made.

The information block contains most of the conventional descriptive cataloging details—corporate source, title, author, report number, etc. It also contains the indexing terms assigned to a given document.

Term encoding. The technique used in the Term Encoding Routine involves reducing pairs of characters to a single character by combining the bits of the characters in the pairs in an Exclusive OR relationship to obtain the bits of a resultant character. As shown in Table 1 (p. 43), "S" Exclusive ORed with "E" gives "P."

A five-character code is generated from a variable length field by combining the first and every fifth character thereafter in the field to form the first character of the code, the second and every fifth character thereafter to form the second, and so on.

All subject term searches are made on these five characters rather than on the full, and often quite lengthy, alphabetic indexing terms. Considerable search time is saved with this technique.

Since the citations are indexed by coded terms, the search program compares question terms in the strategy against citation terms in the coded term block. At WESRAC, for example, the specialist, who is knowledgeable in the client's field of interest, maintains personal contact with the client and works with him to design the research logic (strategy). This strategy will be posed to the computer on punched cards that carry, in term reference, the search terms, weights of search terms, and logic to be followed by the computer.

The selection of appropriate indexing terms and the design of logical equations are major responsibilities of the WESRAC specialist, who must make the search broad enough to include all the items that would be of help to the client, and yet sufficiently

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ATES     1SHELL STABILITY       1STRESS ANALYSIS       1STRUCTURAL STRAIN    $
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Coded Term Block

Information Block

Fig. 2. NASA Tape WESRAC format (tape dump)

narrow so that the client isn't overwhelmed with an unmanageable pile of hundreds of citations.

Selection of indexing terms. After the WESRAC specialist defines his client's problem, he develops a list of relevant search terms with their term references, weight, and posting frequencies. An example is given in the sample strategy.

Term Reference	Weight	Indexing Term	Posting Frequency
AA	20	CARBURETOR	16
A	19	ATOMIZATION	165
B	19	ATOMIZER	56
M	1	ANNULAR FLOW	164
N	1	ANNULAR JET	44
O	1	ANNULAR NOZZLE	50
P	1	COMBUSTION	6563
Q	1	FUEL	10783
R	1	INJECTION	3016

Minimum Weight = 20

Logical Equation = AA+(A+B) . (M+N+O+P+Q+R)$

Table 2. Sample Strategy

Logical equation and Polish notation. In formulating a search strategy, the specialist may specify any desired relationship between indexing terms in the language of Boolean logic to construct search questions. Term references are used to formulate the logical equation (Table 2, above). The terms assigned to any one document must satisfy this relationship in order to be considered a "hit."

Polish notation is used internally in the search system to simplify evaluation of algebraic expressions used to specify search logic for terms. It is useful because it positionally establishes the priority of algebraic operations. This eliminates the use of parentheses and rules establishing priorities between operators.

Algebraically A.B+C is generally taken (A.B.)+C; however, it could be taken as A.(B+C). In Polish notation, A.(B+C) is .+CBA and (A.B)+C is +C.BA. The logical equation shown previously will be taken as +.++++ + R Q P O N M + B A AA.

Weight of terms. Weight values may be arbitrarily assigned to each term in the search. The output of the search may be controlled by specifying that only items having a certain calculated weight, or greater, be retrieved. The weighting technique also permits a search which is simultaneously logical and combinatorial. In the sample equation AA+(A+B). (M+N +O+P+Q+R)$, the weight value of 20 has been assigned to AA; 19 to A and B; 1 to M through R.

A logical "hit" should have a weight of 20. Weights are computed in advance of solving the logical equation. Items not meeting the required weight are rejected without further processing. However, weight alone is not sufficient to make an item a "hit"; a logical equation must be satisfied in order for weight to have any meaning.

The search program compares question terms in a strategy against citation terms. If the terms match, the routine to check the weight accumulator is set. If the citation satisfies the desired weight for a particular problem, then the equation is checked. If the equation is also satisfied, then a switch to retrieve the citation will be set.

Basic computer search techniques

There are three basic searching techniques to compare the terms. They are the linear search method, the binary search method, and the collating search method.

Linear search method. The linear search is one which begins at the first entry in the term table and scans through it, entry by entry, in sequence, until the desired entry is found. It has the advantage of being easy to program but many comparisons may be required. Fig. 3 shows the concept of the linear search method.

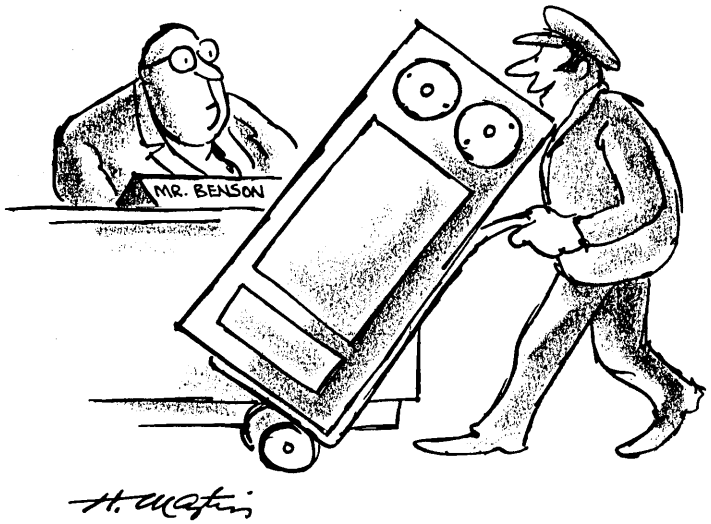
Binary search method. There are search techniques which reduce significantly the number of comparisons. One of them, the binary search technique is used in NASA search programs. This technique requires that the terms be arranged in some order (ascending or descending as in Table 3). The binary search is based on dividing the table in half, determining which half contains the term, dividing that part in half, and so on until a match is made, alter-

Sequence of Comparison	Number of Terms Left in Table
1st	$\frac{N}{2}$
2nd	$\frac{N}{2^2}$
3rd	$\frac{N}{2^3}$
•	•
•	•
•	•
K	$\frac{N}{2^K}$

K = Total Number of Comparisons (Maximum)

$K = AT \times \log_2 QT$

Table 3. Binary Search Method



"En garde, Mr. Benson!"

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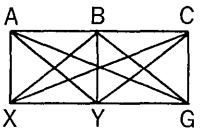
nately decrementing and incrementing the address for the search.

Collating search method. This technique demands that the question terms and citation terms be arranged in some order (collating sequence). In the collating sequence search method, the total number of comparisons is equal to the sum of the question

Question Terms = QT

Assession Terms = AT



Total Number of Comparisons (Maximum) = QT x AT

Fig. 3. Linear Search Method

terms and the accession terms. K=QT=AT (maximum). An example in Fig. 4 shows the concept of the collating search technique.

Sorted Question Terms $Q1 < Q2 < Q3$

Sorted Accession Terms $A1 < A2 < A3$

As an example of typical search sequence, comparison will be executed as follows: Q1 compared against A1; if Q1 is greater than A1, AT address is advanced

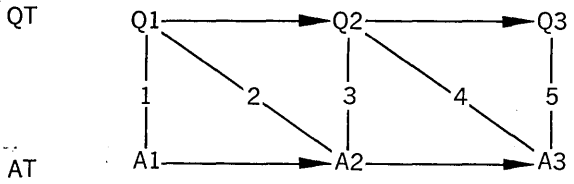


Fig. 4. Sequences of Comparisons for Collating Search Method

to A2 to compare against Q1; if A2 is greater than Q1, QT address is advanced to Q2 to compare against A2; and so on. Keep modifying the address of QT table and AT table alternately until a match is found. If Q_{last} is less than A_1, the search will be terminated and the system will be set to read the next coded term block.

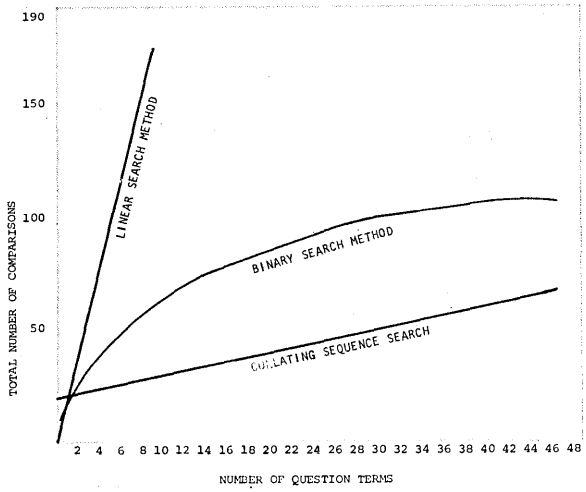


Fig. 5. Number of Total Comparisons by Search Method

The comparative table and chart on Fig. 5 indicate the number of comparisons (maximum) required to complete the search logic by each searching method.

It appears that the collating search technique is the most suited to WESRAC operations in the present environment (the average number of accession terms in the coded term block is 55), even if the average number of terms is doubled.

However, it is evident that when the number of question terms is very low, the binary search is better

Number of QT	Number of AT	Linear Search Total Comparisons	Binary Search Total Comparisons	Collating Search Total Comparisons
20	2	40	20	22
20	4	80	40	24
20	8	160	60	28
20	16	320	80	36
20	32	640	100	52
20	64	1280	120	84
20	128	2360	140	148

than the collating search. We also see that when the number of accession terms is very large, the binary search is still better than the collating search.

The NASA linear search system (binary search system) includes excellent strategy checking routines, extreme versatility in search capabilities, and almost complete freedom to specify type of printout. The system is completely documented but very slow.

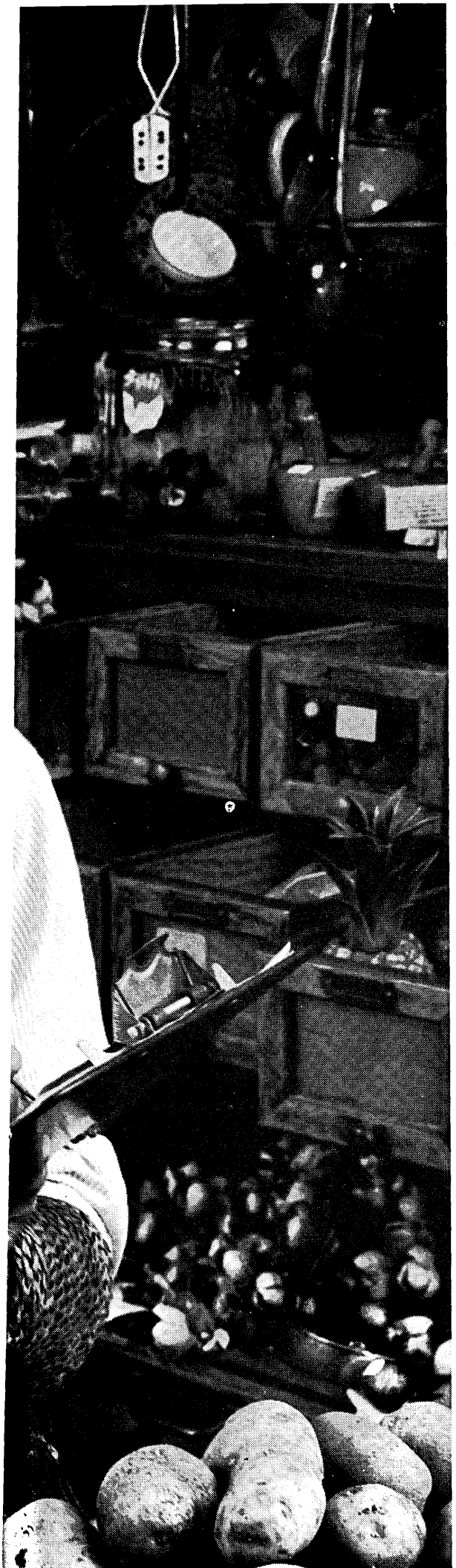
The WESRAC search system was prepared to alleviate this problem and the result is a program that runs about 2.5 times as fast as the original NASA search system. Most of the increase in speed results from conversion from a binary search to a collating search. Typically, depending upon the number of terms to compare, a collating search employs fewer comparisons than the binary search.

Conclusion

NASA, of course, is not the only organization maintaining computerized indexes to vast bodies of information. *Chemical Abstracts, Engineering Indexes, Textile Indexes, Department of Defense Files* and a few other data banks are already on computer tapes for researchers looking for information.

There is also a growing wave of information industry composed of small computer users, who may be able to apply data management concepts and search techniques similar to those used by the NASA Data Bank search system in their information retrieval. ■

Mr. Komoto is presently manager of Information Systems at the Western Research Application Center (WESRAC) in Los Angeles. He has a BA and an MA from Waseda University in Tokyo and an MBA in marketing from USC.



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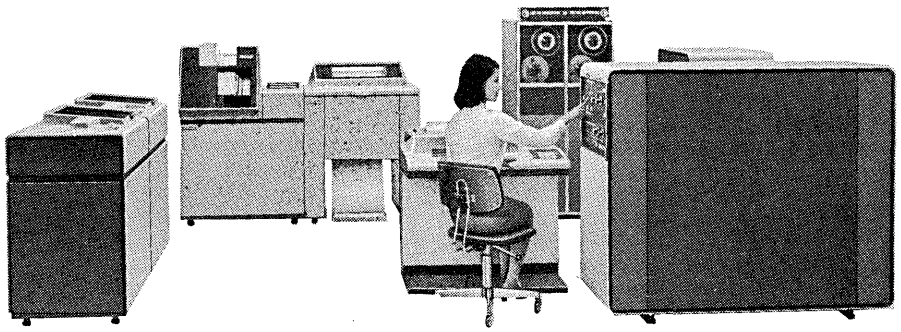

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CIRCLE 54 ON READER CARD

This year the Western Electronic Show and Convention, to be held in Los Angeles, will devote a good part of the exhibits and technical sessions to computer-related topics

WESCON

by Edith D. Myers, Associate Editor

The 1970 Western Electronic Show and Convention (WESCON) Aug. 25-28 in Hollywood Park and the Los Angeles Sports Arena will be more computer oriented than any of its predecessors. It also should be the last of the "split shows" and will be the most split.

The WESCON show, which alternates each year between Los Angeles and San Francisco, has long been forced to split in Los Angeles for lack of a facility large enough to house the whole thing. In 1972 it is hoped the now-under-construction Los Angeles convention center will solve this problem.

In the past, only the exhibits were split up, but this year the technical program also will be divided between the two sites with 20 management and engineering sessions scheduled in the Museum of Science and Industry, next door to the Sports Arena, and seven computer-oriented sessions set for Hollywood Park, which will house some 85 booths of computer-related exhibits. The computer sessions are the first ever included in the electronics industry's second largest annual convention. An attendance of 40,000 plus is expected to view more than 1,000 exhibit units and take in the 27 technical sessions.

The increased edp focus is reflected in both the exhibits and the technical program. The 85 exhibit booths in the computer area, assigned to some 40 companies this year, compares to 22 exhibitors and 42 booths in 1969 when the show was held in San Francisco's Cow Palace. Last year's technical program of 23 sessions had no edp-dedicated sessions and only six computer-related papers. This year seven of the 27 sessions, with 43 papers, are fully computer-oriented and 15 computer-related papers will be presented in other sessions.

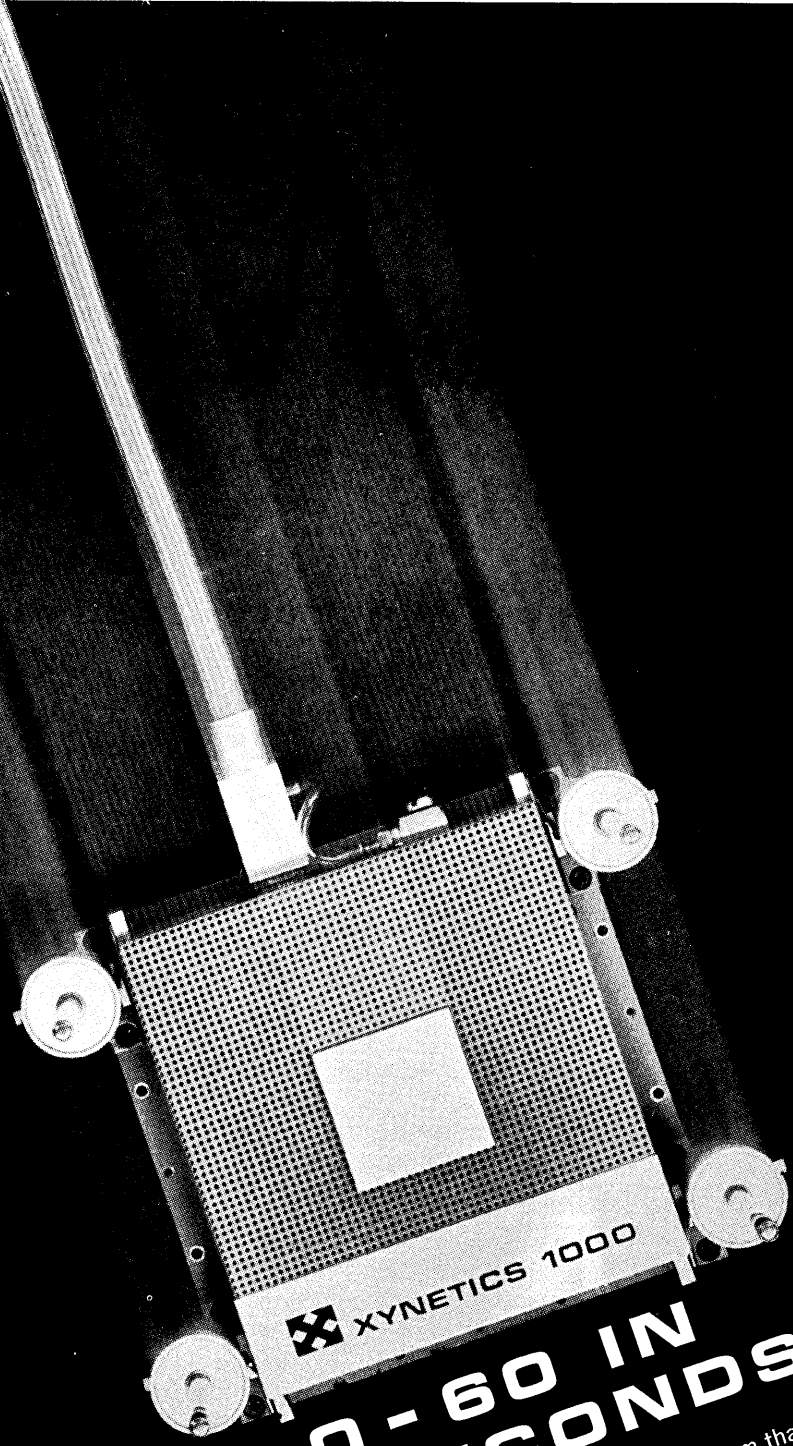
Software gets a lot of attention in the computer-oriented sessions—possibly reflecting the fact that the Western Electronic Manufacturers' Assn. (WEMA), which cosponsors WESCON with Region 6 of the IEEE, last year opened its ranks to software companies for the first time. Two of the seven sessions are "Managing the Development of Large Software Systems," and "Evaluation of Proprietary Software."

Other topics considered in the computer sessions are minicomputers, time-sharing, computer-aided design, interactive computing for the engineer, and programmable calculators. Computer-related topics covered in other sessions include data communications, memory technology, computer-aided design, automated testing, and a computer system in a cardiovascular intensive care unit.

Another WESCON first this year focuses on technology and civil problems. In a two-day symposium Aug. 26 and 27 in the Los Angeles Hilton, 16 industry leaders will cover the topics: "Problems and Opportunities in the Real World," "Technology and the Mobile Population," "Technology and Information Exchange," and "Technology and the Urban Society." Advance registration is necessary (mail to WESCON, Special Symposium, 3600 Wilshire Blvd., Los Angeles, Calif. 90005). Charge is $50.

Registration fee for the exhibits and all technical sessions is $3 for all four days. Advanced registration is unnecessary. Children under 10 are not admitted and children 10-18 only with a parent. Exhibit hours are 10 a.m. to 5:30 p.m. Tuesday and Friday and 10 a.m. to 9:30 p.m., Wednesday and Thursday. Technical sessions are 10 a.m. and 2 p.m. each day.

Dr. John V. N. Granger, president of IEEE and of Granger Associates, Palo Alto, will keynote WESCON week and perhaps sum up the state of the industry in an address at the Sponsors Luncheon on Tuesday. His topic: "Electronics: Past Imperfect, Future Conditional." ■



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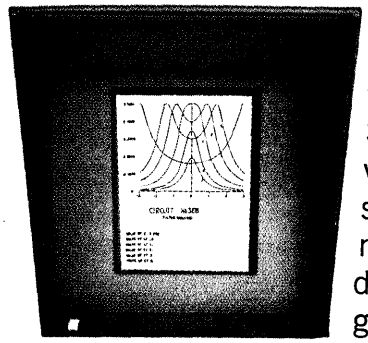

First, it features interactive graphics. So it's an advanced time sharing terminal that can display complex graphs and line drawings as well as alphanumeric data. This lets you make full use of the time you have with your time sharing computer and take full advantage of all its problem solving capabilities.

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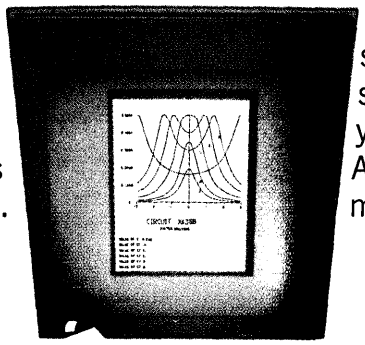

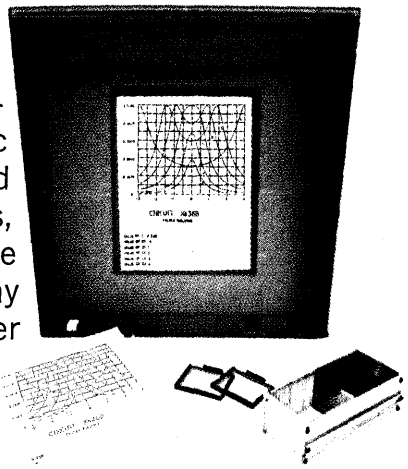

Third, a slide overlay system for superimposing static and computer generated displays. Graph coordinates, forms, and menus may be shown right on the display screen in perfect register with computer generated data. A built-in magazine holds 32 slides that can be randomly accessed. And slide trays are easily interchangeable so you can build your own sets of application slides. And you can make them yourself from hand drawn or printed originals with an accessory Slide Overlay Kit using POLAROID® transparency film.

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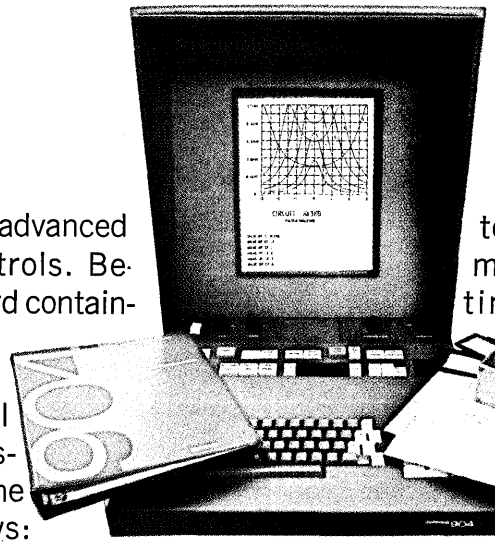
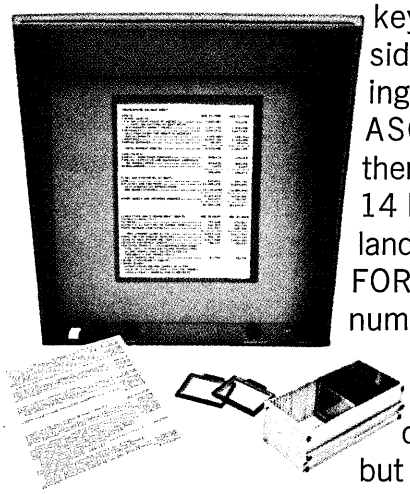


Fifth, is the CORNING 904's advanced keyboard and controls. Besides a main keyboard containing all 128 printable ASCII characters, there's an additional 14 key data entry island. It includes all the FORTRAN input keys: numerals 0 through 9, space, backspace, period, and comma. They're also included on the main keyboard, but we repeat them on the data island keys for one hand data entry.



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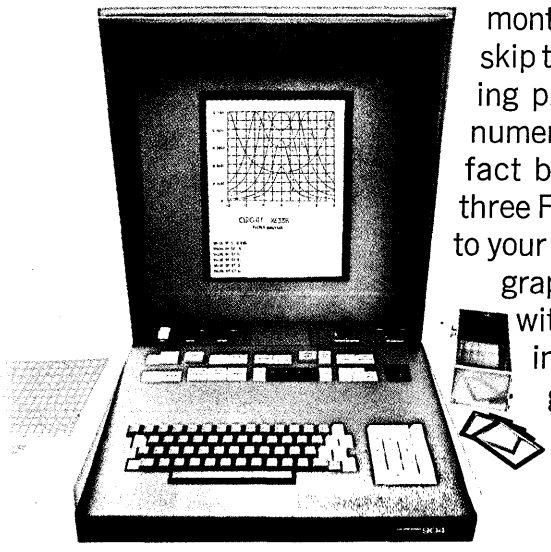

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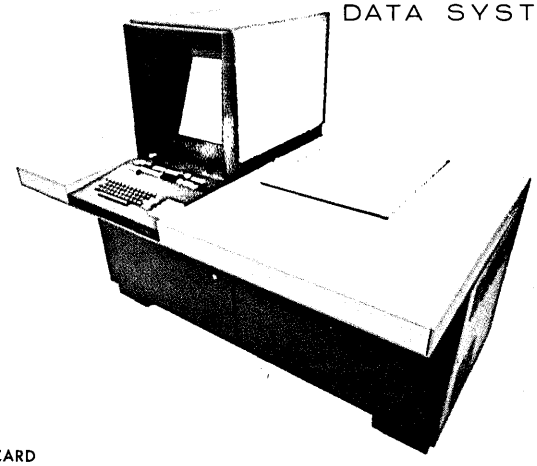

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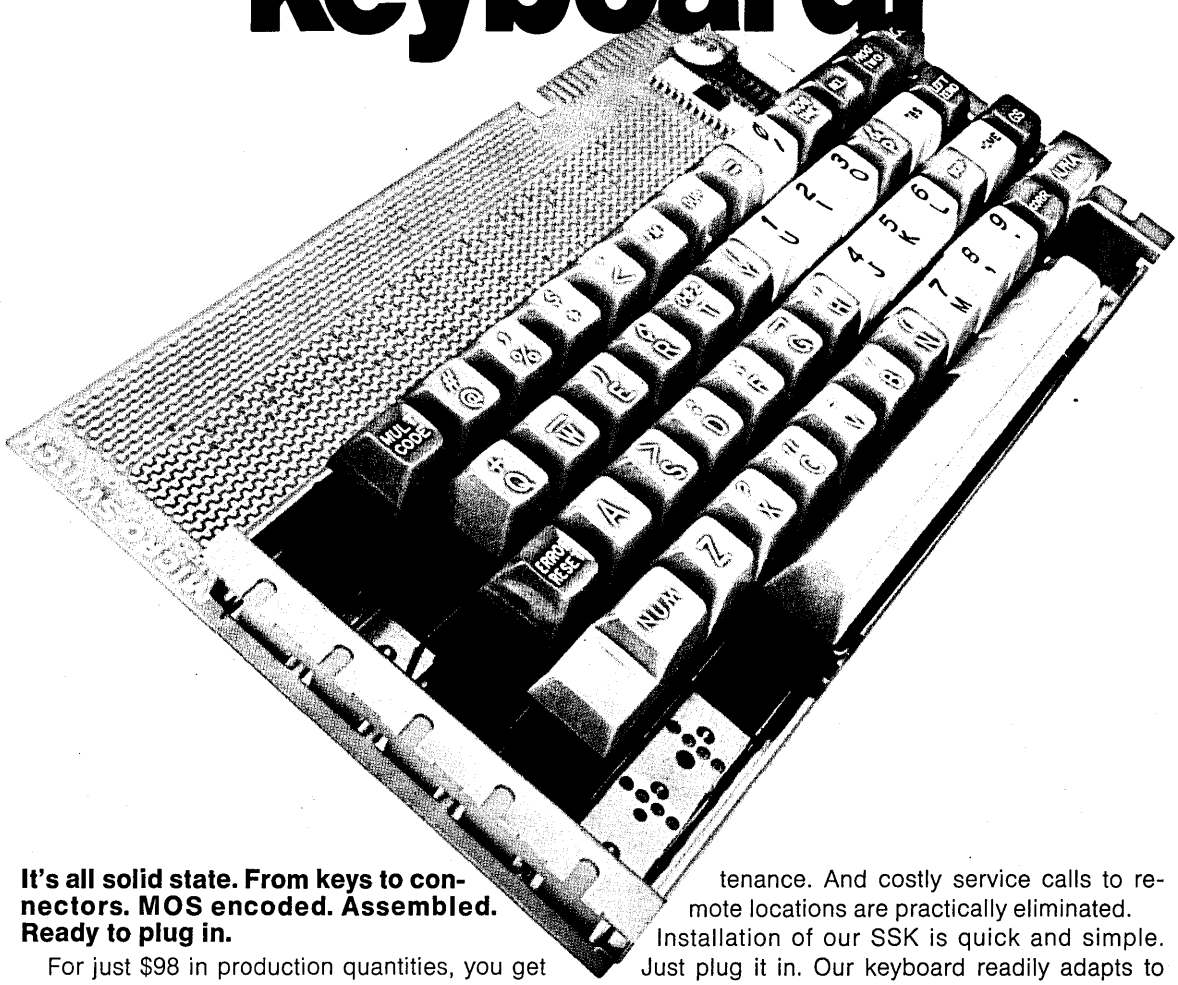

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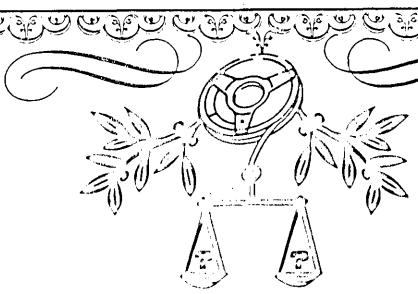
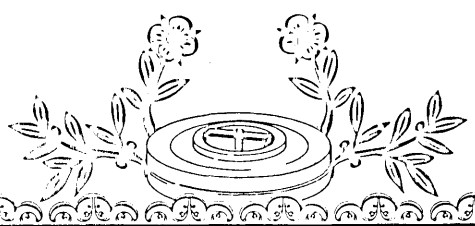


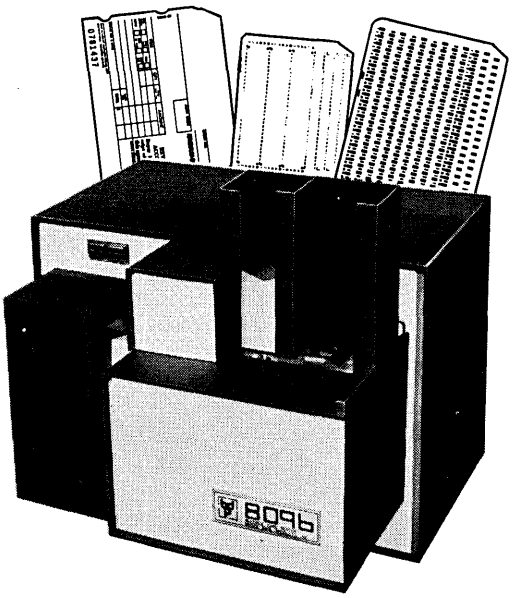
Programmer's Soliloquy

To summon the engineer or not—
that is the question.
Whether in this legacy of Babbage's fertile
brain
Some errant, failing part may yet be found
That thwarts completion of my ill-starred run
And makes a mockery of production schedules.
Or in the cryptic logic of that troubled task,
An ancient algorithm exhumed from ACM,
I failed to set a switch, initialize a laggard
subroutine,
Or overlay a segment of the niggard core.
Perchance, the dozing Operator, sleep-bereft,
Bestowed with leaden hand an unsought aid
And made himself the author of this
mountainous dump
Whose octal mystery shrouds an endless loop
And puzzles the mind.
Aye, there's the rub, for in that chartless realm
Of ill-conceived loops and motley patches
A mortal swain could scarce his earthly wits
sustain.
For who would bear the double-talk of manuals,
The analyst's wishful cerebration,
The deadline dates that fall a week before,
The bellowing salesman's mendacious pitch,
Or files forever lost or scratched when he,
himself,
Might yet his final End-of-the-job attain
By surreptitious alteration. But that the
thought
Of no recurrent paycheck must give him pause
And send him back again with darkened mien
To curse anew a damned and down machine.

William J. Wilson



How to cheat at cards, and win:



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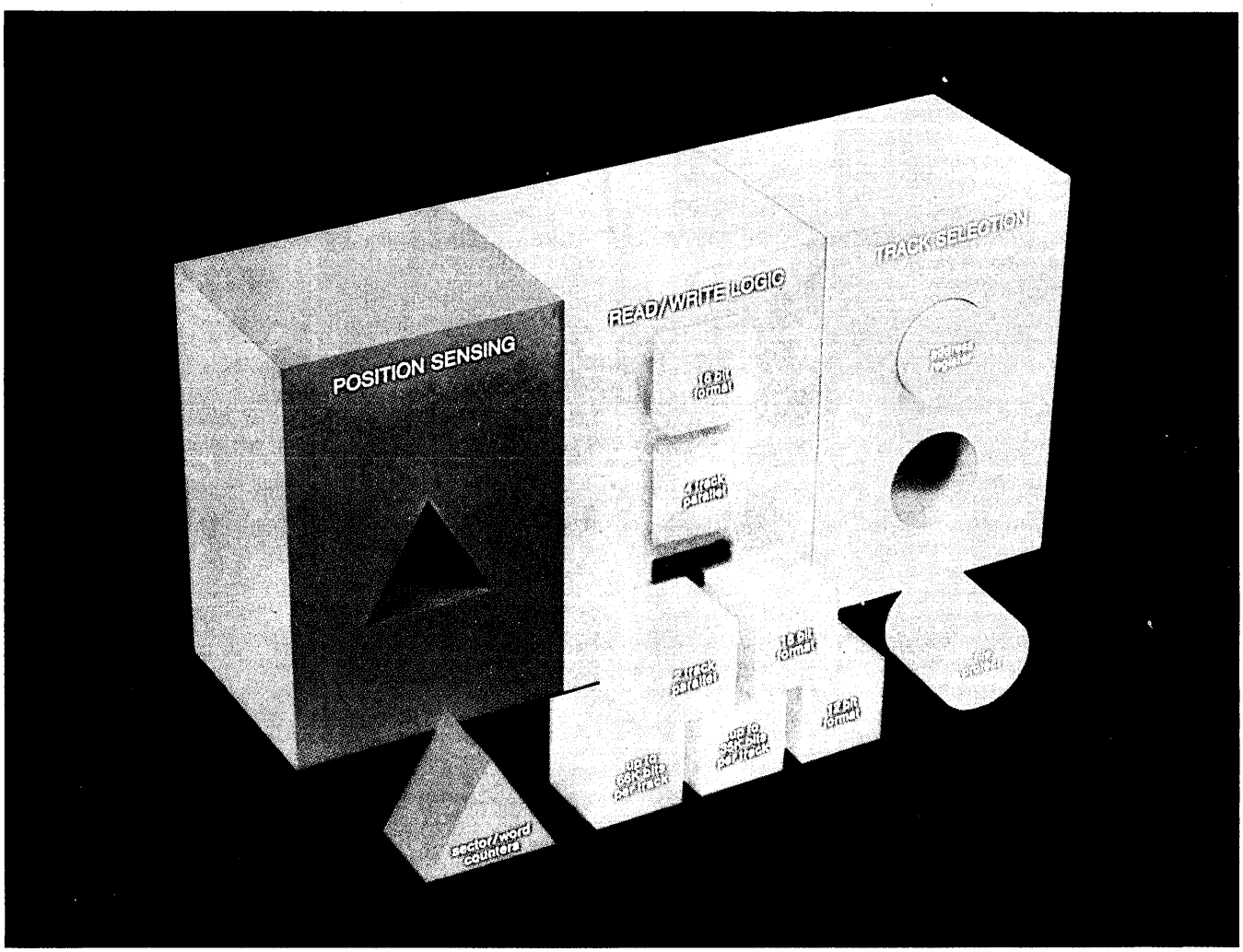
CIRCLE 87 ON READER CARD



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"Computers, Privacy and the Law" keynotes ho-hum joint conference of CIPS and CORS in Vancouver

Canada - Session '70

by Aubrey Dahl, Associate Editor

The 1,700-member Canadian Information Processing Society (CIPS) and the 700-member Canadian Operational Research Society (CORS) found out last year that each was planning a conference to be held in Vancouver, B.C., at about the same time in late spring of '70 and so they decided to join forces. The result was Session '70, the first and probably the last annual joint conference of the two societies. Attendance was around 700, a little disappointing to the sponsors, and the rather bland temper of the gathering was no match for the weather, which touched 88° in the picturesque port city.

The keynote address, entitled "Computers, Privacy and the Law," was given by Canada's Attorney General John N. Turner, a natty, handsomely graying man who is Prime Minister Trudeau's chief rival for leadership within their party. Opening the three-day affair, Turner spoke with concern and eloquence on privacy and what he termed the "computronic age," an unoriginal but necessary consideration on which the conference placed substantial emphasis.

He stressed the point that computer technology has far outstripped the law, which, he said, has yet to cope with the first generation of computers. The Canadian government is preparing legislation controlling electronic surveillance devices—wire tapping, transmitting olives in the martini and the like—but he said it would be about a year before there is enough information on computer surveillance for the government to act. He called on the industry to supply facts to the government before a policy is established, "a most un-Canadian procedure," he jibed.

He outlined a few guidelines for possible policy legislation. He said it does seem possible to argue that an individual has the right to limit the circulation of information about himself . . . in other words, the individual should have the right *not* to communicate, to "disconnect." A procedure for classifying information should be set up, he maintained, so that more extensive safeguards would be required for more delicate information. He recommended the development of a licensing and regulatory system to control information transfer technologies, and legal sanctions to guard against the "undermining of the system from within" by programmers and technicians who know the passwords.

At one point, Turner congratulated the computer industry for having become successful and grown-up enough to have consultants, and then told what is becoming a well-known story to illustrate the consultant's role. A neighborhood was up in arms over the nightly yowling caused by an active tomcat and his admirers and arranged to have the cat, well, arranged. Lo, a few nights later, the tom was back at the old stand with more noisy adherents than ever. When questioned by one of the irate neighbors as to how this could be, the cat replied, "When you have the know-how without the wherewithal, you become a consultant."

About the time Turner was speaking, the news broke that Canada had turned its dollar loose to find its own level in the world market. From a peg of 92¢ to the U.S. dollar, it climbed to 97-98¢ within the day and from then on it was dollar for dollar at the bars and restaurants, something of a blow to American attendees' (of whom there were only a few) hip pockets.

Another keynote speaker was to have been Dr. Alan J. Perlis of Carnegie-Mellon University on "The Direction of Research in Computer Science," but he fell ill the weekend preceding the conference and a last minute substitute was Dr. Butler Lampson of Berkeley Computer Corp. who talked about the large time-sharing computer, which Berkeley happens to be in the process of developing. It was hardly a keynote subject, but Lampson gave a good

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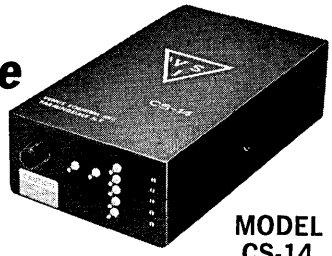

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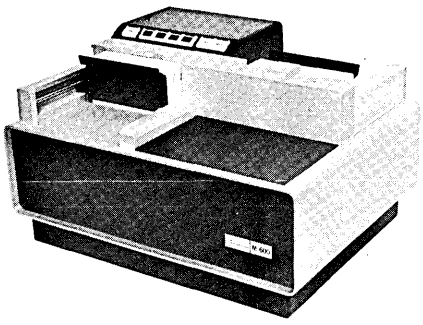

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CIRCLE 44 ON READER CARD

Canada— Session 70 . . .

overview of the tribulations of time-sharing in spite of an inattentive audience. Perhaps that's one of the reasons for the tribulations of t-s.

A panel discussion labeled the "hot seat" by the conference was supposed to elicit searching questions on the subject of management disillusionment with computers but, as at many conferences, the main aim of many members of the audience was to raise the question of technical (programmer) professionalism and how to establish and attain it. It was suggested, as at many conferences, that a special standards group be formed to deal specifically with that subject. It might happen.

Management disillusionment, when it did get the stage, was attributed to computers being oversold, not being used in the right places, and not paying their own way. One panelist observed that when computer people start playing management's game of profit and loss instead of doing simple accounting, management will become involved. Sounds sound.

The technical discussions were held at the Vancouver Hotel, while the product exhibits were at the Bayshore Inn, six blocks away (after an initial delay, the shuttle buses really shuttled). Of the 24 exhibitors represented, at least 14 were of U.S. origin, including IBM, Hewlett-Packard, Xerox, and Univac, indicating the continuing mutuality of the two countries. The exhibit area was small and hot and it didn't take long to tour it. Luckily, the bar was adjacent.

One novel exhibitor was a company called N.E. Thing, which was offering itself as a consultant in "imagination, sensitivity information, visual communication"—any thing, get it? The idealistic firm's motto is "Gross National Good," and that's hard to quarrel with.

During the conference, CIPS installed its new president, George Fierheller, president of Systems Dimensions, Ltd. (June, p. 189), Ottawa, and new vp, Dr. Jim Kennedy (who, with J. R. Roberts of CORS, did an admirable job of chairing the conference as last-minute appointees).

The CIPS organization will next sponsor its first "Canadian Computer Show" in Montreal Sept. 14-16 in conjunction with the Industrial Trade Shows Division of Maclean Hunter, and expects to sponsor the show on an annual basis thereafter. ■

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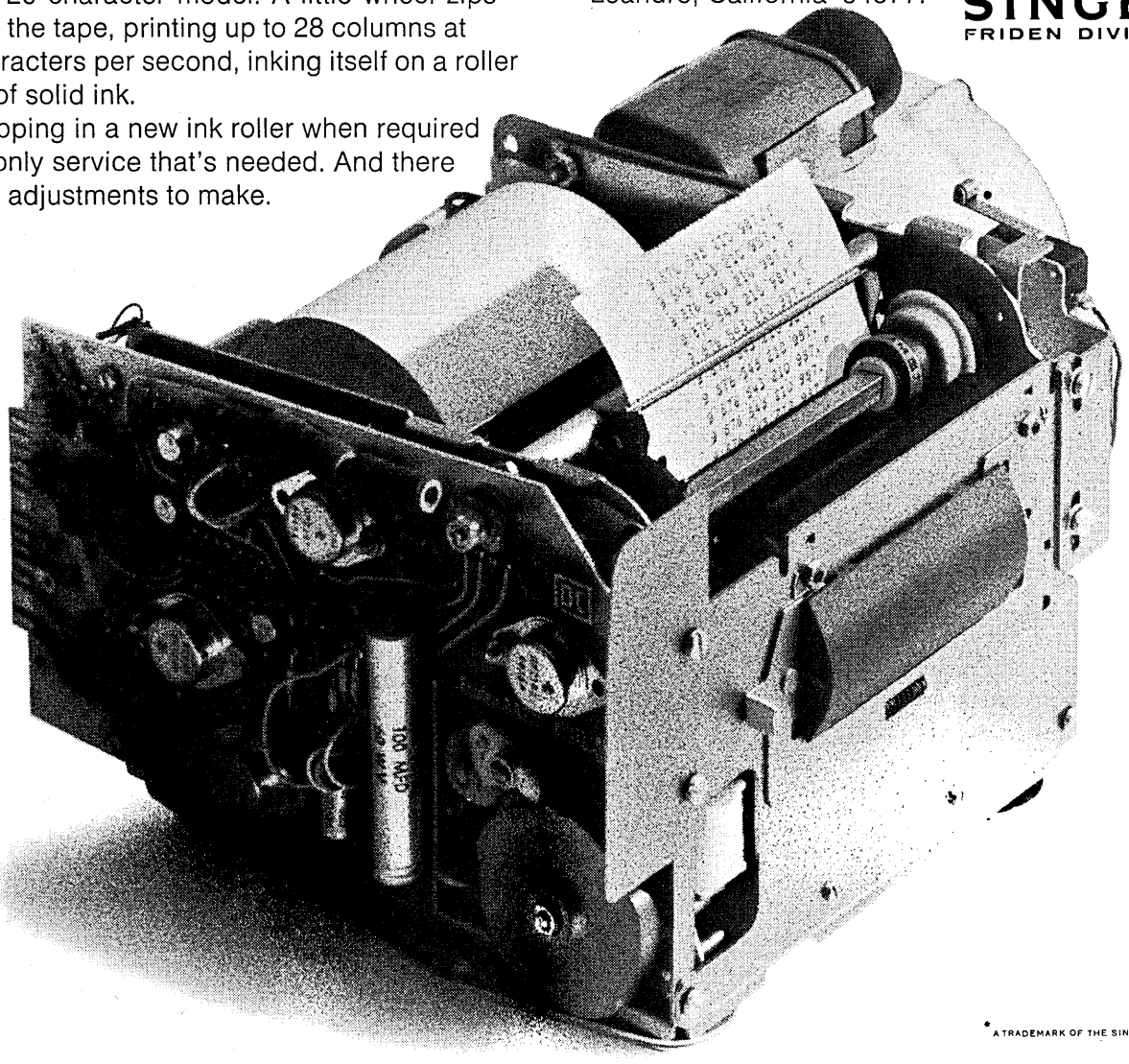

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CIRCLE 38 ON READER CARD

The Association for Educational Data Systems conference.

AEDS Meeting

Miss U.S.A. contestants and educators both converged on Miami Beach during the week of May 11. The educators were there for the 8th annual conference of the Association for Educational Data Systems. Despite the distractions, the 800 members attending the conference remained surprisingly faithful to the sessions and general meetings.

The theme of the conference was Education Through Technology. Most talked-about subjects in and out of sessions were the lack of funds, high cost of computer-assisted instruction and the need for clearer public understanding of computers.

Eugene V. Brock, chief of the computation and analysis division at the NASA Manned Spacecraft Center in Houston, talked about the new frontier in data processing as the "stockpile of information on technology, not just new equipment and new systems." He looked back at the 60's as the decade of improvement and looked at the 70's as the time to utilize that improvement effectively. To do this, he challenged AEDS members to avoid the costly duplication of doing what others have already done. "We [in the computer field] get more enjoyment out of re-inventing the wheel than any group. Quit re-inventing the wheel . . . Quit developing programs just because it's nice to develop programs! And quit doing the simple things we don't need to do!"

Brock recommended that the apparatus to share information be developed through groups like AEDS, the various state agencies, and users groups.

Florida's state commissioner of education Floyd T. Christian had the rapt attention of delegates when he talked of the "trouble with dollars." School boards, legislatures, institutional governing bodies are tightening budgets; federal government funds are drying up; and teachers are striking for more money. Needless to say, the data processing budget assumes rather low priority.

Computer-managed instruction is becoming teacher's pet. It handles the administrative problems of implementing individualized instruction, yet doesn't require interaction between student and computer. The process is much less costly and does help the teacher decide how to work with each student. The computer is used to extract and summarize data from student files to give the classroom teacher more comprehensive information about individual students and individual classes.

Two interesting CMI projects were described by Jim Gunderson, data processing director of Multnomah County Schools, Portland, Ore. Both projects started manually but did not become effective until automated. Interestingly, neither was originated by the computer center; input and output were defined by educators before the computer center was called in.

One project, DRIFT (Diagnostic Retrievable Information for Teachers), is a generalized software system that scores and evaluates a 6th grade diagnostic math test. Individual student profiles are prepared by analyzing the wrong response patterns. Then "significant weakness" statements are selected from a possible 200 within 14 areas of the curriculum. The classroom teacher thus receives data to use in day-to-day work with both individual students and groups with similar deficiencies.

The other system Gunderson described was a high school diagnostic math program. Brief tests are taken at the end of each two-week unit in 9th grade math. The computer analyzes five raw scores together with previous performance and recommends to the teacher the best of the 100 available units for the student to study for the next two weeks. These two systems are cited as typical examples of an important movement in educational data processing to help teachers gear their teaching to the level of their students.

Even though many exhibitors showed CAI systems, CAI took it on the chin in many of the paper reading sessions as being too costly and inflexible.

Over 30 exhibitors showed their education-related products. A few of interest were: National Computer Systems' new Sentry/70 mark reading system; Hewlett-Packard's time-sharing system for concurrent CAI and problem solving; IBM's new 1130 COBOL; and Honeywell's Dino-the-Dropout Dragon.

Each year AEDS conducts a computer programming contest for students in grades 7-12. The grand prize winner for 1970 is Charles D. Sorgie of Ward Melville High School, East Setauket, N.Y. Charles' winning program is "STOLAN—Self-Tutoring Oriented Language." Charles explained that STOLAN is a language developed to permit a closer machine-to-student relationship than either FORTRAN or COBOL. It enables the programmer to ask questions, accept answers, award points for correct responses, and obtain a close rapport between computer and student. Close in syntax to FORTRAN II, STOLAN has the ability to accept a response in sentence form and check for a given word or phrase. Charles received a $100 savings bond plus the all-expense-paid trip to the AEDS convention for himself and his sponsoring teacher, Mr. Rocco DiNapoli.

The banquet speaker, the Honorable William Davis, Minister of Education, Province of Ontario, Canada, urged AEDS members to approach technology with caution. He compared children and computers as both dynamic and both unpredictable. Children today must be allowed "to meet rather than confront computers. We must be the last generation with fears and phobias from respect and awe for computers. Everybody must have a basic understanding of computers and how to use them and of their dependence on human power."

Davis appealed to systems engineers to keep ideas coming and to educators to welcome suggestions with enthusiasm and make requests and countersuggestions. He concluded: "We must develop student-centered systems without jeopardizing that very perishable item—children!"

Some critical comments on the convention were heard: Sessions on the teaching of computing were scarce. . . . Participants complained that sessions were either geared to sophisticated university interests or were much too elementary. . . . Session speakers described what will be rather than what is; educators are interested in learning what is operational now. . . . Why isn't there more on PPBS and COM?

Next year's meeting will be April 13-16 at the Royal York Hotel in Toronto.

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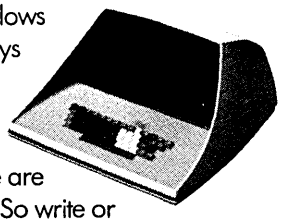

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CIRCLE 35 ON READER CARD

NEWS SCENE

IBM in the Mini Market — Would They, Could They?

The idea that IBM might announce a 16-bit minicomputer has been excellent fodder for the alarmists.

Could IBM become the Digital Equipment Corp. of the mini market? Of course it could, if it chose to, because of marketing strength and low production costs (another place to put the 370's monolithic IC rejects). But most experts believe IBM would use such a system to eliminate the weaknesses in its line, and not the competition.

The optimistic, going by history's lessons, feel IBM won't further aggravate the antitrust issue, will price high (say, starting at $15K), and will create new, or develop, markets the mini makers haven't the strength to cultivate. "If IBM creates a market, then takes a big hunk of it, that still leaves us with more potential business than we had before IBM did its missionary work," says one manufacturer.

As an A. D. Little Co. report has pointed out, the IBM 1800 and the lack of a low-priced intelligent terminal are among weaknesses in its line. The $50K 1800, aimed at industrial control, laboratory, and education applications, is considered an overpriced dinosaur by many of its customers. IBM's systems engineers have been telling these users that there won't be a special system to replace it, making the logical step a low-priced mini that can emulate 1800 programs and talk to 360s and 370s.

The 360/20 had tried to fill the remote terminal role, but its price and performance are no competition for what is on the market. It was also a poor contender for the small business market, and despite its success in numbers, competition was eating away at the IBM foothold until System/3 came around. The S/3 has communications ability, but it's not cheap enough to fill that bill either. Thus, experts envision an IBM attack on special markets — and further project that IBM will concentrate on big packages of one or more mini's linked to large-scale systems like the new 370s. Such an approach will also afford big, concentrated sales of SE and other unbundled services. One competitor says that if IBM advances the big package approach in untapped fields like industrial control, he'll be in there offering his "cheaper" mini's to interface with the 370s.

But what if IBM attacks the mini market across the board and prices cheaply? Or what if its customers eventually demand that it break out these mini's into stand-alone general systems? The potential impact of such a move would invite legal action, of course, although that would take several years to complete. An injunction is nearly impossible, legal experts say, needing proof of IBM intent to destroy competition and other evidence too complex to discuss here.

Any argument against IBM's entry into this market would probably be settled in a consent decree or court decision on the Justice Dept.'s antitrust suit. All this is very hypothetical now, but it is interesting to note that IBM is organizationally prepared to split off its small systems effort, should that need arise, just as it was with its time-sharing effort. Administration is in Atlanta for System/3 and 360/20, and the Boca Raton, Fla., plant handles most S/3 production. That organization could certainly be extended to handle a new 16-bit mini.

More Room for the SE's in IBM's 370 Marketing

IBM is trying to sell, directly and indirectly, more systems engineering time — if changes in policy and contracts incorporated in the 370 announcement are an indication.

A contract change aimed at softening the user's heart in signing up is elimination of the minimum of 18 hours' SE use within each three months. (The three-hour minimum for any visit remains.) The minimum for group workshops — four within six weeks — also is eliminated.

IBM also will allow the systems engineers to help out in computer sales at the customer's site. The previous rule was that SE's could help remotely but could be on site only for SE services. This was to prevent excessive sales use of IBM's force and to avoid accusations it was giving billable services for free.

Presumably the new measure will ease IBM's deployment problems, like having to transfer SE's to sales in marketing the 370s. On-site SE counseling also will make the SE more visible to the user, who may sign up more readily for the SE he knows planned the system.

(Continued on p. 67)

Eugene L. Lewis

What's claimed to be the first major Japanese computer system sold in the U.S. — a Fujitsu Facom 230-25 — has been installed in a display room at the New York offices of ASI Computers, by Computer Preparations, Inc., a computer room construction firm. ASI sells and services the Facom systems (April, p. 235).

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CIRCLE 75 ON READER CARD

System/3 customers also received a carrot. Rather than develop their own applications through the Applications Customerizer Service, they can hire SE's to do it at a fixed fee. Announced fees for four application packages — order writing and invoicing, inventory accounting, accounts receivable, and sales analysis — range from $1075 to $1525. This is about five to seven times the cost of using the Customizer, but it does trim programmer costs for budget-tight customers; and if they're smart, a group of them can get together and split even that minimal fee.

IBM-ADR Free Software Case Gets Court Hearing

Applied Data Research, Inc., and IBM are in court again chewing on the software industry's bone of contention — tie-in sale of manufacturers' software.

ADR claims it has found it impossible to market its ROSCOE program against IBM's free CRJE. It instituted action in late June and on July 7 got a temporary restraining order in U.S. District Court in St. Paul, Minn., preventing IBM from widespread distribution of its package. A hearing for a preliminary injunction halting IBM's distribution of CRJE, as well as other programs called CBJE and TSO, was scheduled this month (between Aug. 12 and 19). If awarded, the injunction will stand until resolution of the company's antitrust action pending against IBM.

IBM claims it proposed the restraints in the order, most significantly a clause that permits IBM to distribute CRJE to 30 users to whom it gave delivery commitments. IBM's attorney Thomas Barr also indicated that one point in his brief at the August hearing will be the argument that the software under discussion is system-controlled software. Thus it is an integral part of the processor and impossible to price separately.

Users seemed to be in IBM's corner. Some hinted they would offer to testify in IBM's behalf at the hearing.

All the packages allow job entry and retrieval and program testing in the conversational mode from terminals. The acronyms allude to this: ROSCOE — Remote OS Conversational Operating Environment; CRBE — Conversational Remote Batch Entry; CRJE — Conversational Remote Job Entry; TSO — Time-Share Option.

The ADR case is based more on restraint of trade through the use of tie-in marketing than on software characteristics, although they must prove the software is a separate product. It contends the Feb. 1969 announcement of CRJE (availability was scheduled for last June 30) seriously impacted the market for ROSCOE which had been under development since 1967 and was operational in October of 1969.

Although dismissing IBM's batch entry program (CRBE) as an interim program which attracted few users, ADR claims the promise of CRJE kept IBM 360 users from leasing its ROSCOE package. The Nov. 1969 announcement of TSO (to be available in the first quarter of 1971) extended the situation. "It made the user reluctant to buy ROSCOE and the company aware it couldn't sell its product," says ADR vp Martin Goetz. ADR then collected affidavits from IBM users attesting to this and filed its petition.

Goetz and ADR president John Bennett told a press conference last month they feel they have a stronger case now than when the company and Programmatics, now a subsidiary, tried for a similar injunction in May 1969. They say the affidavits demonstrate a strong market for ROSCOE and a serious threat to it from CRJE, unlike the case with PI SORT in the 1969 trial.

Besides, Goetz adds, the earlier action came before IBM sanctioned separate pricing of programs. He said ADR has invested $600,000, three years of development, and 10 months of marketing in ROSCOE.

ACM 70 Won't Deal in Milliseconds, Megaboredom

At its 25th National Conference Sept. 1-3 in New York's Hilton Hotel, the Association for Computing Machinery hopes to inaugurate a one-year dialog between those who use or are influenced by computers and those who make them.

Under the new theme, "Unconventional Convention," gone will be industry people talking to industry people. Gone, too, will be trade exhibits as well as "milliseconds and megaboredom," says the association's new president Walter Carlson.

Users, led by consumer champion Ralph Nader, the convention keynoter, have been organized into 17 sectors, each representing an area of application, including government, education, medicine, engineering, and earth resources. (Samples of sector activities start on page 25 of this issue.) Each will present its immediate and future computer needs. The industry, Carlson says, will be given an opportunity to reply a year later at ACM 71. The conference, he says, is "the first major attempt by a data processing society to interface with the cross-section of other disciplines and to identify the needs of the user."

The new theme extends to the exhibit section where some 12 organizations will restrict their displays to computer applications for society, including Honeywell's kitchen computer and TVA's electrocardiogram analysis network. The public will be invited to the exhibits for $2. Admission to the conference is $50; $75 for non-members.

B-R Places $39 Million Bet on Business Division

Bunker-Ramo Corp.'s new president George S. Trimble declared the company's Business & Industry Div. has the greater growth potential and has raised $39 million to prove it. Nine million of the money is from sale of the ailing Numerical Control Systems Div. and wholly owned Data Technology, Inc., to Allen-Bradley Co.; and $30 million is from a private placement.

Previously, B-R had planned a $20 million convertible subordinated debenture issue to fund implementation and support of the National Association of Securities Dealers Automated Quotation System (NASDAQ) for over-the-counter trading and its own Telequote brokerage communication service. The new financing is coming from an undisclosed group of insurance companies at "the most favorable rate" of interest, but higher, it's

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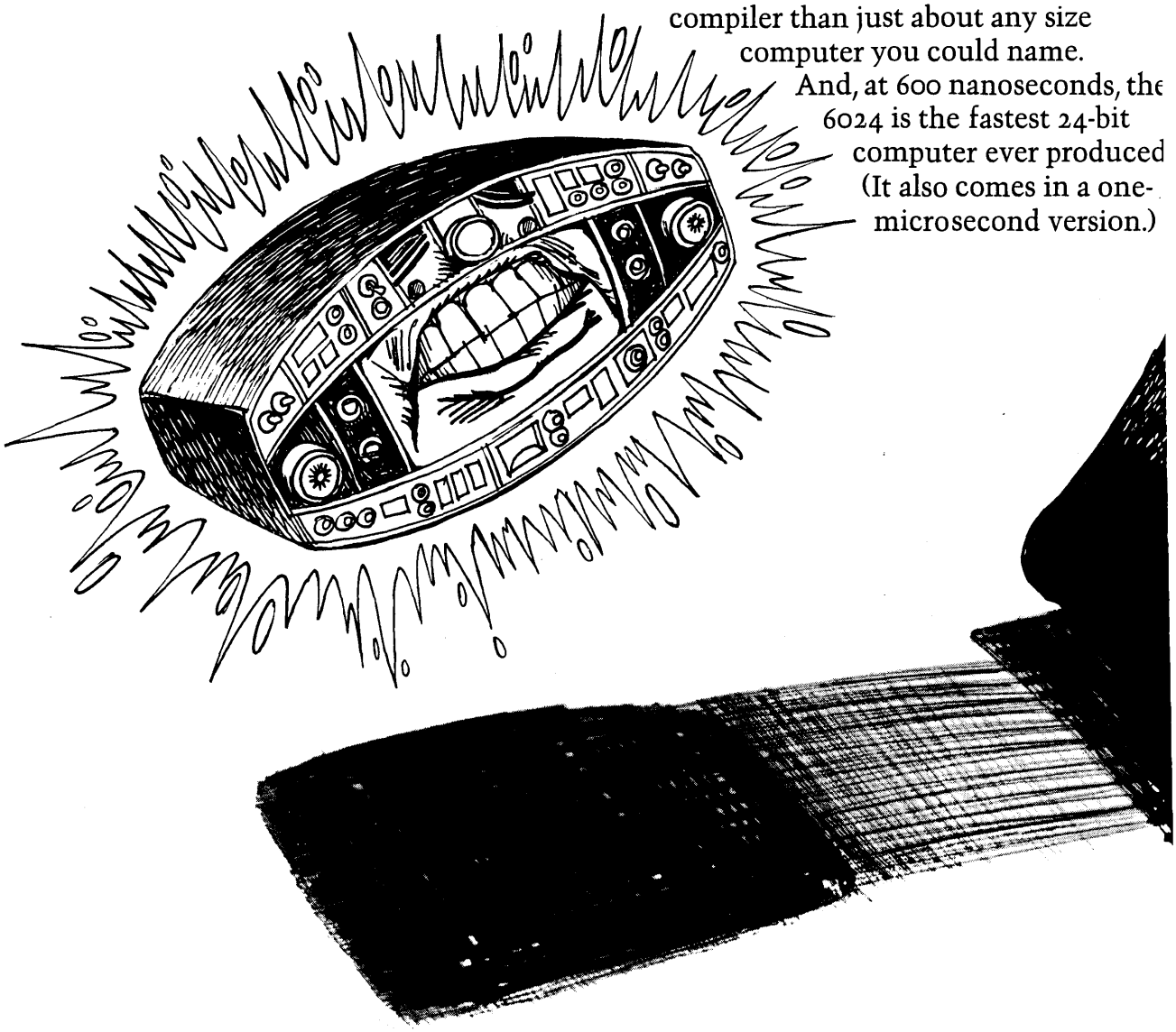
The 6024 is a brand new 24-bit computer. That's right, 24 bits. But not the kind you think.

Ours is a third generation machine with byte manipulation capability. It has a more comprehensive instruction set than any mini, and can compete word-for-word with most maxis.

The 6024 can recognize 594 operational codes. It offers floating point arithmetic and a bit processor as options. It's more expandable than any 16-bit computer on the market. It's easier to program and has a more powerful FORTRAN IV compiler than just about any size computer you could name.

And, at 600 nanoseconds, the 6024 is the fastest 24-bit computer ever produced (It also comes in a one-microsecond version.)

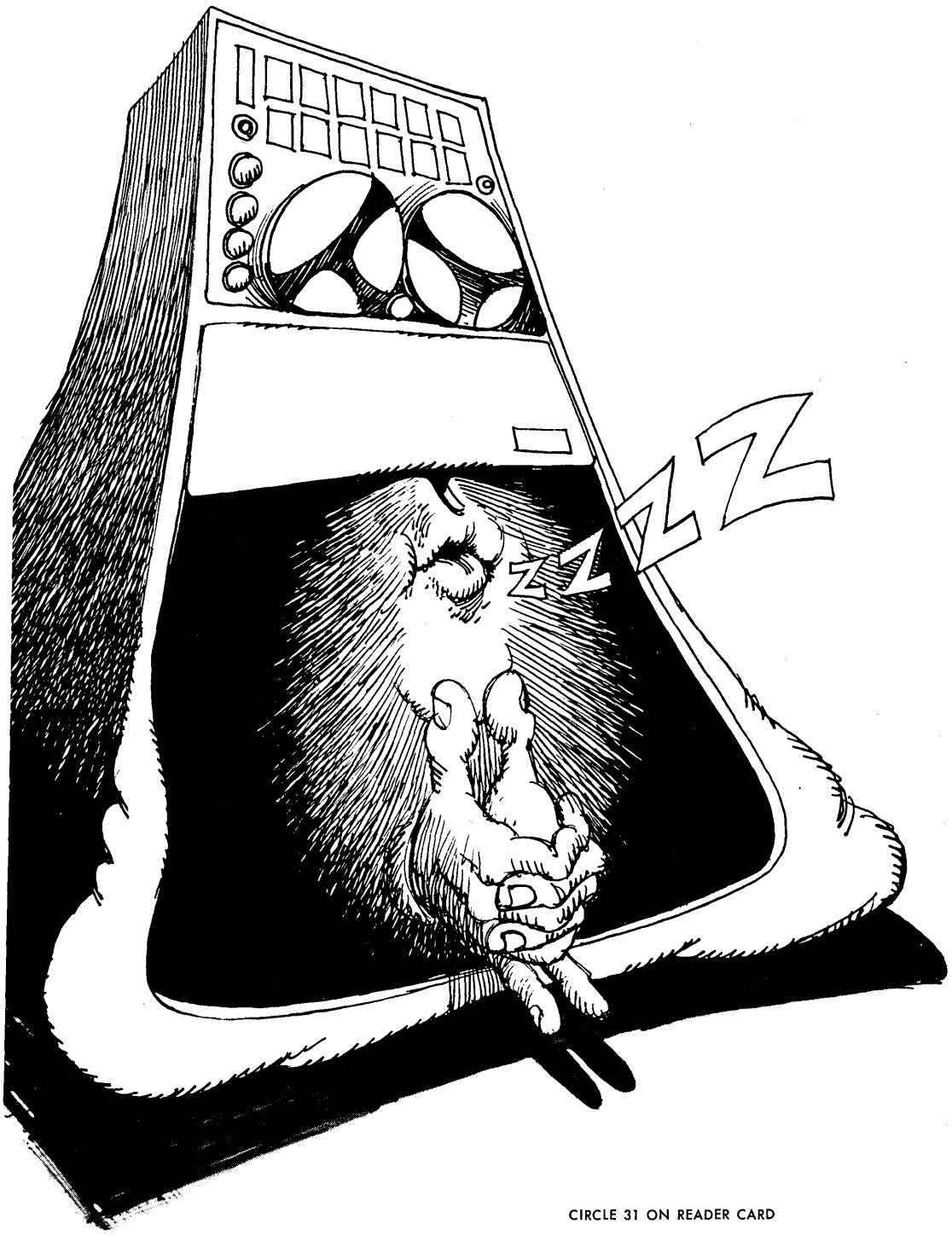


16 BITS CAN'T SHOULDN'T.

We could go on, but you probably get the idea: the 6024 is a much-needed computer that plugs the gap between too much and too little.

Write for a pocket-sized summary of our instruction set and a few other convincing details. **DATACRAFT**

P.O. BOX 23550, 1200 N.W. 70TH ST., FORT LAUDERDALE, FLORIDA 33307 / (305) 933-2651



CIRCLE 31 ON READER CARD

Attention remote terminals.

No remote terminal has ever enjoyed choosing a printer.

Mainly because there have never been any appropriate printers to choose *from*.

On the one hand, there were little typewriter-type printers that were much too slow for high-speed terminals.

And on the other hand, there were big superspeed printers that were designed for big superspeed computers. And they were much too expensive for terminals.

Those were the choices.

And if the terminal didn't like it, it was "Sorry, pal, take it or leave it."

Not much fun.

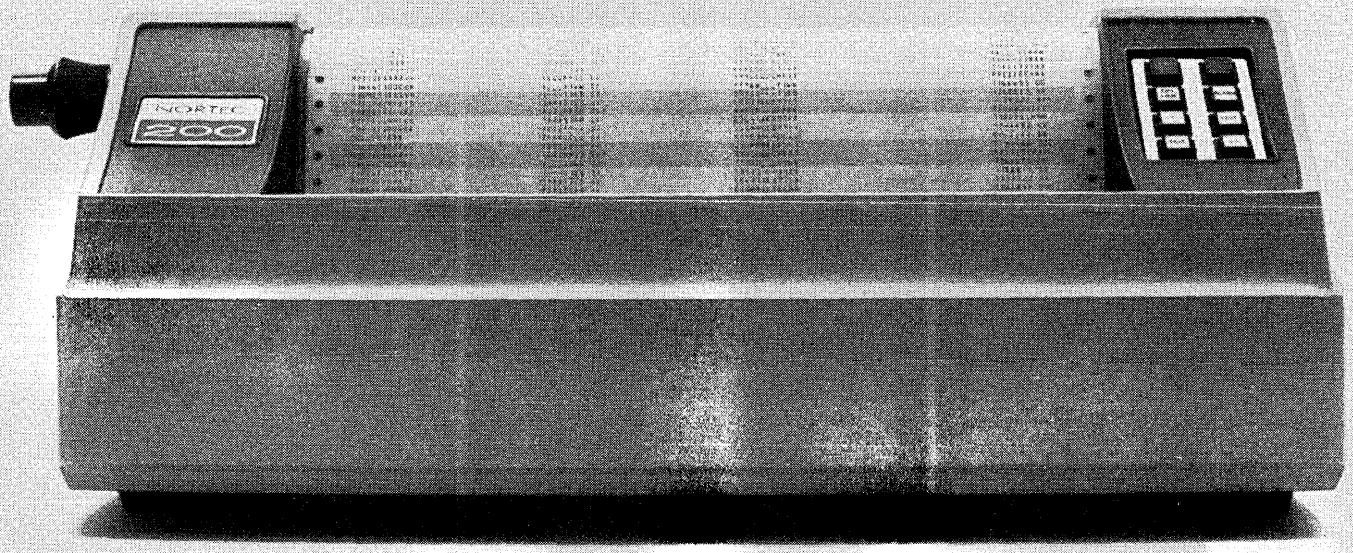
So if you're a remote terminal, you'll be glad to know there is now a printer that was designed specifically for you.

It's not too slow. It's not too expensive. It's exactly right.

So rejoice, terminals.

Rejoice.

Nortec's mini line printer.



Nortec 200 is 132 columns, prints at 200 lines per minute, produces crisp type on up to 6 copies. The entire unit, with all electronics including buffer controller, easily interfaced with any computer, is as low as $6000 in large OEM quantities. It's just a little larger than an electric typewriter. The $6000 price includes these standard features: IBM-compatible vertical format unit, front-opening yoke assembly for easier forms loading and ribbon changing, self-test feature for testing electronics and mechanism. Nortec Computer Devices Inc., a C+T Company, Southboro, Massachusetts 01772, 617-481-2500.

CIRCLE 37 ON READER CARD

learned, than the 8% prime rate.

In support of his claim that business systems are B-R's best bet, Trimble noted that there are 1,100 orders for the NASDAQ system. The dealers' association estimated only 750 users. The contracts in hand, according to B-R, are from OTC retailers and market makers. The securities buyers, who will access the system via B-R's Telequote III, and the Ultronics and Scantlin stock quote services, have yet to be approached for subscription.

Telequote V will be operational in late 1972. B-R has yet to sign the first contract for it, but has been negotiating with Merrill Lynch since before the system was announced.

The main reason for the financing, said Trimble, is the big outlay of capital needed to start up a service in which equipment is leased to the subscriber. However, NASDAQ, which becomes operational in January, is expected to generate earnings during 1971, and Telequote V will be making similar contributions by 1973. B-R earnings for the first half of this year are expected to be around $6.2 million on sales of $129.2 million. In 1969, earnings were $12.6 million on sales of $254.7 million.

Marketing Data Bases Said Not Yet Useful

"Systems concepts are inadequate to the problems of the marketing function," according to a Diebold Research Program study. "Many companies spend sizeable sums to develop technically impressive marketing data bases, information systems, and corporate models of all descriptions . . . but marketing men do not find the information useful." The study blames poor planning: "It is more important to plan the value side . . . than the cost side" when developing data bases.

To improve marketing information systems, the study recommends that "instead of printing huge quantities of data, only the exceptions should be compiled," such as salesmen failing to achieve quotas, sales activities exceeding budgeted expenses, markets in which the company is losing ground, customers with declining purchases, and product lines with slow sales or declining profit margins. The study points out that selected marketing data could be rapidly provided through a marketing data base.

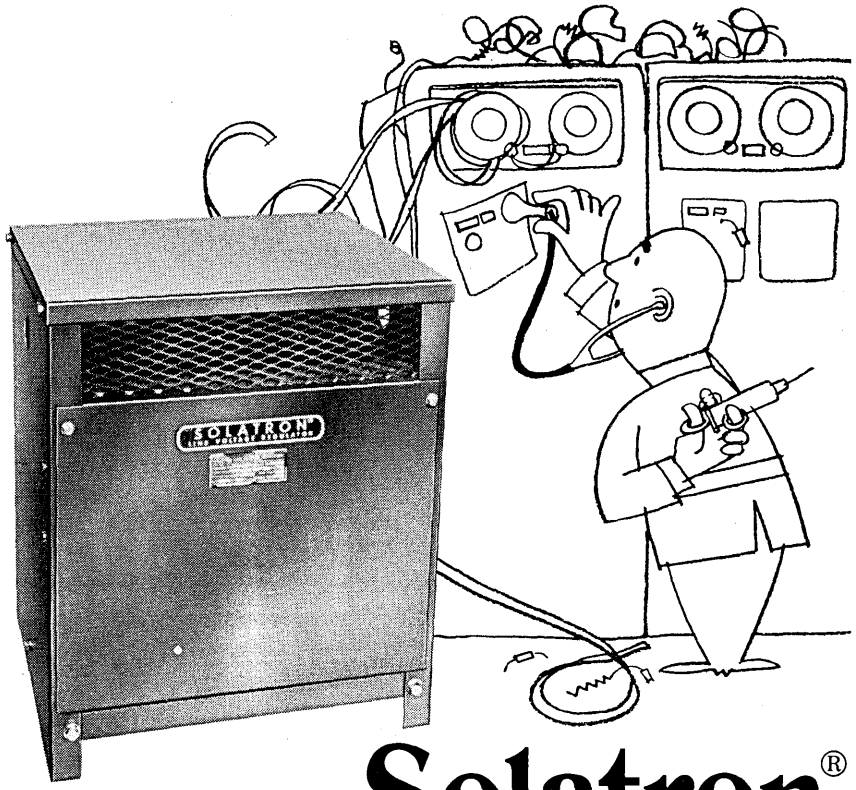
Finally, the study found that firms make more intensive use of available information in a period of business upturn. "The order of search in periods of decline is first toward costs that might be reduced and last toward markets that might be expanded."

ICL Software House Opened in Australia

ICL, the British computer company, finally opened its Australian software house with a staff of 10 on the campus of the South Australian Institute of Technology in Adelaide. The project was announced last year but was held up by the company's merger with

(Continued on p. 73)

Rx for Brownouts



Solatron®

Suffering from digit drops? Parity loss? Losing your mind over sick components and damaged circuit cards . . . not to mention total memory loss?

The symptoms show . . . *You've been exposed to input voltage dips and surges!*

Electrical equipment can cause severe voltage variations. Protect your EDP equipment . . . BE IMMUNIZED WITH SOLATRON®!

Designed for computers, Solatron regulators maintain an even line voltage input within ±0.5% for line changes. The fastest response time available, correction begins in the first half cycle with complete regulation taking place within 1/5 second.

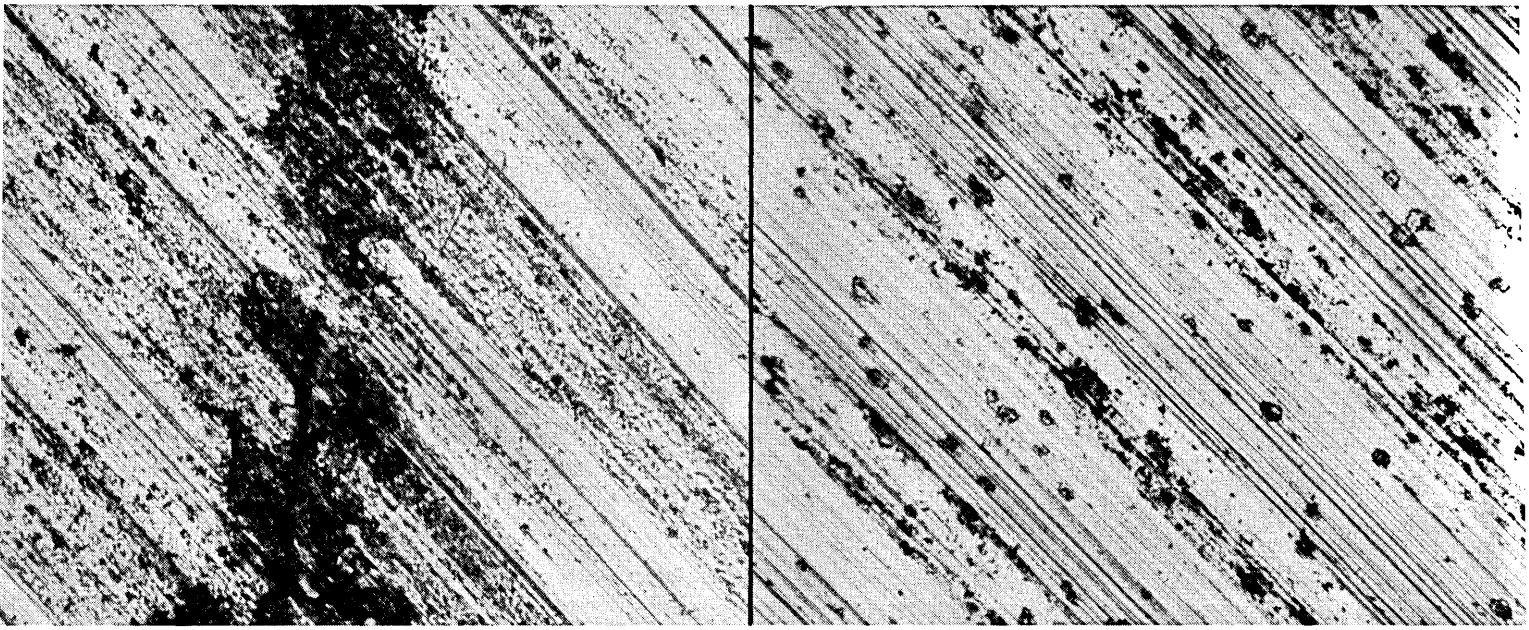
If your computer is getting up tight . . . we have just what the doctor ordered: SOLATRON® Call (312) 439-2800 or write: Sola Electric, 1717 Busse Road, Elk Grove Village, Illinois 60007.

SOLA ELECTRIC SB

DIVISION OF SOLA BASIC INDUSTRIES

CIRCLE 66 ON READER CARD

Our memory disc blanks give you new freedom from metallurgical flaws.



Others. Ordinary memory disc substrate (100x) after machining. Rough valleys show where stringers were "torn" out. Disc could be rejected—or corrected by excessive lapping or polishing. Otherwise, finished disc would be subject to high data dropouts.

Ours. New Kaiser Aluminum ultiMemory O-temper substrate (100x) after machining. Unique filtering minimizes stringers. Result: Lowest rejection rate in the industry for subsurface discontinuities. Finished disc can be expected to deliver minimum dropouts.

Our new ultiMemory™ substrate has the least metallurgical flaws of any memory disc substrate in the industry. We've effectively reduced stringers and oxides with a unique filtering process. And eliminated all surface protrusions to minimize your pre-sanding operations.

In O-temper, ultiMemory also is the flattest substrate available. Our special thermal flattening technique is the reason. This means you cut production time and costs. We deliver ultiMemory substrate in air-tight, heat-shrunk plastic packaging to keep blanks clean, scratch-free. And each "pack" weighs only 24 pounds which may be easily handled by women.

If you want to start cleaner for a smoother finish, use the reader inquiry card. Or write *the knowledgeable source* —Kaiser Aluminum, Room 2129, Kaiser Center, Oakland, California 94604.

KAISER ALUMINUM

CIRCLE 59 ON READER CARD

English Electric.

The operation is headed by Dr. Robert Northcote, a New Zealander who left the Univ. of Illinois where he was engaged in software development for Illiac IV. Northcote says the staff will be doubled by the end of the year and increased to 40 in September 1971 and to 80 by the end of 1972.

Called the Software Development Centre, it will have access to the Institute's new 1903A computer, and its first task is to modify the I/O generator for extended mode operation — a job expected to take four man-years.

In applications software, the center will investigate Australia's mining industry and the automatic composition of whole pages in newspapers for the country's printing industry. There also will be software research, since Dr. Northcote, through his association with Illiac IV, has a special interest in compilers.

1¢ Computer Sale — You Buy the Peripherals

In Australia these days you can buy a 4K Nova, HP 2114B or a MAC Jr. computer for a penny. Honest. That's the advertised offer by Information Electronics, the Sydney terminal maker and distributor of U.S.-made peripherals.

The catch: a customer must pay the shipping and landing charges and sales tax, plus buying a further $120,000 worth of equipment from Information Electronics — either its terminals or imported peripherals.

IE's president Malcolm Macaulay, who said his company will introduce a minicomputer before year end, admits the "sale" is a device to sell more peripherals. He had second thoughts about the clarity of the message when the first order came with a $4 check for 400 computers.

What's All the Noise About?

The National Bureau of Standards has been making a little noise lately about an investigation it conducted on hazardous noise levels in computer rooms. Although the NBS asserts that the investigation was begun because "Relatively simple errors by programmers have been blamed on high noise levels in computer laboratories" (can't you see them sitting there by the computer making errors?), anyone who has tried to make himself heard above the din of 24 tape drives making themselves heard knows the problem needs investigating and solving.

Headed by E. L. Corliss and R. D. Berendt, the probe established that in some computer environments the noise level can indeed exceed that considered safe for human tolerance. A range of about 130 decibels is detectable by the human ear, with ordinary speech pegged at 60 db's above sounds that are just at the level of audibility. The NBS determined that the noise level in some labs when the computer is in its quiescent condition (no reading, printing or punching) is about 80 db, which is bearable, but when things start whirring and clacking, the level rises to 89-94 db. Studies of medical histories of noise-induced hearing loss have shown "that a significant risk of damage to hearing exists if a half day's exposure to levels in excess of 90 db occurs with any regularity."

Corliss and Berendt propose several recommendations to reduce computer room noise, noting that coating the ceiling and upper parts of the walls with acoustical tile did little to alleviate the problem. First, they counsel quite sensibly that people should not stay around noisy equipment unless their presence is required. And it usually is. And then they list precautions that can be taken with the equipment, including covering all openings around card punches, readers and printers with lucite shields edged with rubber gaskets to effect an airtight seal; vibration mounting all drive motors and fans on rubber pads; and installing U-shaped acoustical enclosures around individual computers.

One observer has noted that most mainframe manufacturers don't provide good machine room layout advice, although all of them are working on lowering equipment noise. IBM, for instance, advises its users to consult acoustical firms to implement the generalized data it provides. At least, IBM's learned to cool it. It recently announced a hybrid air-liquid cooling system for the /195 capable of handling a total heat load of more than 300,000 BTU's per hour.

But keep it quiet.

Keep the Turned-On On Give a Computer . . .

Computing is "turning-on" kids to education — kids to whom education once was a dirty word.

Whether or not these kids will go into the field isn't important according to those who have made this discovery. "The important thing is they have been excited by the whole idea of learning."

The discoverers are people who have been running computer courses for underprivileged teenagers (give or take a year or two).

Some of these people, who are pretty turned-on themselves by their discovery, have managed to turn-on outside businessmen to the point of involvement in terms of donations of goods or services. And they're trying for more of the same.

One of them is Winston Doby, director of Project Upward Bound at UCLA. This project started in summer 1966 offering special training to 130 youngsters from three "ghetto high schools" with potential for college, taking them as sophomores and continuing with them through the summer following their high school graduation. They take credit courses at UCLA on weekends during the school year and as resident students for six weeks during the summer.

Doby added a computer workshop to the curriculum early this year using computer time donated by Call-A-Computer of Los Angeles. He followed this up with a summer workshop using a hook-up with Stanford Univ. The summer workshop cost the program some $5000 but, said Doby, "the educational impact was worth it . . . these kids are really turned on."

He managed to eke the $5K from his $148K per year HEW-funded budget by turning on local merchants who donated tickets and services, which enabled him to lop off his "recreational and cultural" allocations.

Another group, not so healthily endowed to begin with, has had some luck turning on business, but not enough to keep going after the end of

(Continued on p. 75)

Moore New Ideas for Data Processing

No mixing, no matching

There are some kinds of businesses where a company transacts several items of business for a given customer. Brokers are an example. Billing for a month's transactions opens the door for a great many errors. And matching up the transactions with the right customers is both tedious and expensive. Moore has a simple system that keeps transactions and customers and charges all together in one place and always current. Ready, envelope and all, for mailing. Ask about Idea #421.

Give computer a helping hand

Shipping data is accumulated at the tail end of a transaction. Which makes it difficult to program the data through the computer without a second run. Moore has a way to run the shipping papers through the computer and then add the shipping data by hand. Saves extra computer run. Gets shipping papers out much quicker and with less chance for error. Ask about Idea #422.

Keep parts lists current and error-free

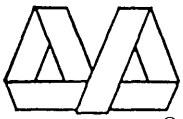
Where parts are both manufactured and bought from outside vendors, record keeping can be a nightmare. Especially with design changes and new models being introduced. Moore has a way to turn this task over to your computer so it is done quicker, more accurately, and at far less cost. It even lets you determine at a glance which parts come from outside vendors. Ask about Idea #423.

No clipping, no snipping

Be good to your clerical help. They hate snapping, clipping, snipping and decarboning the output from your high-speed printer. And, besides, this is the slow, expensive way. A Moore Decollator machine is a fast, economical way to separate forms and remove carbons. Other Moore equipment can automate the trimming, imprinting and other steps required in handling continuous forms at high speed. Ask your Moore man about them. Ask about Idea #424.

Refresher for business

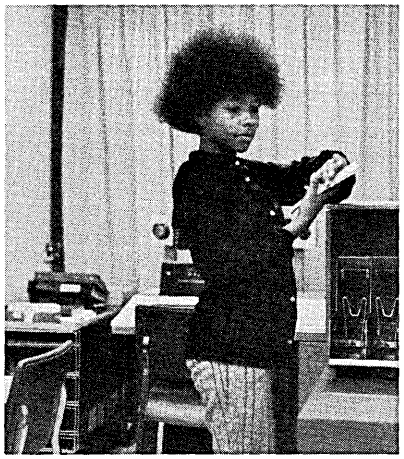
One fresh idea, a new twist on an old one, and a business can perk up. Moore ideas have a way of taking the tedium out of routine. A way of making things work smoother. Your Moore man has thousands of them. Call him. He's in your telephone book. One Moore idea may be what you need.



MOORE® BUSINESS FORMS, INC.

Over 675 offices and plants, 2618 salesmen in North America

this year. Computer Jobs Through Training is an inter-departmental project of the Univ. of California at San Diego. It got its start in summer '68 and subsequently was put on wheels thanks to a van donated by Safeway Stores and turned into a computer center by the instructors and students. Granger Morgan, founder and director, said the mobility was necessary because the minority population of the San Diego area is



From the inside the CJTT van-turned-computer-training-center looks like this to its "turned-on" students . . .

. . . and from the outside this is the face the mobile computer training facility shows the public.

widely dispersed and "you can't turn kids on by sitting them on a bus."

In addition to the van from Safeway, CJTT has received some instructor-salary support from Gulf General Atomic and some hardware from Xerox Data Systems, among others. But what they really need is a computer *and* a committment of $50-80K by Dec. 31. Currently they use a leased IBM 1130. To defray the $1200 monthly rental they have to unload the computer from the van several times a week to rent to laboratory users and this is too costly and time consuming. They're hoping for industry help in the form of a loan or grant of a small machine with card reader, slow printer and keyboard which is capable of running simple FORTRAN on its own and which also could act as a remote terminal to the UCSD B6500 for larger FORTRAN and COBOL jobs. And it must be rugged enough to withstand van mounting.

Any offers?

Standard Acquires CAC to Enter Time-Sharing

For more than two years, Standard Computer Corp., Santa Ana, Calif., has been building a large-scale, microprogrammed computer, the IC 7000, for Call-A-Computer, the Minneapolis time-sharing company which developed the software. Last month, with three 7000's installed, the arrangement grew into a marriage when Standard issued 1,090,000 shares to acquire Call-A-Computer, which becomes a subsidiary.

With the acquisition, Standard receives the company's six GE 265-based time-sharing centers, a sales organization of 40 in 11 cities, and management expertise.

CAC's chairman James G. Rude joins Standard's chairman Fred J. Howden, Jr., as co-chairman. CAC's president Warren Prince continues to head the time-sharing subsidiary which, with 550 customers and about $2.5 million in sales last year, is the nation's sixth largest conversational time-sharing organization. Prince said the CAC sales staff will have a major role in assisting Standard's 10-man hardware sales organization.

Joining Standard's board are Terrance Hanold, president of Pillsbury Co., and R. Payton Woodsen, chairman of Occidental Life of North Carolina. Pillsbury and Occidental owned 83% of CAC through a joint venture company, Pillsbury-Occidental. Chase Manhattan Bank owned the rest.

CAC next month will begin converting customers from GE 265's to the new IC 7000 at Minneapolis and Los Angeles centers. It will add a 7000 to the New York branch in January. Other branches are in Boston, Chicago, Indianapolis, and Raleigh, N. C.

Standard was formed in 1965 to make high-speed language independent general-purpose computers. Twelve of its earlier models — IC 4000 and IC 6000 — have been installed. The only 7000 installations are the three with CAC.

MERGERS, ACQUISITIONS

Another photocopier concern has gone the way of computers because it believes "there will be opportunities for technical capability for direct interaction between computers and copying machines in the next few years." **Saxon Industries, Inc.,** NYC manufacturer of Copystat and distributor of packaging and paper products, has made a deal to acquire **Multidata Corp.,** Westminster, Calif., minicomputer maker. Until Saxon decides just how to apply Multidata's system-oriented expertise, that company will continue the same operations under the same management. . . . When **Compucare, Inc.,** Chicago, acquires **Executive Data Systems, Inc.,** Cedar Rapids, Iowa, it says it will be serving more hospitals than any other such firm in the U.S. and that the resulting unified accounting and patient-centered systems will be a budgetary blessing to medical facilities that now spend up to 40% of their budgets on information handling. . . . Dp centers are being shuffled like cards in a deck this summer: **Tab Products Co.,** Palo Alto, sold its Data Input Center division to **United Financial Data Centers, Inc.,** Detroit. The Tab centers, admittedly not yet profitable, are in Seattle, L.A., Chicago, Atlanta, Miami, NYC and Detroit. Tab will now "concentrate its effort in the development of products, as opposed to services, for the dp industry." . . . **Datatab, Inc.,** NYC, added a West Coast data center to its other two at home base and in Chicago by buying **Marshall Data Processing Center,** in the L.A. area, for cash. . . . Down in Santee, Calif., near the Mexican border, **Information Machines Corp.,** deviser of

(Continued on p. 79)

Wiltek moves data communications three steps forward

Step 1: A modern replacement for paper tape store-and-forward devices. Step 2: A way to increase the efficiency of CRT data entry systems. Step 3: A way to make distributed storage practical and economical. Wiltek's new Digi-Store® line of buffers helps achieve all three.

The concept behind Wiltek's new buffers is simple. Take an endless loop of magnetic tape. Pass it through two heads, one to record data, the other to read it. Make the tape drives capable of operating at the same time, at different speeds. Provide a wide range of options to interface with other components in a data communications system.

The results are dramatic: low cost data-storage and buffering units that can receive data at one speed, and send it at another — simultaneously.

That can receive and transmit up to 333 8-bit characters per second.

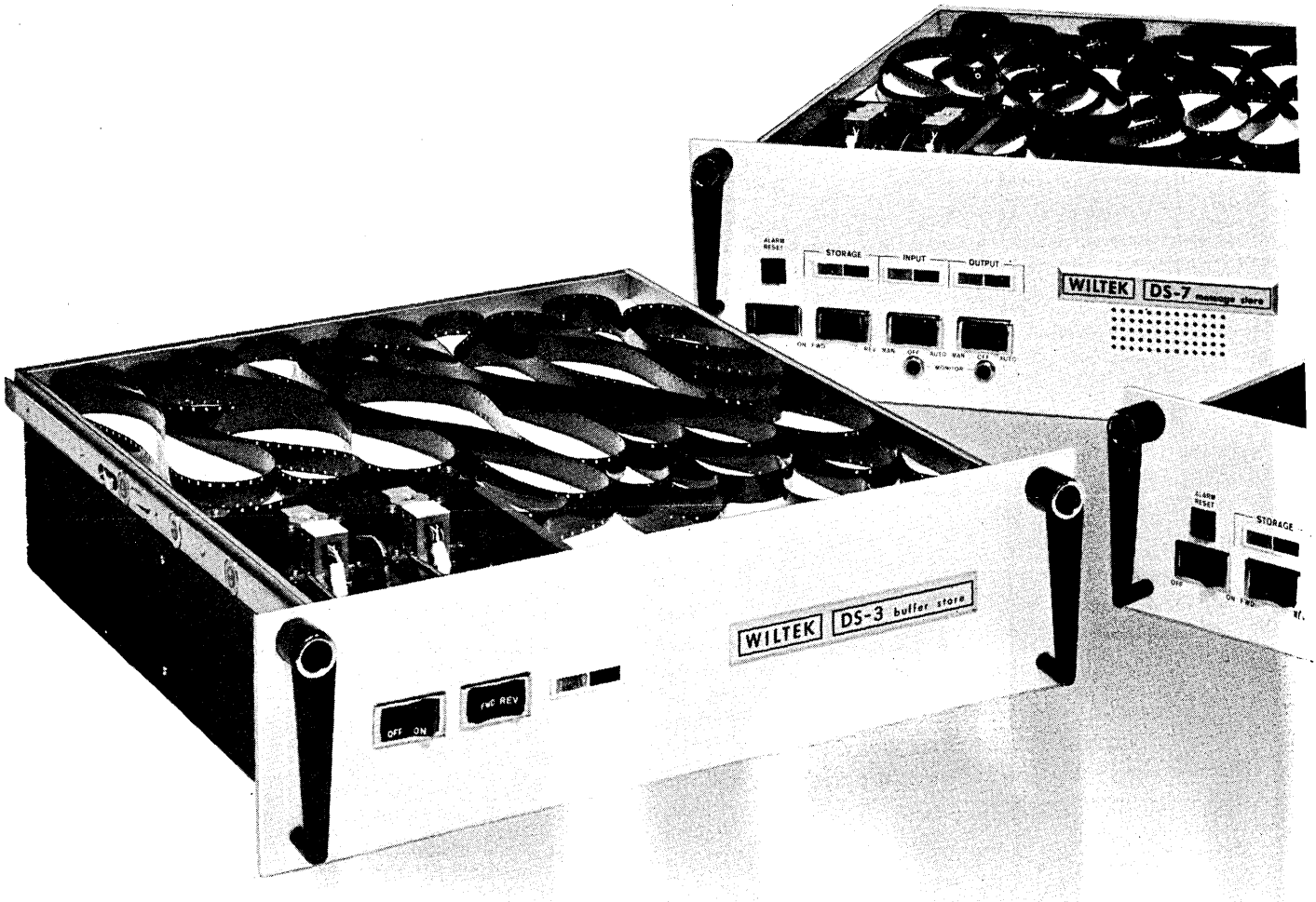
That can store data for less than a penny a bit.

That can record over 50,000 characters on a long lived, reuseable loop of tape.

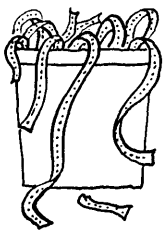
That can operate totally unattended, with high reliability and low maintenance.

As store-and-forward devices: The great replacement.

Probably the most familiar store-and-forward devices are paper tape



units. Many are 30 years old, and show their age—bulky, chad-strewn machines that are the weak link in modern data communications.

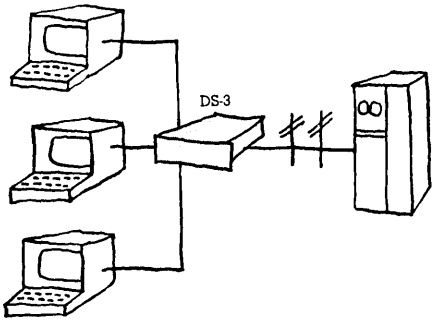


Wiltek Digi-Store units are markedly superior, yet competitively priced.

The Wiltek buffers can handle 5, 6, 7 or 8 level code . . . fit neatly into drawers or racks . . . are quiet and unobtrusive . . . seldom need maintenance . . . operate at an error rate of less than one per million characters. What's more, they're plug-for-plug compatible with communications systems currently using old-fashioned paper tape equipment.

With CRT's: Breaking the bottleneck.

For many CRT operators, waiting is a way of life. They enter data, then sit idle, waiting permission to transmit. Wiltek's Digi-Store buffers introduce a completely new way to enter CRT data, and an economical way to break this bottleneck. Here's a simple example.



Instead of waiting for an OK to transmit, CRT operators free-wheel their data on a message-by-message basis to a Wiltek buffer-store. The data is called out of the buffer on either a single- or multi-message basis by the receiving device. The receiving unit can call data out of the buffer-store at one speed at the same time that the CRT operators are putting data into it at a different speed.

Result: Data entry and data reception are independent of each other. Operators enter data whenever they wish. There's no hand carrying of data, and no frustrating delays. Data flow is completely automatic.

Distributed storage: Making it practical and economical.

Until now the trend in data communications has been to allocate areas of central storage for on-line buffering of incoming data from all terminals in the network. This centralized storage approach suffers from two basic problems: First, a breakdown in a single system component can cause all of the input stations to be out of service. Second, during peak periods a queue may develop which results in lower throughput and higher line cost.

The Wiltek Digi-Store line of buffers changes all that. The Wiltek units are economical enough to be installed at each station where data originates. They can hold data until the computer polls and asks for it. And, should one station go down, all the others in the distributed system can continue sending. Line costs are reduced by transmitting data in bursts. Should a message to the computer be garbled, a buffer can swiftly re-transmit it.

Wiltek makes three Buffer-Stores.

- **The DS-3** is the basic unit for store-and-forward applications and data entry systems.
- **The DS-6** provides polling or call selection for selective calling networks, or for linking computers.
- **The DS-7** supplies both polling and call selection for communications between two selective calling systems, or between computers.

Wiltek has just published a booklet covering this remarkable new family of buffers. It shows in photos and diagrams how they work and how they can help solve data handling problems in a broad range of EDP applications. For your copy, simply mail the coupon, circle the magazine reply number, or call directly — Area Code 203-762-5521.

wiltek
makes the Digi-Store line

Wiltek, Inc.
59 Danbury Road
Wilton, Conn. 06897

Please send me a copy of your booklet on the Digi-Store buffer line.

Name_____

Title_____

Firm_____

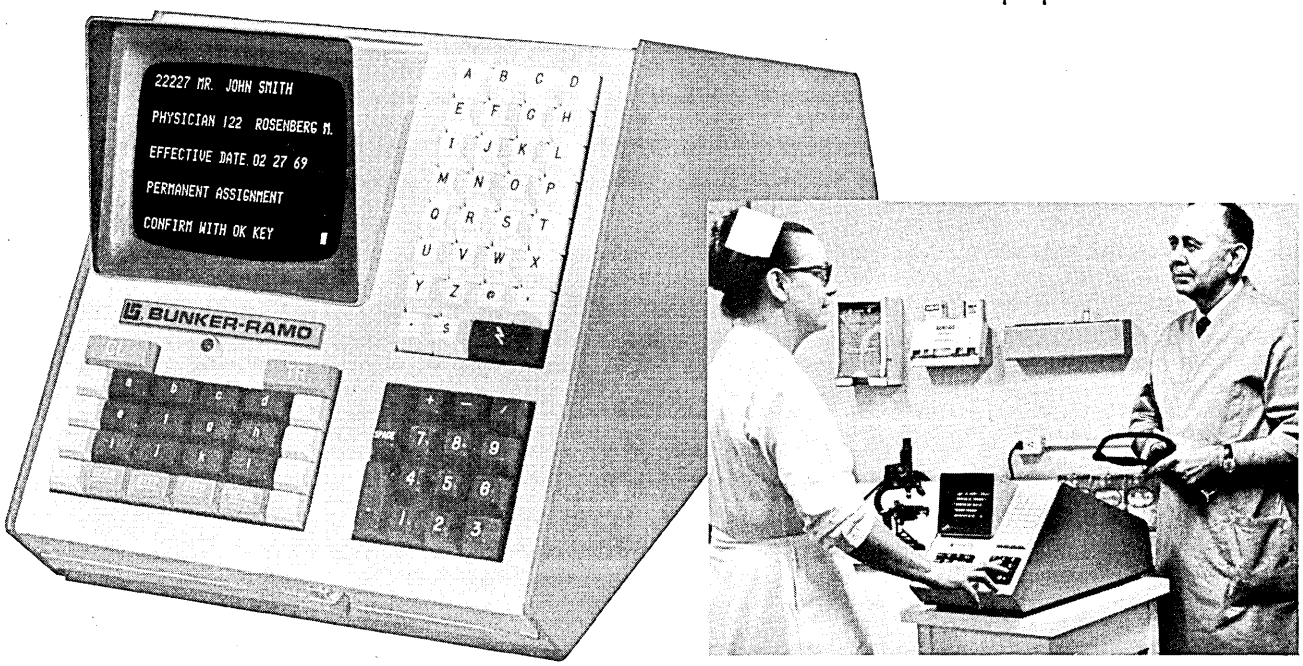
Street_____

City_____ State_____ Zip_____

CIRCLE 30 ON READER CARD

good medicine

This Bunker-Ramo terminal saves money while freeing doctors and nurses from excess paperwork.



It can be good medicine for your organization, too.

This system, for a hospital in Hartford, Connecticut, replaced slow card-input batch communication with their computer. Bunker-Ramo CRT's put doctors, nurses and administrative personnel in direct, real-time, instantaneous contact with patient records in the hospital's IBM computer.

Two types of terminals are in use. One has a block-alpha keyboard (unique to Bunker-Ramo) which speeds the "hunt-and-peck" messages of non-typists at the nursing stations. The other has a standard typewriter arrangement for fast typists in the administrative departments.

All entries are visually verified and edited on the terminal screen before transmittal. Answers to information requests appear on-screen in seconds.

Bunker-Ramo has more experience putting people in visual contact with their computer data than anyone else. Let us show you systems we've built for hospitals, utilities, stock exchanges, manufacturers and businesses of all kinds.

For information, contact Mr. Guy Mallery, Vice President, Business & Industry Division, The Bunker-Ramo Corporation, 409 Fairfield Avenue, Stamford, Connecticut 06904. Phone (203) 348-4291.

The real real-time people.

THE BUNKER-RAMO CORPORATION

® Business & Industry Division

CIRCLE 73 ON READER CARD

NEWS SCENE

REGISTRON, a point-of-sale system, agreed in principle to acquire **Century Computer,** of Elk Grove Village, Ill., so it can count on communication and processing facilities in the Midwest to service IMC terminals. Century has centers in Milwaukee and Chicago, also in the South.

NEW COMPANIES

Dp companies looking for financing, and investors ready, or at least willing and able, to finance them are being brought together by a specialist organization, **Capital Structures, Inc.,** which has been set up in White Plains, N.Y., by a couple of experienced principals: Peter Heller, former director and senior vp at Walter Heller, and John S. Ransom, a former member of IBM's corporate marketing staff. Says Heller: "Tight money and uncertain economic conditions have cast an entirely different light on the funding of new and emerging companies, as well as those companies seeking to expand ... Emphasis (is) shifting back to the more traditional source — the private investor." ... Reducing the "high and growing" costs of dp users is the goal of **Paradyne Corp.** The company, hq'd in Rockville, Md., with engineering and production facilities in Clearwater, Fla., plans to market high-speed communications modems and electronic systems.... **North American Rockwell Microelectronics Co.,** now separate from the Autonetics div., is starting operations with a $30 million contract for devices to be shipped to Osaka, Japan (the Sharp Corp.), and a total backlog of more than $60 million. This, the company claims, makes it — overnight — the world's largest manufacturer of MOS/LSI circuits.... A special consulting service for minicomputer users, **Logos Designs, Inc.,** has been started with laboratory and office at Port Jefferson, Long Island. Its founders have had 20 years' combined experience in minicomputer applications.... A firm that plans to promote the general welfare, **Government Studies and Systems, Inc.,** has been formed in Philadelphia. Its executives, including director Charles P. Cella, are mostly from the Univ. of Pennsylvania's Government Studies Center. The group is affiliated with Mathematica, Inc., which conducted the ongoing study of guaranteed income of welfare recipients in N.J., Pa., and D.C. for the OEO.... Potter Instrument has started two subsidiaries to handle its peripherals business: **Potter Data Products Corp.** for leasing, and **Potter Data Products Service, Inc.,** for maintenance to users and oem customers. Both are hq'd at Plainview, N.Y.

NEWS BRIEFS

Leasing Firm Firms Up

All bets, lawsuits, counterclaims, insults and mergers are off at Levin-Townsend (April, p. 216, etc.). The financially beleaguered computer leasing firm has managed to reach agreement both with IBM and its own ex-president, Howard Levin, to settle the $49 million debt owed the computer manufacturer and to take Levin back into the fold as chairman of the finance committee.

IBM will hold virtually all of the assets of Levin-Townsend as security for the debt and has agreed to withdraw notices of repossession that were sent to three L-T customers.

Levin has withdrawn his suits against both IBM and L-T, and will remain a member of an expanded nine-member board that will include four outside directors. Townsend will remain president.

The end?

Mission Possible?

AFIPS is looking for five mission-minded people with PhD's in computing, and possibly would accept some who are on the verge of getting their doctorates, to be good Samaritans in dp development to countries in Southeast Asia, the Middle East, Africa and Latin America. The idea is to grant them each up to $2000 to travel to the designated country, which supposedly would provide "basic sustenance" to the candidate after he or she arrives. The intern could then serve that country by teaching and helping with systems and applications programming, hardware, and logical design. Participation in cultural activi-

(Continued on p. 83)

Litton DATALOG's amazing new MC 1000 Military Strip Printer weighs less than 5 pounds — with the power supply! At speeds up to 100 alphanumeric characters per second, with measurements of only 3 x 3 x 8½" and a disposable paper cassette, the MC 1000 is the lightest and fastest Military Strip Printer available.

The printer is qualified to MIL-E-5400 and is ideal for hard copy readout in applications such as airborne integrated data systems, field and command communication and mobile communication systems.

The MC 1000 contains only one moving part, thus making it incredibly reliable. It consumes an average of 45 Watts and is available with or without the power supply.

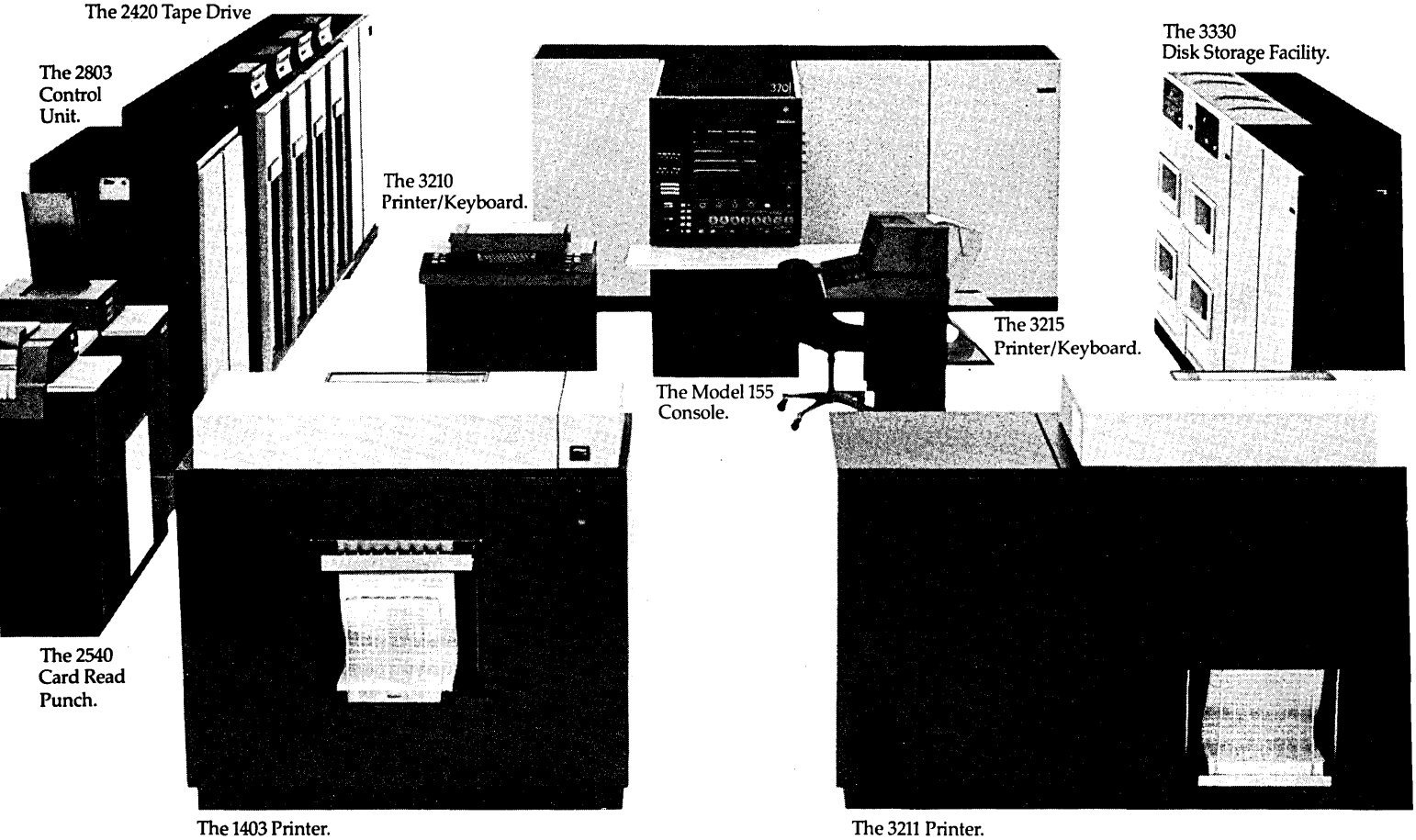
This printer far surpasses any other Military Strip Printer on the market for speed, reliability, lightness and quick loading. Call or write DATALOG for further information:

DATALOG Division, Litton Industries, 7801 E. Belleview Avenue, Englewood, Colorado 80110; A. C. 303-771-2010.

DATALOG DIVISION
LITTON INDUSTRIES

CIRCLE 53 ON READER CARD

The 370.



IBM System/370: the computers for the seventies.

This is IBM's new System/370.

It's designed to give you a lot more computing.

Yet it's compatible with System/360.

Which means you can install System/370 and still keep using most of the same programs your programmers have written. And still keep using the same terminals. And the same instruction set.

Which also means if you're now using System/360, you can easily make the move up to System/370.

More work, less time.

The key idea behind System/370 is speed and throughput. We've speeded up the computing process. And not just a little bit, either.

Compared to System/360's central processing unit, System/370's is 2 to 5 times faster internally.

The result is you get more computing.

Model 155.

On the left, you see System/370 Model 155.

If you're now using Model 40 or 50, it's the natural system to grow to.

Model 155's internal speed is 3½ to 4 times faster than Model 50's.

It also has more channels (6 in all) and the widest range of core storage ever offered by IBM on a medium-sized system. From 256K to 2 million bytes.

Model 165.

If you're now using Model 65 or 75, you can easily grow into Model 165.

Model 165's internal speed is 2 to 5 times Model 65's. It also has more channels (12 in all) and a remarkable range of core storage. From 512K to 3 million bytes.

Both models use a high-speed buffer that dramatically reduces the time it takes to get at stored data.

A file, a file and a printer.

To keep up with speeds like these, we've developed some of the most sophisticated input/output devices to go with the system.

First, there's a new high-speed disk file (the 3330). It can hold up to three and a half times more information (800 million bytes) than our current files. And it can transfer it up to two and a half times faster. This file alone can significantly increase performance.

Then there's a fixed-head, high-speed file (previously available with System/360, Models 85 and 195). It's for people who want fast access to even more data than the large memory can store.

In its own way, it's an inexpensive extension of your computer's memory. It, too, can feed data into your computer at incredible speeds.

Finally, there's a high-speed train printer (the 3211). It prints letters and numbers at the rate of 2000 lines per minute. It's the fastest printer we've ever made.

Easy installation.

We've already told you that with System/370 you don't have to convert most existing programs. Or develop new sets of instructions.

All of which makes System/370 easy to install.

But there's another reason why System/370 is easy to install. We're using monolithic circuit families. You get more computing per cubic foot.

Certain Model 155 configurations actually take up less space than Model 50.

We support the system.

We realize our job isn't only making computers. But also making sure you get the most out of them.

So we intend to make available the best possible services to support System/370.

Our systems engineers are available to help you get ready for System/370.

They can work with your own people to smooth the way for its arrival. And at the same time, tailor the system to solve your particular problems.

Our computer programs for System/370 are, by and large, the same as those we offer for System/360.

The same holds true for our education courses. There are over 70 to choose from.

Our products change.

But our philosophy doesn't.

We want you to get the most out of your computer system.

IBM

the MSI-100 speaks out.

The MSI-100 system includes a terminal, acoustic coupler, polling device, and receiver. This provides a complete electronic data recording and transmission between remote sources and a central location. The polling option, with the automatic answer bar, allows for unattended terminal operation.

The terminal records numerical data on a magnetic tape cassette. The data is then transmitted over dial up phone lines to a receiver at the data center. Your choice of receivers will allow for output to be converted to seven or nine track magnetic tape, punched tape, or data can be fed directly into the computer.

The MSI system is complete with all hardware, software and systems and service support. Over 3,000 operating terminals prove the economies and efficiencies of the MSI system.

If your problem is data gathering and transmission, look to the MSI Data Corporation for the answers.

Gentlemen:
I would like more information on the MSI electronic data transmission system.

Name_____

Address_____

City_____

State_____ Zip_____

MSI™
DATA CORPORATION

Department D8
4751 Holt Avenue
Montclair, Calif. 91763
(714) 626-2451

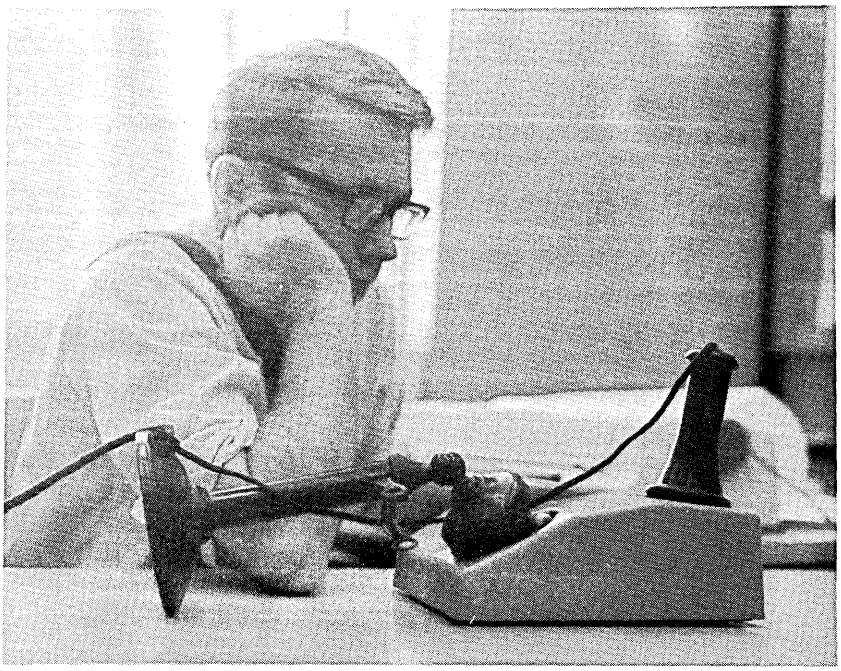
ties of the host country is encouraged; marriage is no disqualifier, but transportation may be only partially paid for the spouse, and there is a caution that out-of-pocket expense may be necessary in "some parts of the world." The candidate should: send academic transcript and copy of doctoral dissertation (or professor's explanation that it is finishable); furnish two academic references and two character references; list what languages known and first, second, and third choice of countries. If married, the mate's background should also be detailed. Deadline for submission is Oct. 1, to Dr. Harry D. Huskey, computer center director at the Univ. of California at Santa Cruz 95060. Actual internships will begin in summer, 1971.

IBM Service Centers

IBM opened its first Purchased Equipment Service Center this month in Los Angeles, plans a second in New York in the fall and is considering a third in Chicago. The centers will perform reconditioning, modification, and repair and appeal primarily to leasing companies who are expected to move leased equipment from site to site from one to five times over the next five years.

SDC Final Edits Magazine

After 13 years of publication, the SDC Magazine has been quietly folded by the System Development Corp. for the usual economic reasons as the firm continues to pare its personnel while it prepares to go for profit, hopefully by the end of this year (the work force is down to around 2,700 from 3,400, and some observers think that certain necessary capabilities are being impaired). The SDC Magazine probably wasn't vital to the company's pursuits but it was among the best of its kind, paying only nominal attention to the company puffery that permeates most other such publications, and instead concentrating on the imaginative presentation of the results of SDC studies in urban planning, education, Indian affairs, business management, computer art, and the dangers of social strife. Perhaps the magazine should have investigated the dangers of not being profit oriented under the new setup.



Enthusiastic user of advanced technology breakthrough, supplied by telephone companies, waiting for it to break through.

Mass Processing Processors

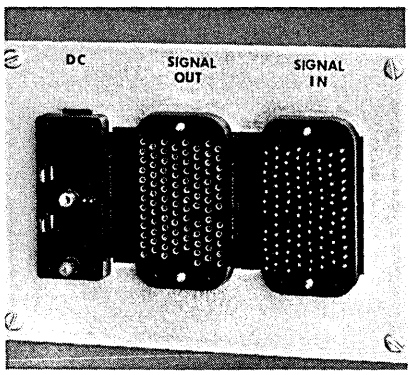
West German manufacturers, who forecast that about 15,000 dp systems, with at least 20,000 operators and 30,000 programmers needed to operate them, will be installed in their country by 1975, have moved to train the necessary personnel without waiting for the inadequate output from regular educational channels. Siemens AG has opened a dp school in Munich that will put through 10,000 trainees in 1970, with 30 instruction rooms, a lecture hall, and two computer training centers housing 12 computers. Courses will be given in information processing introduction, programming, and operations. One hundred lecturers can train about 800 people at a time. Siemens has other centers at Essen, Frankfurt am Main, and Hanover, and expects to train a total of 16,000 people this year.

SHORTLINES

A day off every two weeks — but without pay — is the dubious privilege of 11,000 Hewlett-Packard Co. workers countrywide, who have been caught in the economic slowdown. HP figures the extra down day, which includes all corporate officers, is a fair way of reducing costs and inventory.... WESCON is extending a helping hand to out-of-work engineers who attend its convention in LA, Aug. 25-28, by waiving the registration fee. Although the gesture will cost all of $3, it can make the difference in racking up another attendance record like last year's (40,000), while showing good faith to a great many orphans of the aerospace industry.... A national processing center with two computer systems has opened in Dallas to handle Western Union's nationwide accounting and payroll, encompassing more than 10,000 offices and 14,500 employees. Now that the FCC has approved WU's purchase of Bell System's TWX service, WU calculates to spend some $118 million on it, including working capital and setup expenses.... A casualty of the liquidity squeeze, Topas Computer Corp. and its subsidiary, Allied Data Processing, Inc., folded in NYC the other day, after announcing plans to acquire a Washington, D.C. company for further expansion. Another subsidiary, Corporate Computers, Inc., a used computer brokerage, is continuing in operation but may have to be sold down the river. ■

The IBM 2314 is a slower, more expensive replacement for a CDS 114/1014 disk storage system.

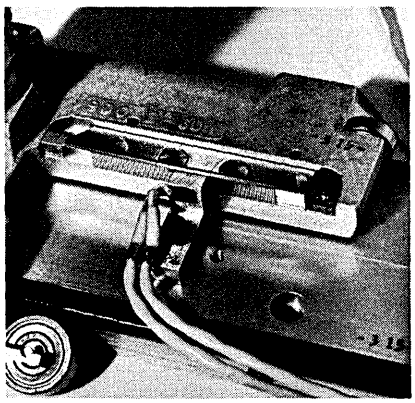
The CDS 114/1014 and the IBM 2314 direct-access storage system do the same work. They're plug-for-plug replacements for each other, they use the same recording format, and you can intermix libraries between the two and never know the difference.



The CDS 114/1014 and the IBM 2314 are plug-for-plug replacements for each other.

But there is a difference.

The CDS 114 gives you data transfer rates of 312,000 bytes per second, track-to-track access of 12 msec, and average access time of 35 msec. The 2314 (according to latest published manufacturer's specs) gives you 25 msec. track-to-track, and 60 msec. average access.

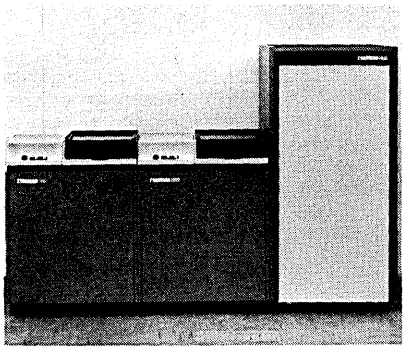


Our electromagnetic positioning system is the most reliable and accurate system there is because you can't wear out an air gap.

And, of course, the CDS 114 has our electromagnetic positioning system which uses no mechanical pawls, detents, gears, or optical devices. Head position is sensed by a fixed variable-reluctance transducer mounted near the rack face. It's the most reliable and accurate system there is because you can't wear out an air gap.

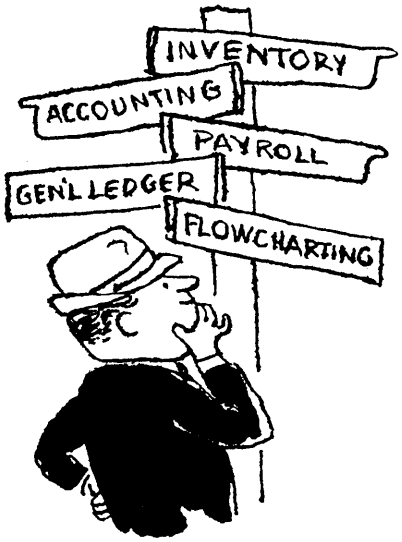
The CDS 114 plugs into a 2314 controller, or you can get it with the Century Data 1014 controller. The CDS 1014 controls eight on-line drives and one off-line spare, and is completely interchangeable with the 2314 controller for any system 360/30 or larger.

Send for our complete specifications and description. You'll find that there's only one characteristic of the 2314 which we don't match: The high price.



The CDS 114 gives you data transfer rates of 312,000 bytes per second, track-to-track access of 12 msec, and average access time of 35 msec.

Century Data
SYSTEMS
1630 South State College Blvd.
Anaheim, California 92806
(714) 639-5900



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AUERBACH Software Reports is a new reference service updated bi-monthly that answers the computer user's pressing need for quick, accurate information. It's being prepared by AUERBACH's staff of computer analysts with over ten years' experience gathering and publishing first-hand information behind them. It gives you the facts you need to decide whether to develop a software system in-house or buy an existing one. And it enables you to select the right package for *your* application from the more than 3000 software programs now being offered.

Here are the facts you've been looking for, covering over 20 application areas. *Definitional Reports and Comparison Charts* provide hardware requirements, operational characteristics, sources, and even the *cost* for each package! You'll save weeks of frustrating research. And you'll be able to justify your decision in less time than it takes to make a wrong one.

As a complete looseleaf reference service, *AUERBACH Software Reports* will be introduced early in the fall. However, the first two Reports—*Inventory Control* and *Payroll*—are now being published as separately bound editions. If you subscribe now, you'll receive a full year's service beginning in October plus free copies of these and other advance Applications Reports. These 60-120 page Reports are also available individually at $90 each.

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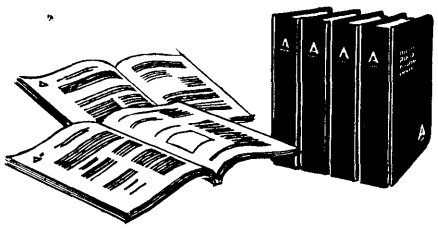

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Abstracts of pertinent books and papers.
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Professional meeting reports.
Convention announcements and reports.
Major contract awards.
Acquisitions and mergers.
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Financial information and reporting.
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New applications for present software systems.
Announcements of new computers.
Peripheral equipment developments.
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The CompuTalk audio-taped digest will provide the answer to the problem of keeping up with the state of the art in EDP. If you want to be well-informed, CompuTalk is for you. Send the coupon and your check today and start with the August digest issue. Your choice of the 3-month trial subscription or the 12-month subscription with the FREE Hitachi cassette playback.

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☐ 3-month trial subscription, $21.00

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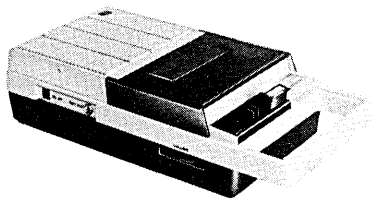
FREE Hitachi tape cassette playback.



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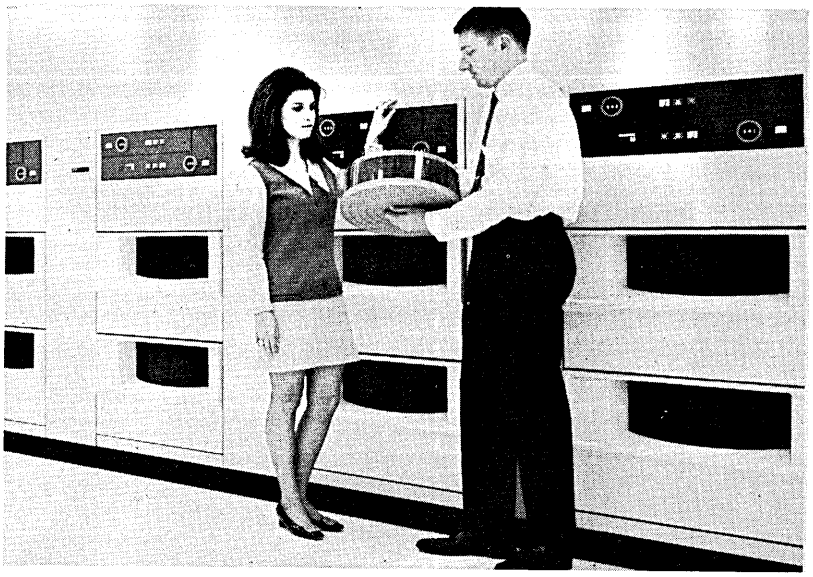
PRODUCT SPOTLIGHT

HARDWARE

Disc Storage



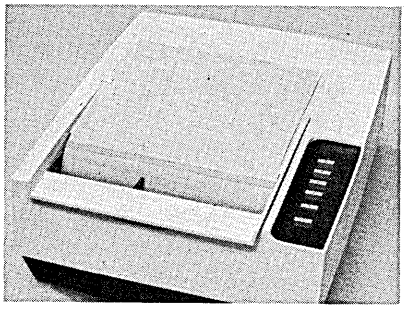
Boasting a maximum storage capacity of 800 million bytes with a maximum transfer rate of 806 thousand bytes/second, the Model 3330 Disc Storage unit is approximately three times larger and faster than the popular 2314. These figures, together with an average access time of 30 msec (twice as fast as the 2314), qualify the 3330 for large data base applications on 360 Model 85's and 195's, and the new 370 series.

Similar in appearance to the 2314, the hardware features modular construction, allowing users to configure up to four dual disc modules as their requirements expand. Each 3336 disc pack holds 100 megabytes on its 19 recording surfaces; another surface holds timing marks; and two more platters, the top and bottom ones, are not used at all for recording —only for protection of the recording and timing surfaces.

Other features include a hardware retry unit that facilitates recovery from controller or file errors without requiring supporting software, and rotational position sensing that allows the drive to disconnect from the channel during the time the disc pack is rotating to the desired seek position. This latter feature allows simultaneous channel usage, and should help throughput.

Initial deliveries of the 3330 will start in August, 1971. The unit is $357,200 on purchase; or it can be leased for $7,600/month. These figures are for a full eight-pack configuration. IBM, White Plains, N.Y. For information:

CIRCLE 380 ON READER CARD



Remote Printer

Making good on their promise of supplying a printer to complement their Datapoint 3300 crt terminal and cassette unit, the vendor announces the 3300P.

Printing is accomplished through a thermal process using a crt-compatible 5x7 dot matrix. Less than 25 moving parts produce up to 30 cps on specially treated 8½-inch paper rolls.

The unit accepts input at 110, 150, 220, and 300 bps, and will also be compatible with forthcoming terminal units from the company. Its price is $3600. COMPUTER TERMINAL CORP., San Antonio, Texas. For information:

CIRCLE 381 ON READER CARD

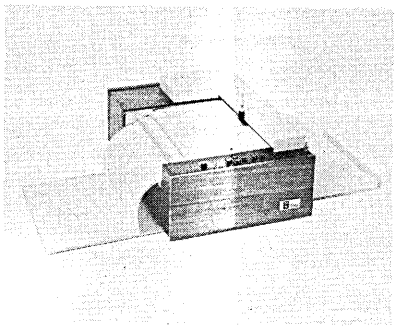
Voice Terminal

The manufacturer of this 3-pound acoustic terminal is primarily interested in building voice response systems. A basic unit for such systems, it combines a numeric touch-tone pad with the coupler and a speaker for audio response. The unit has a "two of eight" tone format and can be used with a Bell 403 modem. It is available now at prices ranging from $300 to $500. SDA SYSTEMS, INC., New York, N.Y. For information:

CIRCLE 387 ON READER CARD

On-Line Plotters

The models 130, 135 and 145 plotters are strictly for direct parallel interface to a computer. The 130 and 135 operate at 300 steps/second, while the 145 plots at 450 increments/second with 5-mil resolution.

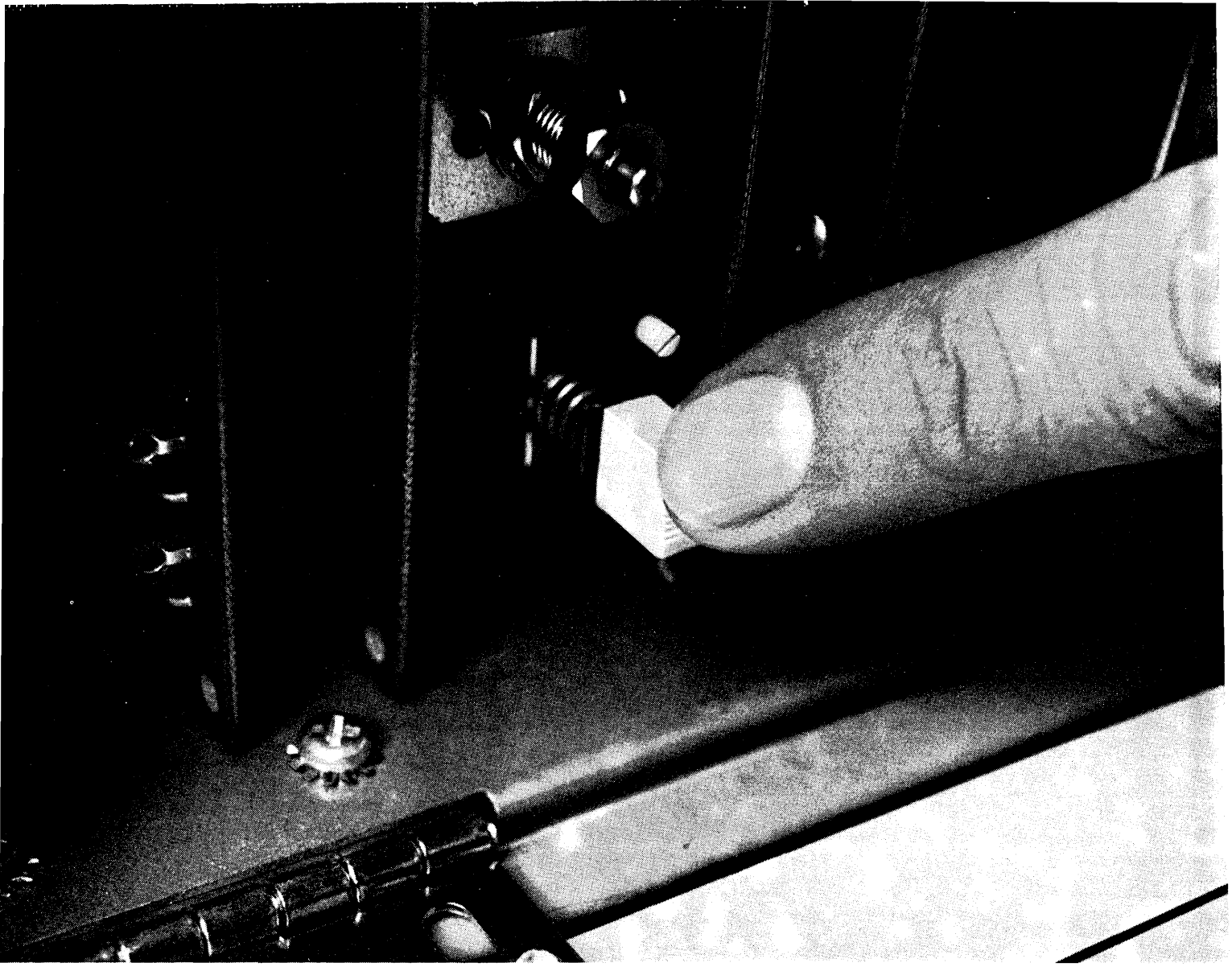


The 130 accepts standard 4-bit computer commands; the 135 and 145 users will have the bonus of a software support package called the Zeta Data Pack, whose purpose is to pack 4-bit plotting commands into whatever word size their computer has. So instead of storing 1,000 plot coordinates in 1,000 discreet cells, they could be stored in 250 cells on a 16-bit machine, for example.

All plotters use 8½x11-inch fanfold paper. The 135 and 145 prices are $3650 and $3950, respectively, while the 130 sells for $3450. Delivery is 60 days ARO. ZETA RESEARCH, Lafayette, Calif. For information:

CIRCLE 388 ON READER CARD

(Continued on p. 89)



If your system goes to pieces, press a button and our modems tell you which piece went.

ZAP!

You're down. And that's where you stay until a serviceman finds the trouble (time! time! time!) and fixes it.

Before you break down just thinking about it, here's a thought to cheer you up. It doesn't have to be that way. Not if you get smart and get an Ultronic modem.

Our modems do everything everybody else's do.

When things are going fine, they just sit there, quietly modulating and demodulating.

But when the fun starts, they turn into crack troubleshooters. Their panel of buttons isolates various parts of your data transmission system. In just a few minutes, a serviceman can locate the part that's giving you trouble. Which saves a lot of time.

Saves a lot of money, too. Ultronic double-duty modems cost only about what you'd pay to lease somebody else's single-duty jobs for two years.

How can you go wrong? You've got Ultronic experience behind you all the way. The experience that comes from running one of the world's largest on-line data communications systems. Plus the experience of over 300 technicians in 56 major cities. Just in case anything ever does go wrong.

Check with us. At Ultronic Systems Corp., Mount Laurel Industrial Park, Moorestown, New Jersey 08057. For a system or a modem, we've got what you want. TDM and FDM, multiplexers, front end controllers.

If you need modems that give you peace of mind by watching each piece of your system, call us at (609) 235-7300.

ULTRONIC SYSTEMS

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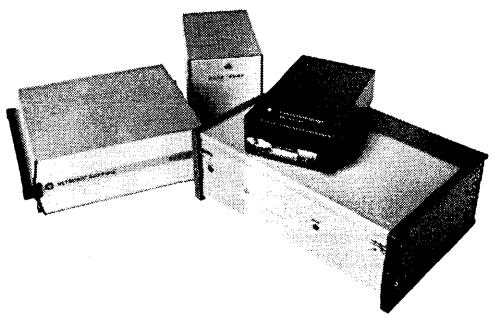


CIRCLE 88 ON READER CARD

Multiprocessor Adapter

With its System/3, IBM is moving down into the small computer market; and other large mainframe manufacturers are beginning to tag along. But this minicomputer company is counter-attacking, going after larger systems using a device called the multiprocessor communications adapter which permits a network of up to 15 Nova's or Supernova's to share each others' memories.

This makes large amounts of core available at very low prices, allows for file-sharing between computer sites, and is particularly significant for applications where lots of core capacity is required but long word length is not necessary.

Technically, the multiprocessor communications adapter has a bus bandwidth of one megabyte (500KHz 16-bit words) and contains a time-partition multiplexor and all associated logic.

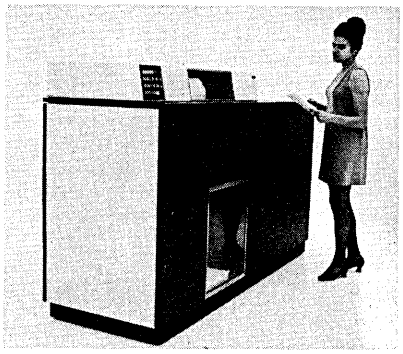
At $2100, the adapter is an inexpensive way to get a file-sharing system on the air. An adapter is required for each member of the network. DATA GENERAL CORP., Southboro, Mass. For information:

CIRCLE 382 ON READER CARD

Line Printer

The Model 3211 line printer debuted with the 370 computer series, but the 2000-lpm unit (with 48-character train, or 2500 lpm with a 36-character train) can also be attached to most 360s.

Operators and supervisors will doubtlessly take a liking to the 3211 because there are no carriage tapes to match up to the appropriate forms; instead there is a forms control buffer that continually controls spacing and skipping (90 ips maximum after seven lines, 30 ips during a regular skip). Also in the forms handling area, an automatically positioning platen for different paper thickness and a stacker that adjusts to the height of the printed forms are being introduced.



At six and eight lines/inch the maximum form lengths are 24 and 22½ inches, respectively, with a minimum length of three inches. Form widths ranging from 3.5 to 18.75 inches are allowed.

For $129,150, or $2800 per month on lease, the 3211 can be yours, but not until December of next year. IBM, White Plains, N.Y. For information:

CIRCLE 385 ON READER CARD

Selectric Alternative

Incorporating MSI circuitry, a heavy duty Selectric keyboard, and a two-character buffer, the Selectronic Model 841 terminal competes directly with the IBM 2741 Selectric. It speaks EBCDIC through either a built-in modem or EIA interface to Bell data access devices or acoustic couplers.

Because of the two-character buffer, fast typists do not have to slow down at the end of lines; 17-character bursts are handled, thus lessening the chances of the computer misunderstanding input.

Standard are a large selection of typespheres, a 130- or 156-character line, repeat function on all keys, and a computer interrupt. Optional are pin-feed platens, carrying case, and a reverse break device that allows the computer to lock the keyboard during input in order to transmit to the operator.

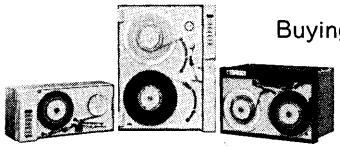
The basic model price is $4100; with a 300 baud modem, $4475; and with the modem and an acoustic coupler, $4574. ANDERSON JACOBSON, INC., Sunnyvale, Calif. For information:

CIRCLE 386 ON READER CARD

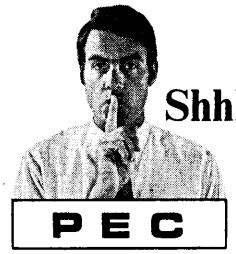
(Continued on p. 91)

Pssst... don't tell the big guys

But PEC's got something they don't—delivery.



Buying a tape transport is easy. Getting "on time" delivery is something else. Impossible sometimes. To get your transports to you on time, PEC has a huge new plant producing tape transports, so you can get them when you need them. PEC makes over 200 models in three reel sizes. 9-track or 7-track, speeds from 6.25 to 37.5ips and densities from 200 to 1600cpi. In formatted or unformatted models. And you can get them fast, in OEM quantities and prices from PEC. For complete information on PEC transports, just write to Peripheral Equipment Corporation, 9600 Irondale Avenue, Chatsworth, California 91311 (213) 882-0030.



Shhhh...

PEC

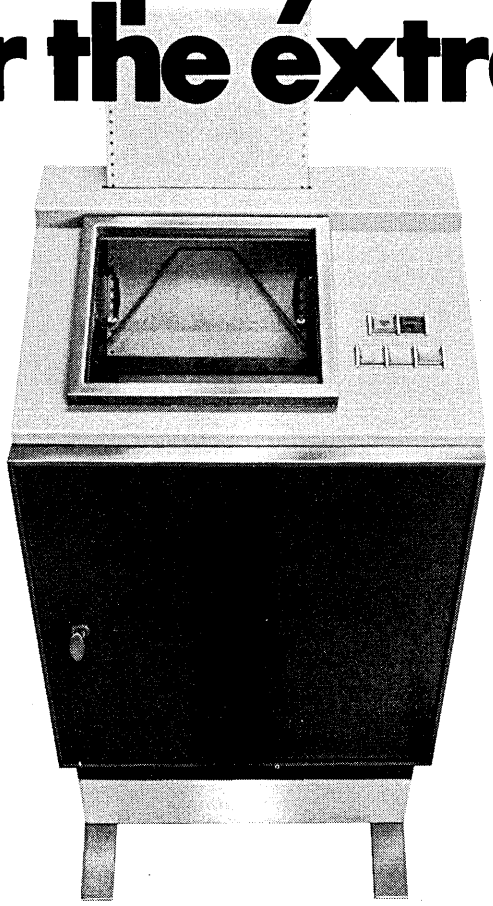
CIRCLE 15 ON READER CARD

Full line buffer. Interfacing. 6-copy printout. 400 lines per min. $7,800.

Don't pay extra for the extras.

If your mini-computer is a PDP-8, HP-2116, Varian 620, Honeywell 316 and 516 (plus many others), just plug us in. Our Vogue/Shepard 880 Series Printers, equipped with a full 80 column line memory and complete interfacing including connectors, cables, computer interface cards and software, can be connected up immediately. All at the price of the printer itself. Without interfacing, the complete system is available for only $7,000 installed.

What's more all of our 880 Printers incorporate our uniquely designed combination of ink roller reliability and patented, drum-impact, ballistic hammers that gives you six clear copies of data.



Five copies more than you get with non-impact printers at no extra cost.

And at $7,800 installed, our 400 lpm printers cost a lot less and do a lot more than any competitive printers around. Quantity pricing available, of course.

For information about the printers with the built-in extras, write: Shepard Division/Vogue Instrument Corporation, 131st Street at Jamaica Avenue, Richmond Hill, New York 11418 • (212) 641-8800 TWX 710-582-4796

The Vogue/Shepard 880 Series Printers

CIRCLE 86 ON READER CARD

Video Display

Selective display, alternate page display, processor controlled erase, cursor positioning and hard copy generation are among the features embodied in the Spectra 70/7522 display.

The selective display feature permits the operator to eliminate display and printout of confidential data during entry. The alternate page display allows switching from between two 1,080 or 1,134 character displays at the touch of a key. The two can be combined into a single unit for transmission.

Hard copy printout can be controlled either by the operator, the processor, or automatically in an unattended mode. The data comes from a separate buffer and doesn't interfere with display operation. A 120 cps serial printer can be connected to the unit.

Transmission speed for the 7522 is from 300 to 2400 baud. It is line and character addressable from the processor.

The display unit will be available in three models with three keyboard configurations: the Model 10, with a standard typewriter keyboard and an $8,325 price; the Model 11 with a numeric keypunch pad and shift controls for the same price; and the Model 12, which provides 96 characters, upper and lower case, for $9,290. The 70/7522 will be available in November. RCA INFORMATION SYSTEMS, Camden, N.J. For information:

CIRCLE 390 ON READER CARD

Data Scrambler

Worried about your teleprinter data privacy? The Model JJC-3 Data Sequestor scrambles teleprinter text at the point of origin and unscrambles the text at the receiving station for the authorized user. More than 500,000 codes are available, so the probability of reception of confidential transmissions—even at another Sequestor—is virtually nil unless the receiving station has the correct code module and switch setting. Confidential data can also be Sequestored for storage on tape.

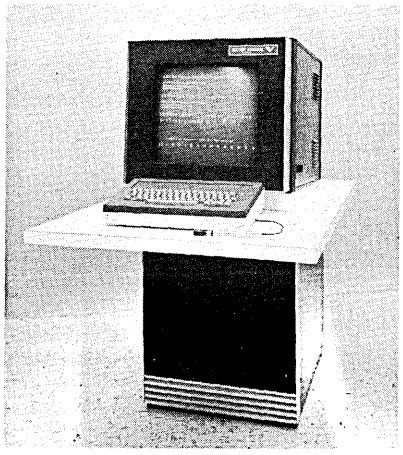
The Sequestors operate with ASR 33 or 35 Teletypes, IBM 150 or 2741, Flexowriter, and similar terminals. Standard half-duplex JJC-3 is $1400 in small quantities. Delivery is 90 days ARO. GROUND/DATA CORP., Ft. Lauderdale, Fla. For information:

CIRCLE 384 ON READER CARD

Graphics Terminal

The basic model DD1 interactive graphics terminal consists of a 17-inch crt and supporting controller, but a host of options enable the prospective purchaser to pick and choose those features he needs. Stock are a drawing rate of 2.5 usec/inch, a 96-character ASCII set (10 usec/character average), a refresh rate of 30 frames/second for 7000 vectors, four character sizes, and 16 intensity levels.

Options include a "big screen" 21-



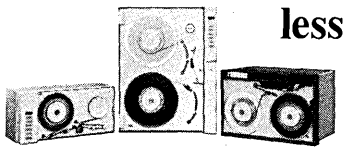
inch tube, function switches, alphanumeric keyboard, light pen, data tablet, joystick, analog-to-digital conversion capability, a faster drawing rate (1.5 usec/inch), extended ASCII set, 32 user-specified special symbols, and image manipulation capability. The DD1 is base priced is $19,800. VECTOR GENERAL, INC., Canoga Park, Calif.

CIRCLE 383 ON READER CARD

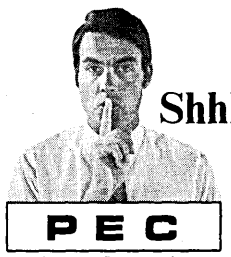
(Continued on p. 93)

Pssst... don't tell the big guys

But PEC's digital mag tape transports cost less than theirs. And work better.



A lot less. For only $3000 in OEM quantities, you can buy a PEC 10½ inch reel, NRZI synchronous transport. 7 or 9-track with speeds of 25, 18.75, or 12.5ips, and densities of 200, 556, or 800cpi. Or maybe your system needs 1600cpi. Just $3740, in the same OEM quantities. And for less than $2000 in quantities, you can buy a PEC 7 inch reel, NRZI transport. Compare that to the big guys' prices. And PEC transports work a lot better and are built to last longer. With simple and dependable features that give you data reliability. Year after year. For information, just write to Peripheral Equipment Corporation, 9600 Irondale Avenue, Chatsworth, California 91311 (213) 882-0030.



CIRCLE 16 ON READER CARD

The new PDP-8/e:
Its own mother wouldn't know it.

The PDP-8/e is a radical departure in computer design. There's no back panel wiring—everything plugs into the OMNIBUS,™ even the CPU. In any order. It's completely flexible; you buy only what you need. And if you need more later, just buy it and plug it in. And the PDP-8/e is easier to interface and easier to maintain than old-style computers.

We've made a few other changes. Easier programming. 1.2 μ sec memory cycle time. 15 added instructions. 256 words of read-only memory. 256 words of read/write memory.

Yet there's no generation gap between the PDP-8/e and the rest of the PDP-8 family computers in 7500 world-wide installations. They all use the same peripherals (over 60 of them). They're all program and interface compatible, they all have extensive applications and documentation. PDP-8/e was born with a silver software package in its mouth.

The basic 4K machine sells for less than $5000. With teletype, less than $6500. Quantity discounts available.

digital
COMPUTERS · MODULES

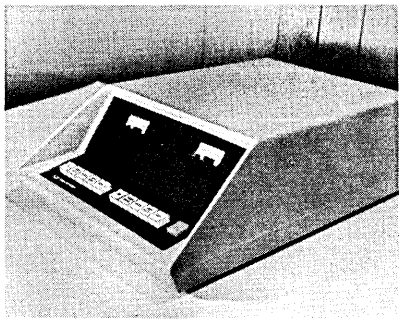
Digital Equipment Corporation
Maynard, Mass. 01754 (617) 897-5111

CIRCLE 20 ON READER CARD

Cassette Recorder

Two models of the DigiCorder are available. Model 270 holds two of the standard Phillips-type cassettes, while the 170 holds one. Other than that they have identical specs—up to 120,000 bytes capacity per cassette and synchronous read/write rates of 300 bytes/second.

Designed primarily for minicomputers, the DigiCorders feature forward and reverse reading, error detection in read mode, end of data code, interrupt generation, etc. Applications include loading and dumping of programs; tape duplicating, assembling, sorting, and merging.

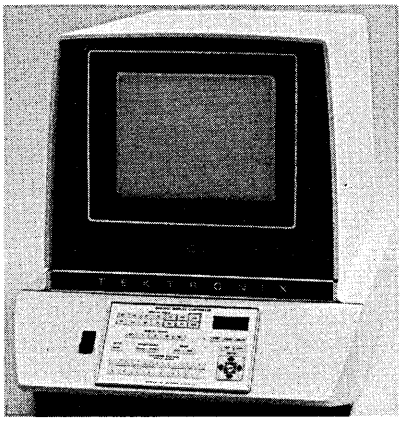


The 170 DigiCorder price is $2240 and the 270 price is $2990. INTERNATIONAL COMPUTER PRODUCTS, INC., Dallas, Texas. For information:

CIRCLE 391 ON READER CARD

Graphic Display Unit

While graphic displays are being used more and more in all computer applications, there have been several chronic drawbacks. One has been the necessity for the image to be continually refreshed—low refresh rates caused flicker, and high rates used up lots of expensive cpu time. The other has been that the software required to scale, offset, or zoom the image took up core space.



One solution to these problems is the T4005 Graphic Display Unit. By using an 11-inch phosphor-coated storage/display tube, the image can be stored up to one hour without refreshing. The second limitation is solved by designing the controller hardware to handle all the plot manipulation functions. This hardware also is capable of driving three additional parallel displays.

Resolution on the 8K x 8K dot matrix image is rated at 400 x 300 line pairs, and image augmentation is possible at high magnification (the user can zoom in on any portion of the full screen). Interface for the IBM 1130 is available now, with others planned. Price is $7850 plus interface and cables, or approximately $780/month for one year. The unit will be available in the third quarter.

Also available to T4005 users (and users of the earlier T4002) is a hard copy unit that attaches easily. Depending upon usage, reproductions from the crt images of suitable quality for slides, enlargements, transparencies, and duplicates can cost as little as a nickel each, and are ready in only 18 sec. The 4601 Hard Copy Unit costs $3750, or approximately $375/month for one year. TEKTRONIX, INC., Beaverton, Ore. For information:

CIRCLE 416 ON READER CARD

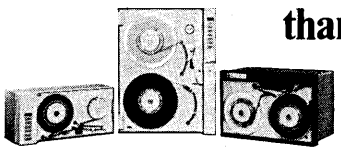
TTY-Coupler

The Model 200, a flush-mounted acoustic coupler for use with Teletype series 33 and 35, features originate only, 150 baud, full- and half-duplex capabilities. It can be installed in less than five minutes using a screwdriver. The complete unit sells for $245 in single quantities, with delivery from stock. SIMULATORS, INC., Elk Grove Village, Ill. For information:

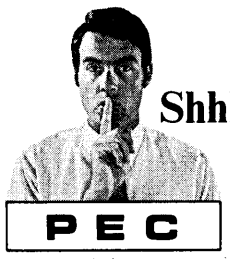
CIRCLE 393 ON READER CARD

Pssst... don't tell the big guys

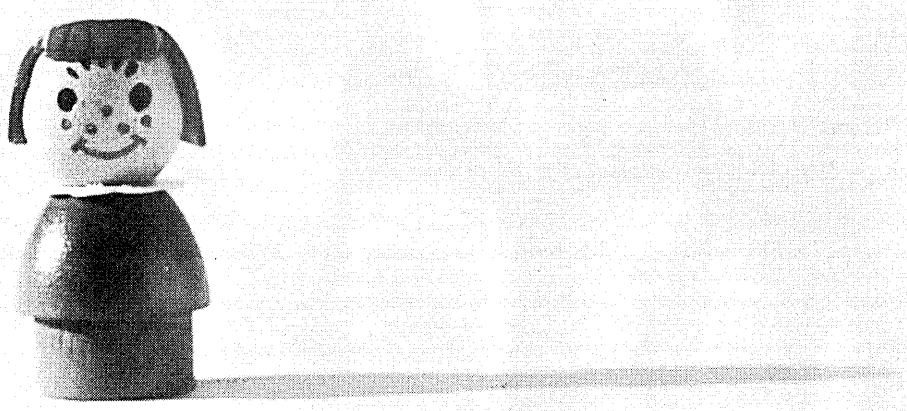
But PEC makes more tape transport models than both of them combined.



Surprised? PEC makes **over** two hundred models in three reel sizes, 7, 8½, and 10½ inch. Choose from tape speeds and densities of 6.25 to 37.5ips at 200, 556, 800 or our new 1600cpi in synchronous versions. In 9-track or 7-track dual density with read-after-write, read/write, write only or read only. Formatted and unformatted. Or our incremental units with asynchronous rates of 0 to 1000 steps per second. PEC offers the industry's most complete line of tape transports. All available from our huge new plant. For more information, write to Peripheral Equipment Corporation, 9600 Irondale Avenue, Chatsworth, California 91311. (213) 882-0030.



CIRCLE 17 ON READER CARD



One key person is one too many.

Eliminate your key entry personnel. And you wipe out the expense of their time, space, and errors. Whether it's keypunch, key-to-tape, or any other keyed-up system, every operator who comes between your original business forms and the computer is simply one key person too many.

Converting business information into computer-ready data could cost you 90% less. Because the original documents, typed by your business staff for business use, need never go through a keyboard again to be computer compatible.

You can do it. With DATAPLEX™. The total data acquisition and preparation system that short-cuts the job automatically. By taking advantage of the operations already being handled right in your own business offices, using your regular personnel, performing their regular duties. Without altering your routines or business forms in the slightest.

Purchase orders, inventory, text material, invoices ...forms by the hundreds pour out of your office machines. Make all those machines DATAPLEX Recording Typewriters, and the data's simultaneously captured for processing.

Your secretaries, accountants, clerks and typists continue their basic tasks as before. DATAPLEX makes the difference. Push a button on the Recording Typewriter, and all the facts and figures are "copied" on magnetic tape cassettes for the DATAPLEX Processor at the same time the forms are being typed for business use.

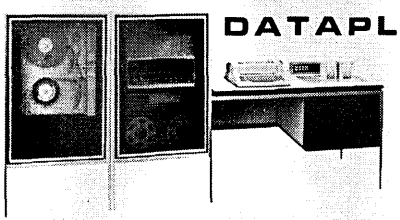
No more batching, coding, keypunching, verifying, pooling—all those repetitive functions by "key people," who really do nothing more than copy again and again the information your business staff has already prepared. Our exclusive FORMOL™ language (a whole new data processing system in itself) accommodates every function and more, within the DATAPLEX Processor. Automatically. Totally. With no data-handling personnel required. No change in your computer and its programs.

You get a ten-to-one improvement in unit record cost. From a minimum of 2¢ to a typical 5¢ per unit record, DATAPLEX drops the cost to 0.2¢ for each unit record. One-fifth of a cent instead of a nickel—big change you can appreciate: tens of thousands of dollars a month for even a medium-sized business.

Cut out key people . . . cut 90% off your data preparation costs. DATAPLEX. The revolutionary system from Data Instruments Company. 16611 Roscoe Place, Sepulveda, California 91343. Call collect for immediate consultation. (213) 893-6464. New York: (212) 986-7987. Chicago: (312) 696-3440.

DATA INSTRUMENTS

DATAPLEX™



CIRCLE 71 ON READER CARD

Add interactive graphic display capability to your IBM 1130 for $5500!

That's right. We wanted this capability for our own in-house IBM 1130. But it was not available at our price. So we built our own system. And it's working so well we've decided to offer it to other IBM 1130 users.

We call our versatile display the Bendix ICD-1100. Its basic features include:

- Hardware/software interface
- FORTRAN callable routines
- Compatibility with digital plotter software
- High resolution (10 bit)
- Two-speed joystick for program interaction
- Alphanumeric display

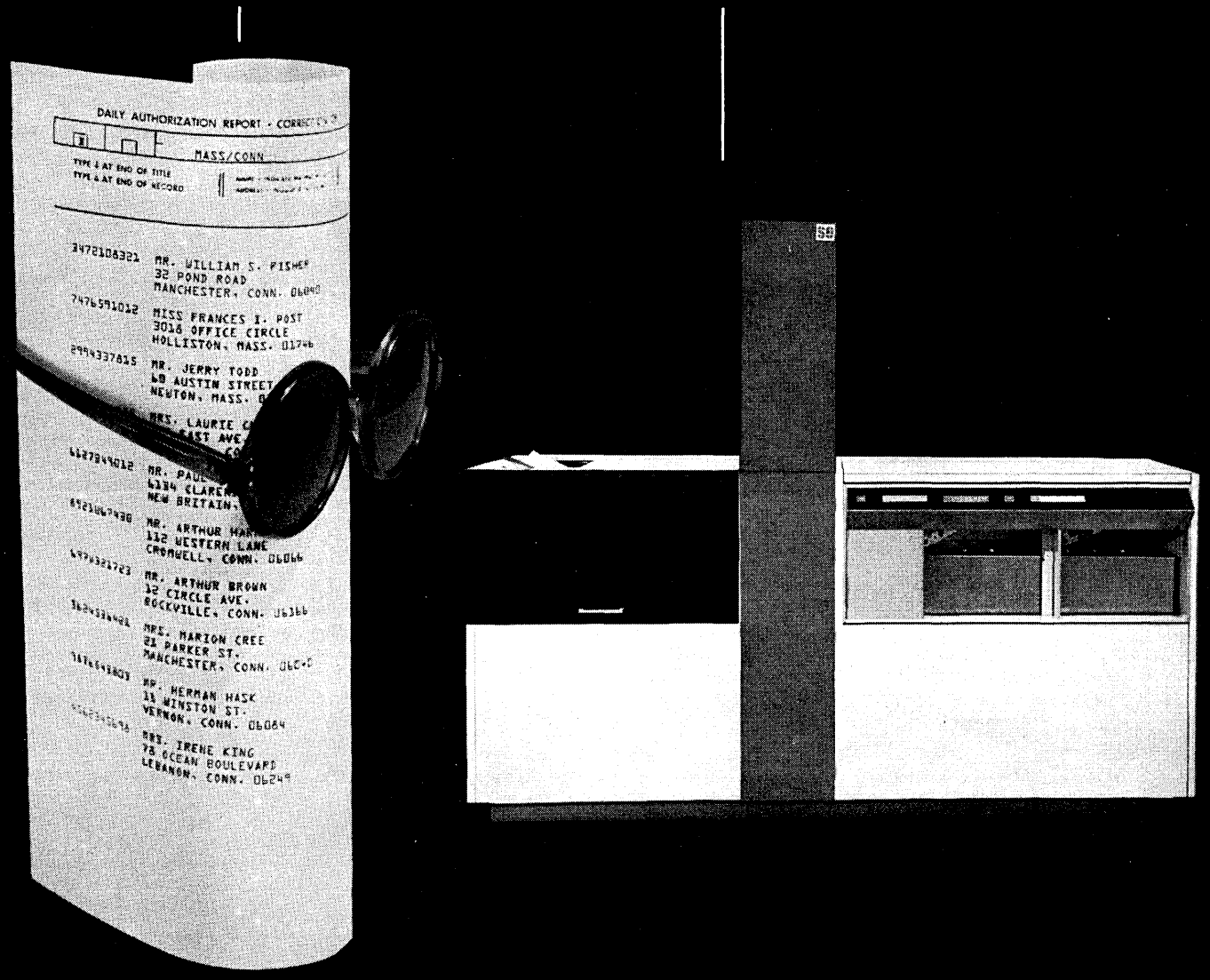
We have more good things to tell you about the ICD-1100, as a peripheral to the IBM 1130.

Call (301) 825-7604. Or write: The Bendix Corporation, Communications Division, East Joppa Road, Baltimore, Maryland 21204.

Bendix

I'm an 850 character 8½ x 11" page that wants to move at... like 80 pages a minute

I read you man



Right! And not only does the new Scan-Optics 20/20™ Optical Character Reader come on strong with a higher thruput than any other page reader . . . . it also really makes it as a document reader. Like multiple line documents processed at 500 per minute.

Would you believe it's the only high-speed combined page and document reader? Right again.

But thruput is only one of the many outta' sight advantages of the 20/20.

Like it directly converts all kinds of data into computer usable form. No keying in or re-transcribing of source data. Add to this, off-line operation which means you forget about tying up expensive computer time.

Need more? Dig. How about the best cost/performance ratio in the whole industry. Or modular design for all the add-on options you'll ever use. A variety of fonts. No format restrictions. Comprehensive systems software package. And a dozen or so other pluses . . . . more than we can fit in one ad.

Get with the 20/20 scene. Get with Scan-Optics. For info . . . . Scan-Optics Inc., Prestige Park, East Hartford, Conn. 06108. Phone 203 289-6001.

You just may find that no matter what kind of fast-moving characters you have . . . . we'll read them man!

Scan-Optics Inc

CIRCLE 83 ON READER CARD

Spectra OS

Remote job entry is the big feature of this operating system, which is described by the manufacturer as offering greater communication capability and more efficient memory use. It is based on the RCA DOS but has a completely new executive and, in addition to RJE, features job scheduling and batch and remote I/O spooling. Its data base module supports batch, remote batch and real-time processing.

OS/70 is for the Spectra 70/35, 45, 55 and 60 computers and is compatible with disc, tape and tape-disc operating systems. It is also compatible with IBM OS/360 programs and will be compatible with RCA's upcoming new processors.

The operating system is resident on random access storage, either the 70/564 disc, 70/567 drum or 70/590 disc. The executive requires 8-10K of core on a 32K system. On a 262K or larger system 55-64K is needed.

OS/70 can process 14 programs concurrently and supports COBOL, ANSI COBOL, FORTRAN, RPG, and BAL. The amount and type of hardware it supports is limited only by hardware channel and trunk capacity.

There are two communications modules available with the system, a Basic Communications Support Package for small special-purpose systems, and COS (Communication Oriented Software), which offers computer-to-computer communications between any of the four kinds of cpu's and simultaneous operation of up to six communications programs.

Memory efficiency is improved through dynamic allocation of both core and random access storage.

OS/70 will be available "free" to Spectra 70 users in about 12 months. It's reported there is still a lot of programming to do. RCA INFORMATION SYSTEMS, Camden, N.J. For information:

CIRCLE 396 ON READER CARD

COBOL for Mini's

Combining the automatic processing features of an RPG with the data definition and procedural capabilities of COBOL, CUBOL is a practical business language for "mini's." It features report writing, file manipulation and table processing capabilities, and can be tailored to operate on almost any 4K 16-bit machine.

Supporting the system are a stand-alone one-pass compiler, a run-time monitor, complete language specifications, and a tutorial user's manual.

For a typical system the price will be approximately $60,000. COMPUTER USAGE CO., Los Angeles, Calif. For information:

CIRCLE 397 ON READER CARD

Computer Utilization

The acronym isn't the most apt because CURES (Computer Utilization Reporting System) tallies computer use and doesn't give remedies for anything. It is written in RPG for use on the Mod 20 and other 360 computers and Univac's 9000 series. A card reader and 8K of memory are required.

The reports it generates indicate computer use by job type, operators and programmers, and application area or department. The system compares meter time to clock time and shows percentage of use. An optional feature allocates expense.

A source deck and operations manual is supplied with the program. The price is $99, which will be refunded if the user is not completely satisfied with the package one week after it is received. COMPUTER MANAGEMENT ASSOCIATES, Malden, Mass. For information:

CIRCLE 401 ON READER CARD

Time-Sharing PL/I

BRUIN-II, a dialect of PL/I for use on IBM time-sharing systems, provides the t-s user with increased problem solving and file handling capabilities. It handles matrix operations--including arrays with up to four subscripts --and allows the user to get, put, and edit data, and provides statements for handling file interrupts. It also performs arithmetic, Boolean, and string operations, and handles variables which may be single/double precision, character/bit strings, and arrays.

BRUIN-II operates under the control of most byte-oriented t-s systems, including ITF, TSO, RAX, and CMS. It also operates under the vendor's SYSTEL, an OS/MVT t-s system. It requires 24K main storage plus user work space. BRUIN-II was developed by the Brown Univ. Computer Laboratory. Price is $3900 or $180 per month. A 78-page user guide is $3. HYGAIN TECHNOLOGIES, INC., Westport, Conn. For information:

CIRCLE 398 ON READER CARD

51 Statistical Programs

Available to Hewlett-Packard users is an extensive set of programs and subroutines for general statistical analysis. There are 11 routines for regression analysis; seven for variance analysis; seven hypotheses tests; three nonparametric programs; 15 general statistic programs; and eight miscellaneous routines.

The programs and subroutines are written in FORTRAN II and priced at $10 each, including program tape and documentation. Or the documentation (including test cases) can be purchased separately at $2 per program. HEWLETT - PACKARD CO., Palo Alto, Calif. For information:

CIRCLE 400 ON READER CARD

Investment Management

Whether the stock market is bearish or bullish, it's claimed that banks, insurance companies, mutual funds and investment counselors will manage better with this system.

Written in COBOL, the 40 programs in the package provide direct access processing of large files of securities or bank accounts and other properties. Most of the programs generate some variety of stock analysis or report. Audit trails, validation, editing, and guarantee of legitimate postings by trial postings of all input transactions assure accuracy of data.

The $25,000 system requires a minimum of 48K of memory, plus four 2311 disc drives on a 360/25. On-site installation with conversion and implementation assistance and training is provided. KEANE ASSOCIATES, INC., Wellesley Hills, Mass. For information:

CIRCLE 404 ON READER CARD

(Continued on p. 103)

SOFTWARE

That's because you buy the video tape and run it all you want, on any schedule, to as many people as you want. So the more you use the course, the less it costs.

By course, we mean the whole bit; crisp 20-30 minute lectures by experts on video tape; CA manuals complete with outlines, displays, charts, instructions, sample problems and quizzes.

All courses are modular. Great for quick reviews, great for adapting the courses to slow, medium and fast learners — ever hear of a whole class that had exactly the same learning rate?

Here at Consultants Associated, Inc., we've been teaching computer software for years, to blue chip clients. Now we're packaging ourselves in the economical tape format.

The S/360 Operating System series includes:

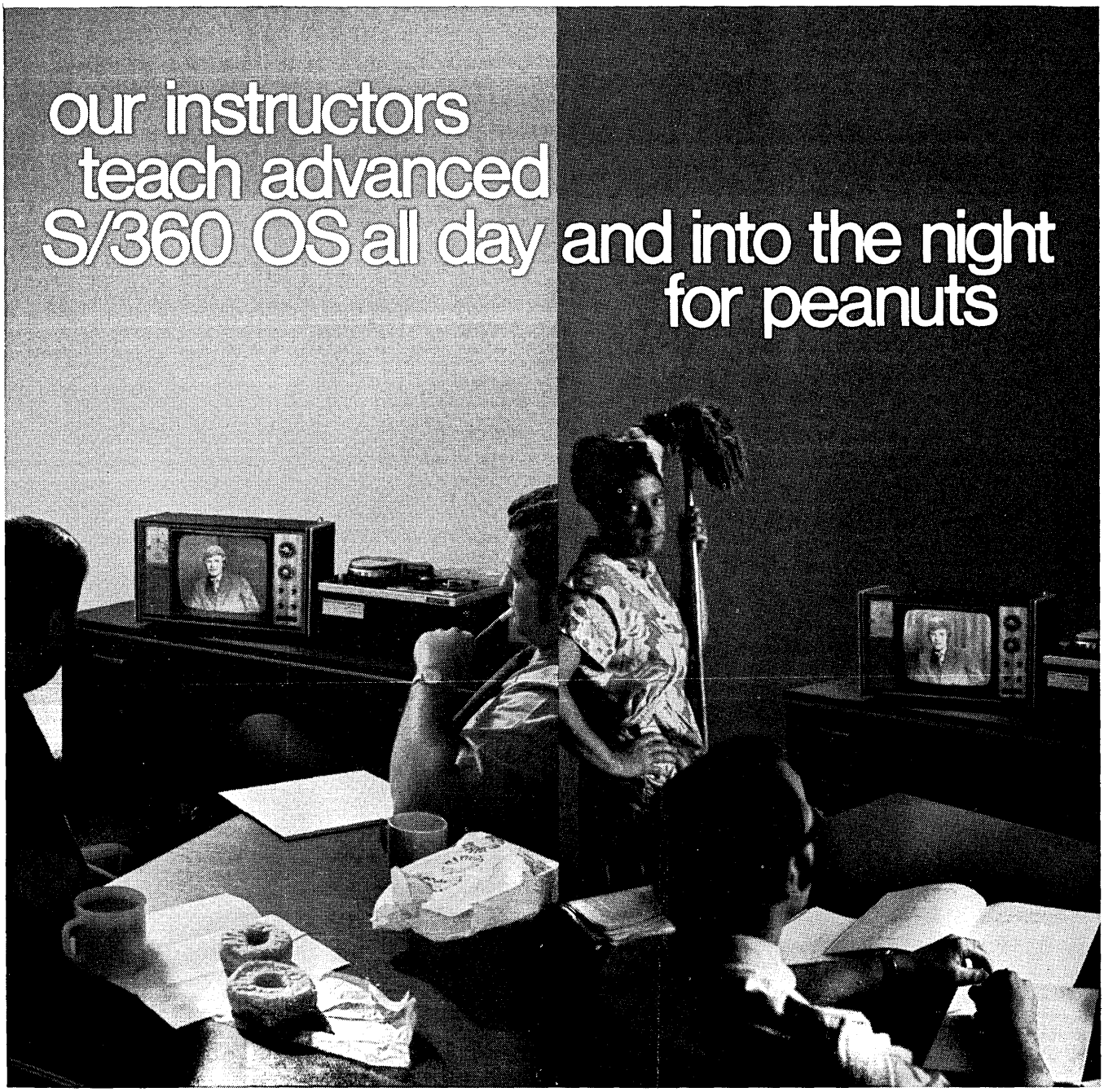
Overview	Job Control Language
Utilities	Techniques and Aids
Dumps	Operator Training

Other series ready soon will include S-360 Disk Operating System; Introduction to Data Processing and OCR Concepts.

Tapes can be supplied for any model video tape equipment you care to name. For complete information, call collect, or write.

CONSULTANTS ASSOCIATED, INC.

Lakeside Office Park,
Wakefield, Massachusetts 01880 (617) 245-0148



I/O Supervisor

Local batch I/O and real-time telecommunications for the PDP-8/I are handled by this I/O supervisor. The software monitors multiple interrupts, performing in an enabled state which allows for concurrent fielding and servicing.

Written in PAL III, the supervisor has logical submodules for each of the supported peripherals. The peripherals can include up to four DF-32 discs, three TC-01 DEC tapes, a programmable real-time clock, two 680-1 telecommunications clocks (6-level, 56 baud and 5-level, 50 baud), a low power option, and a Teletype console with two-channel simultaneous I/O.

The supervisor requires 2-4K (12-bit) words of core depending on the peripherals used. It is priced at $4000 exclusive of modifications or additional peripheral support. There is also a charge for installation outside the New York City area. COMPLEX SYSTEMS INC., New York, N.Y. For information:

CIRCLE 399 ON READER CARD

File Security

Worried about confidential data being stolen? Cipher/1 will take any type of file (sequential, direct access, etc.) in any machine-readable form (cards, tapes, discs, etc.) and juggle it in such a way that the data becomes meaningless to unauthorized people. It also deciphers the data. This process is begun by selection of a password which becomes the key to the ciphered data and permits it to be accessed.

The module can be used on any 360 machine that uses the standard IBM calling sequence and may be called in COBOL, FORTRAN, PL/I, and assembler language, among others. Available for OS or DOS/TOS, the program requires 500 bytes of core and an 880-byte work area per file.

Cipher/1 is sold by mail and is self-supporting. Documentation, some 40 pages of it, is supplied with sample calling programs and training aids. The vendor claims it is about as difficult to use as a FORTRAN subroutine. The price is $495. XANTHOS XOFTWARE INC., Wilmington, Mass. For information:

CIRCLE 406 ON READER CARD

(Continued on p. 105)

Directing a Big Management Problem?

C-E-I-R Professional Services Division forecasts problem areas and analyzes alternative plans.

C-E-I-R Professional Services Division's Operations Research Systems effectively minimize the chance of error in large, costly management projects. This is accomplished by duplicating your unique enterprise on a special simulation model. There's your project reproduced on computer tape and stored in logic cells.

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Try any proposal that comes up. Mistakes on a simulation model are far from disastrous. If you're responsible for a big management project, test your bright ideas on us first. Call or write:

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CIRCLE 65 ON READER CARD

For process control you need an economical, powerful computer that will talk to anything.

Raytheon Computer has three.

Three powerful 16-bit processors for direct digital control, monitoring, sequencing, analysis or any other process control application. All with the best price/performance ratio in the industry.

Cycle times range from 1.75μs to 900 ns and prices go from under $10,000 to $19,000, so you can make your own cost/performance trade-offs. All processors have direct I/O to the CPU, 4 addressable registers and 74 instructions that include bit, byte and word manipulation.

And all processors are fully hardware and software compatible. Start with the least expensive then upgrade to the fastest processor when your requirements change. There'll be no redesign costs, no reprogramming penalties.

You can make your system as powerful as you want to by choosing the appropriate options. Hardware multiply/divide. Direct memory access. An Array Transform Processor. All the standard peripherals. And instant Raytheon Computer interfaces for any non-standard equipment in your system.

And no matter what the hardware configuration, we'll get it all on-line sooner with our software. Executives and monitors. Conversational FORTRAN in just 4k of memory. Applications programs and operating systems. And the fastest, most accurate math library in the 16-bit processor class. More than 400 programs and subroutines off-the-shelf. All tested, debugged and being proven in systems every day.

So write for all the details today. Ask for Data File C-184. There isn't a better price/performance story in the industry.

RAYTHEON

Raytheon Computer, 2700 South Fairview, Santa Ana, California, 92704, Telephone (714) 546-7160.

Conversion Cutter

DUO/360 is a set of routines that enable DOS/360 programs to run under OS/360 without reprogramming, allowing users access to all features of OS, while retaining those available in DOS only.

It works like this: one routine is added to the user's OS nucleus via a link edit step; the others are selected, as needed, at execution time to process a DOS object program load module. There are many advantages in the OS world compared to DOS, but some of the principal ones are the OS sort, data set cataloging (so it isn't necessary to change the JCL for each run), and better space allocation. Both DOS and OS jobs are in the same job stream (up to six DOS jobs can run concurrently with OS jobs).

Depending on cpu size, DUO/360 is leased for $625 to $1250 per month. Each additional processor costs 75% of the first. COMPUTER TECHNOLOGY INC., Dallas, Texas. For information:

CIRCLE 402 ON READER CARD

PL/I Environment Extension

PLIANT (PL/I Application Nucleus Tools) uses 24 PL/I modules that perform routine "housekeeping" and error handling operations for PL/I programs running under OS/360.

Functions performed automatically include initialization, interrupt handling, and termination. PLIANT also provides a number of facilities that can be invoked by the user, including an error handler. Price is $2.5K for the first cpu, $1.5K for the second, and $750 thereafter, including source decks, instructional material, and module descriptions. DELTA SYSTEMS CORP., Wilmette, Ill. For information:

CIRCLE 403 ON READER CARD

CCAP Extension

An extension of IBM's CCAP (Communication Capability Application Program), billed as CCAP/75, is said to provide extended multiprogramming capability while retaining the efficiencies of CCAP as a message switching system. Up to 99 asynchronous tasks can be run under CCAP either batched and/or on-line. Real-time applications may be written in any supported language and interfaced with the communications network via CCAP/75's Message Access Method.

The subprogram operates under the control of CCAP and utilizes one additional disc unit, either a 2311 or 2314. It adds 9-20K to current core requirements, and is available in two versions: CCAP/75 without BTAM capability, $33K; with BTAM, $37K. Rentals are also available. BUTTONWOOD DATA SYSTEMS, INC., New York, N.Y. For information:

CIRCLE 405 ON READER CARD

Management Information

Using a company's allowable variances, this management information system supplies exception reports and graphs for keeping company management aware. The following areas are covered by the system: inventory control and costing; purchasing status; accounts payable and receivable; budgeting; invoicing and statements; and others. Up to 50 reports are generated.

The COBOL language modules can be divided into any combination one wishes, and operate through terminals from a 65K 360/30 or larger.

The complete system is priced at $25,000; leases are also available. CREATIVE DATA SYSTEMS, Encino, Calif. For information:

CIRCLE 410 ON READER CARD

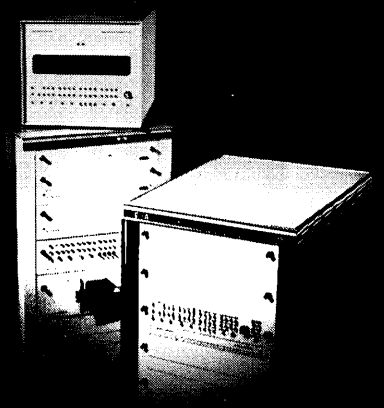
Utility I/O

The HELP utility program handles up to 18 I/O operations, including such functions as gang punching, card-to-printer reformatting, tape-to-tape reformatting, tape-to-printer reformatting, search-and-skip tape records, tape-to-tape blocking, reblocking and deblocking. A common routine will reformat any data from any I/O area. The BAL program runs on any 4K System/360 Model 25 or up under DOS with BPS or TOS. Price is $900. SEYMORE DATA PROCESSING SERVICES, INC., Chicago, Ill. For information:

CIRCLE 407 ON READER CARD

The only thing Raytheon Computer does is your job.

Efficiently.



RAYTHEON

CIRCLE 55 ON READER CARD

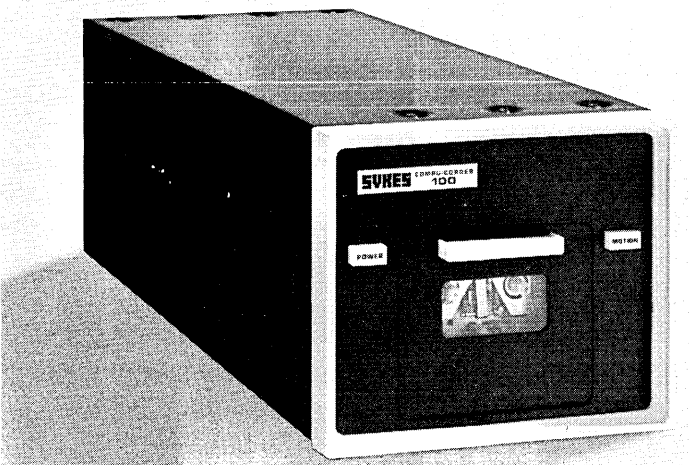
Attention Systems Designers

Would you like the direct access of a disc with the storage capacity of magnetic tape?

Then you should use the Sykes COMPU/CORDER™ 100...
a magnetic tape device that:

- **Provides high speed direct access** to data in both forward and reverse directions at 120 ips. (Made possible by an exclusive, patented tape addressing system.)
- **Enables users to edit,** assemble and manipulate data.
- **Increases the memory** capacity of a mini-computer by an additional 360,000 words *per cassette.* (Average mini-computer memory stores 4K words.)
- **Stores up** to 3,600,000 bits of information on each 300 foot cassette.
- **Offers a unique library system** that allows you to convert existing programs stored on punched paper tape to magnetic tape.
- **Has proven itself** in a wide variety of applications. Ask us.
- **Comes packaged** with software and interfacing.
- **And costs $2,507.50** in lots of 20. Single unit—$2950.00

Ask your Sykes representatives for complete details.
Or mail in the attached coupon.



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ROCHESTER, NEW YORK 14606
CIRCLE 77 ON READER CARD

Sykes Datatronics
375 Orchard Street, Rochester, New York 14606

☐ Please send me complete details on the COMPU/CORDER 100
☐ Please have representative call

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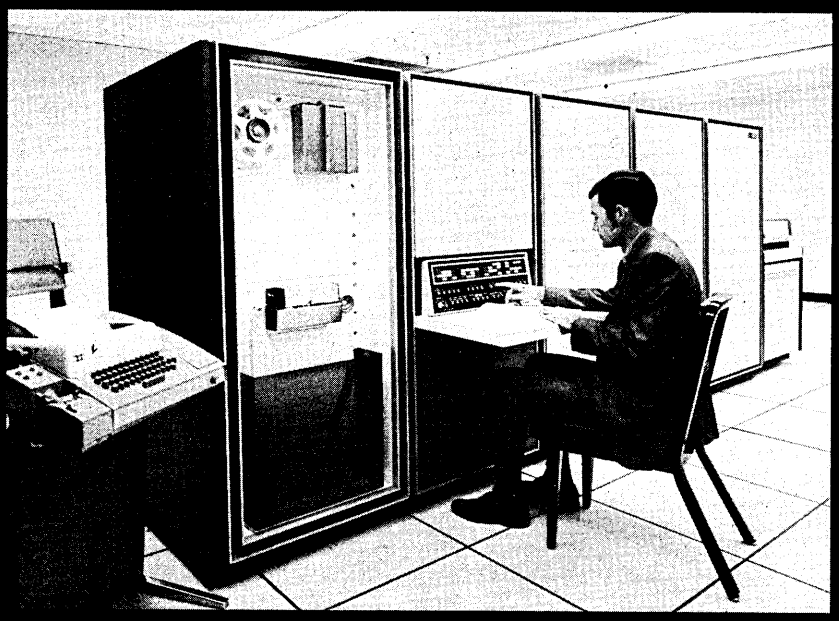
Title_____
Company_____
Address_____
City_____
State_____ Zip_____

• Stores 30 4K programs and directory.
• Average access for any program— 10 seconds.
• Program loading time (assuming 4K) 16 seconds.
SYKES
APPLIED INFORMATION TECHNOLOGY
CERTIFIED TAPE 300 FEET
REMOVE PLUG TO PROTECT
CASSETTE NO.
6/15/70
Sykes Library Cassette
POWER
MOTION

SCC 4700

...the power of a 360/50 for the price of a 360/20



Maybe you don't need all that power.

The 4700 is still for you. Because we can also configure this 16-bit computer for under $35K to include 4K memory, hardware floating point with double precision arithmetic, multiply/divide, and an ASR-33 with high-speed paper tape reader.

The 4700 has up to 65K of memory, memory mapping and protection, power fail-safe and real time features, multiprogramming and a modular design that lets you build as your needs change. The system has built-in performance capability for more than 70 peripheral and optional hardware items. And software available includes Fortran IV, Basic Fortran, real time monitor and assembler.

For computation, research analysis, other mathematically oriented jobs; for front-end processing in communications; or for process control, consider the SCC 4700 — the standout value in its class.

When you call us... see how fast we answer.

Scientific Control Corporation

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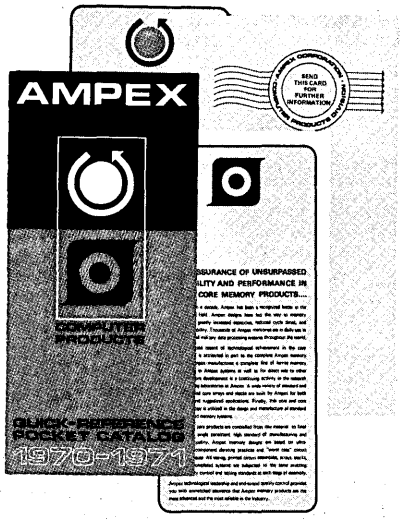
CIRCLE 96 ON READER CARD



Quick-See

Twenty-page catalog (a little taller than passport size) of mag tape and core memories, core stacks and arrays, and ferrite cores is designed for quick reference. All items are pictured, with specs. Tables include a foldout on the characteristics of ferrite cores and another on transport characteristics of mag tape drives, including plug interchangeable. Each core memory has its own page with description, characteristics table, several options available, and "highlights" pointing out desirable features. A request card is furnished for further info. AMPEX CORP., Redwood City, Calif. For copy:

CIRCLE 350 ON READER CARD

Disc Patterns

Four-page cutout brochure includes a specially designed circular slide rule which gives resolution equivalents for coded optical discs. The discs were previously used for in-house prodution of peripheral equipment, optical encoders, encoded torque motors and control systems. They are now being offered separately, in various diameters and resolutions. The discs are available off-the-shelf in absolute, incremental, and tachometer codes, or new masters can be made to specification. SEQUENTIAL INFORMATION SYSTEMS, INC., Dobbs Ferry, N.Y. For copy:

CIRCLE 354 ON READER CARD

What a Name's In

Thirty-five tall pages of acronyms are offered in a booklet, "MAny Computer AbbReviations fOr DefiNing Your TerMs EaSily" (put the underlined caps together, and guess what). Names of industry associations are included. There are already as many as three different meanings for some letter combinations. The more ordinary ones, like FORTRAN or ENIAC are expected; but how about OUTRAN (Output Translator) or MANIAC (Mechanical and Numerical Integrator and Computer). And some are more familiar outside dp, like KP (keypunch *or* keypulsing) and MADAM (Moderately Advanced Data Management). The last page contains a form which enables the reader to contribute acronyms of his own. Price: $1.00. COMPUTER GUIDANCE CORP., 777 Third Ave., New York, N.Y. 10017.

Everyman's Kit

Twelve-page brochure itemizes the many components of "Comp-U-Kit," which the maker maintains provides the material and instructions to "build electronic systems from simple to out-of-sight as easily as making it with Tinkertoy, Erector, or American Bricks." With the kit the recipient can establish a Logic Lab (I or II), supposedly sufficient to tackle a minicomputer. Equipment includes connectors, patches, tails, breadboards, et much cetera. SCIENTIFIC MEASUREMENTS, INC., Skokie, Ill. For copy:

CIRCLE 352 ON READER CARD

Video DP

TV-to-computer interface equipment is included in four-page short-form catalog listing 20 video instruments —data display devices, video analyzers, video disc recorders, special effects, image enhancers, test and sync generators. A camera intended for laboratory use features both real-time and slow-scan video output for daa reduction. COLORADO VIDEO, INC., Boulder, Colo. For copy:

CIRCLE 356 ON READER CARD

Programming Series

A series of volumes in the works to instruct programmers on two levels—basic and advanced—is announced in 24-page brochure. The "foundations" volumes cover user requirements, architecture, development process, and technique. More advanced topics offered to the more experienced or thoroughly educated programmer cover mathematical background, graphics, compilers, language structure, I/O and file management systems, data communications, and other more specialized information. The series has been developed in conjunction with IBM to improve the present computer personnel situation by aiding in education and training at all stages. ADDISON-WESLEY PUBLISHING CO., Reading, Mass. For copy:

CIRCLE 351 ON READER CARD

Lyrics Unromantic

Dp in-the-field commentary is converted into parody lyrics on a long-playing record with only a couple of company plugs. Melodies are all too readily recallable ("Puff, the Magic Dragon," "Paper Doll"). Commentary is applied general: "She was on-line, but time-share with others gave me trouble," sung by Randy Z and Bongo Jack. VERSATEC, INC., Cupertino, Calif. For copy:

CIRCLE 355 ON READER CARD

Inquiry and Report

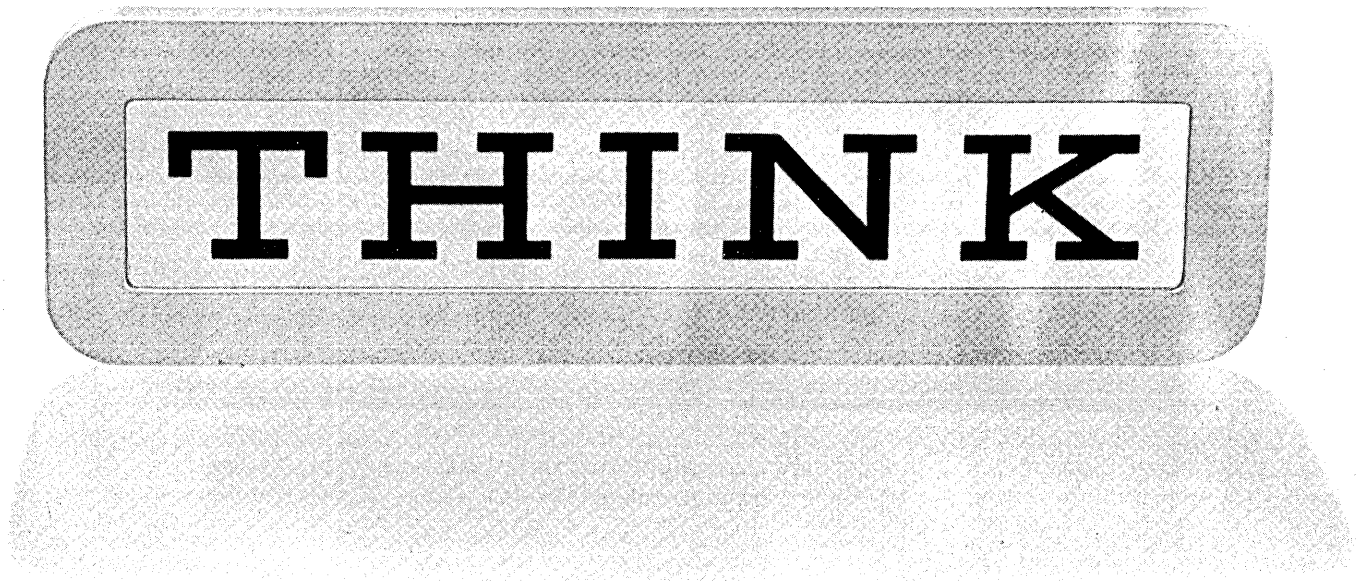
Sixteen-page brochure says it has "programming to tighten your corporate belt" and goes on to explain IRS (Inquiry and Reporting System), used to extract information from computer files, process it, and summarize it on card, printer, tape and disc. Designed to function with IBM/360 equipment or in a different version for RCA's Spectra 70 series, the program operates with as little as 18K core, eliminates the usual terms like "sort," and "read." It can be used by nonprogrammers. Two back flaps show samples of input and output forms. SIGMA DATA COMPUTING CORP., Bethesda, Md. For copy:

CIRCLE 353 ON READER CARD

(Continued on p. 111)

LITERATURE

Compare the IBM 360/20 with the NCR Century 100.



Compare price/performance. The NCR Century 100 computer delivers one of the best price/performance ratios in the EDP business.

On the average, the NCR Century 100 is 23 per cent to 43 per cent more productive than 360/20 Models 2 and 4, according to a benchmark study performed by an independent consultant.

. Compare language ability. The NCR Century 100 is fluent in COBOL and FORTRAN in addition to NCR's NEAT/3. And the NCR Century 100 has an RPG Translator that easily converts RPG source programs to NEAT/3.

Compare upward compatibility. The NCR Century 100's true upward compatibility lets you easily move up to even greater capacity whenever you want to.

For more to think about, write NCR Dayton, Ohio 45409. Get all the facts on the NCR Century 100, facts that'll set you to thinking NCR whenever you think computers.

Think. Think again. Think NCR

Think NCR.

NCR®
Computers

NCR is proud to be the sponsor of the Space Exploration Exhibit in the United States Pavilion at Expo '70, Osaka, Japan.

Multiplexing Cities

Twelve-page brochure details multiplexor that can contend with up to 38 channels from multiple cities on a single telephone circuit. The TTC-3000 concentrator is designed for time-sharing networks which must handle shifting loads with shifting time zones. Both it and the TTC-2000, also featured, have individual channel status indicators, showing traffic patterns, and operate with various terminals. System layouts are furnished, with specs listed on the back page. TEL-TECH CORP., Rockville, Md. For copy:

CIRCLE 358 ON READER CARD

Telecom Primer

Sixteen-page plentifully illustrated brochure gives the elementary operation principles and functions of teleprinters for students or trainees. Different kinds of keyboards, tape senders and receivers, and printers are shown, with an explanation of how they send and receive in five- and eight-level codes. The use of data terminals is also discussed. A complete line of equipment is pictured, with a roundup of how and where it is used. TELETYPE CORP., Skokie, Ill. For copy:

CIRCLE 361 ON READER CARD

A Pair of Robots

Two man-sized, manipulating robots used on industry production lines are specified in data sheets. Details are given on their moving parts—arm and wrist movements—circulation (cooling), build (dimensions and tooling), how much they can handle, and memory. One model is more for "put and take," the other for operations requiring tracking or smooth, contouring-type continuous motions. They can work as automotive, metal stamping, forging and molding (as well as plastic), glass and ceramic treating tools. AMF THERMATOOL, INC., New Rochelle, N.Y. For copies:

CIRCLE 357 ON READER CARD

Info Centers

Directory of 79 pages lists names of 119 federally supported information analysis centers, reported on by the Committee on Scientific and Technical Information (COSATI). Mission, scope and services of the centers, as well as an index of the subject areas they individually cover, are included. Directors or operators of the centers are also listed. PB-189 300. Price: $3; microfiche, $.65. U.S. DEPT. OF COMMERCE CLEARINGHOUSE, Springfield, Va. 22151.

Artistic Endeavor

The British have instituted a Computer Arts Society, which in turn is publishing a bulletin on its efforts, called *Page*. A little hard on the eyes because of its fine type, it nevertheless details the activities and accomplishments of the European art-computer colony, as well as quite a bit on the U.S. Art subjects encompass architecture and photography. COMPUTER ARTS SOCIETY, Bracknell, Berkshire, England. For copy:

CIRCLE 360 ON READER CARD

the fastest way to put your new mini-computer to work is with an

***Encom* interface controller**

Mini-computers and peripheral equipment are designed to save you time and money. Up to now most systems have required as much as six months time for interfacing and adapting peripherals and computers before the system could begin to work for you.

Now the Encom Division of Manzano Laboratories, Inc. offers off-the-shelf delivery of interface controllers that solve computer interface problems while your equipment is being built and shipped. Encom Controllers interface most mini-computers with peripherals and give you maximum flexibility in systems design. All we need to know is the equipment you are purchasing and the systems you are designing. The controllers can be installed the same day your equipment arrives.

Encom Controllers are the result of years of interface experience and save months of start-up time. They are economical too. Before you get tangled in the web of time before your system is operational contact us. We'll be over with the full story including price and delivery information that will surprise you.

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CIRCLE 24 ON READER CARD

FOOD BROKER TELLS INSURANCE COMPANY HOW TO DECENTRALIZE BILLINGS.

"What radicalized me," reports K.L. of Des Moines, "was a run-in with my life insurance company's main-office computer. It started with a notice I got in the mail: *'Because you are a very busy man, perhaps you overlooked your first-quarter premium payment. Please accept this friendly reminder that it is overdue.'*

"Of course, I had made the payment months before and had a cancelled check to prove it. But before that computer got off my back, I must have written twenty letters and made eight long-distance phone calls to Connecticut. Not to mention having my policy cancelled twice.

"The ironic thing was that during all this hassle, the company's big regional office sat just a block from mine. And they couldn't do a thing to help me. When I told them how much simpler and more personal it would be if local offices handled premiums, they agreed. But they said the company had found it too expensive to install the necessary data processing operations in each of its 48 branch offices.

KNOWS BETTER

"It just so happened that I knew better. I'm in the food brokerage business and have 27 warehouses in 11 states. I just finished installing a system that lets me decentralize my billing and record-keeping operations, while still keeping close control over things from Des Moines. The heart of the system is a new, low-cost optical reader from Recognition Equipment, called INPUT 3. I've got an INPUT 3 reader at each warehouse. And each one reads information directly from bills, checks, invoices, etc., to my IBM 360 in Des Moines. What it does is eliminate the big source of expense and error in so many data processing operations: keypunching.

"I wrote a letter to the president of the insurance company and told him how, with INPUT 3, branch offices could handle premium payments and other policy transactions at less than the cost of centralized operations. I told him how INPUT 3 could read the details of transactions directly from paper and, once a day, report everything to the main computer for processing.

"The company would save money, I told him, because one INPUT 3 can record as much data as twenty keypunch stations, at a monthly cost of less than two. It would also save money because more personalized service would mean fewer frustrated customers demanding expensive executive attention to mistakes. Then, as a clincher, I reminded him that premiums traveling across country in the mail are earning zero interest.

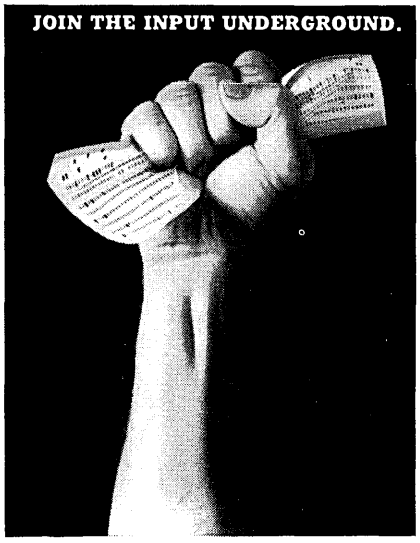
GETS LETTER

"About a week later, I got a personal letter from the president of the company thanking me for my suggestions. He told me that he had forwarded my letter to his EDP vice-president and that the company would surely look into INPUT 3.

"It's too early to tell whether or not the insurance company will adopt decentralized billing with INPUT 3. But, at least we've learned The Establishment *will* listen if someone has a better idea."

If you know someone who still has an expensive and unnecessary step in his data processing operations, send his name to The Input Underground. P.O. Box 5274, Dallas, Texas 75222.

It's not too late to join the Input Underground. Just send us your name and address and we'll send you a membership card and button.



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BOOKS

***Progress in Direct Digital Control*, edited by T. J. Williams and F. M. Ryan. Instrument Society of America, 530 William Penn Place, Pittsburgh, Pa. 15219. 301 pp. $17.00.**

This book is a compilation of technical papers and documents covering the history, technical requirements, and application experience of direct digital control of industrial processes. Although all have been previously published individually, the attempt here is to provide a comprehensive reference in a single volume. The editors have selected 39 references from the over 200 compiled in the bibliography. These papers cover the period from the June, 1962, report of one of the earliest applications, Monsanto Chemical Co.'s ethylene plant at Texas City, to an October, 1968, pilot plant control paper.

The editors have organized the book into five divisions as follows:

General survey. Two papers discuss early (1962) simulation studies of DDC. The remainder of the papers in this section survey the history of DDC, operational requirements, problems and solutions to common problems. The section does provide a background perspective but suffers somewhat from redundancy.

DDC applications. Thirteen papers cover some of the benchmark applications in such process areas as ethylene plant, ammonia-soda plant, glass furnace, power turbine start-up, polyvinyl-chloride plant, cement kiln, soaking pits, and power generation.

The result is a potpourri of historical and technical information on both continuous and batch applications which, again, furnishes an overview of the development of DDC during its 10-year existence. It is interesting to note how favorably the early jobs compare to the more recent ones. All of them are successful; however, difficulties in implementation are elaborated in some cases.

Display and I/O hardware. This section is primarily on the functional specifications and design of operator consoles for DDC and other types of control. The consoles presented are mainly of traditional thumbwheel and rotary switch design. Little is said about the more modern techniques such as cathode ray tubes. One paper discusses process analog input requirements.

Control algorithms. The most detailed and comprehensive treatment in the book covers the control algorithms used in digital computers. The basis is the mathematical representation of two- and three-mode analog controllers in both position and velocity forms. Feedforward, adaptive, cascade and ratio, nonlinear, deadband, noninteracting, and sequencing control are also described in detail. Associated problems of process noise, sampling rates, digital filtering, and process output methods are treated as well. More than any other section in the book, this is a practical presentation of basic concepts of DDC and how to apply them.

DDC workshops. The Users Workshop on Direct Digital Computer Control Systems (now ISA Computer Control Workshop) met first in 1963 and has been a significant influence in the development of DDC. Published in this section are some early but extensive guidelines and specifications.

In total, the book presents considerable useful information but suffers from the redundancy and lack of overall organization inherent in the compilation approach. This makes it difficult to use as a reference or textbook. It does represent an accurate and complete picture of the development of this important computer control technology.

—R. Douglas Russell

BOOK BRIEFS...

***Advanced Linear-Programming Computing Techniques*, by William Orchard-Hays. McGraw-Hill Book Co., New York, 1968. 366 pp. $12.50.**

This book presents the complete range of algebra and logic involved in simplex techniques applied to linear models. Information is provided on linear programming computing, the mathematics of algorithms, debugging, basic documentation, and other subjects. Actual computer methods are discussed for dealing with ill-conditioned matrices, as well as questions of data format and modern matrix and inversion techniques.

The book discusses separable programming and generalized upper-bounding algorithms. The generalization of variable types is carried through all proofs and algorithms.

The book emphasizes algebra and logic throughout, and is organized in the logical development of definitions, theorems, algorithms, and techniques without diverging into other subjects.

***Linear Programming and Cash Management/CASH ALPHA*, by Robert F. Calman. The M.I.T. Press, Cambridge, Mass., 1968. 165 pp. $10.00.**

The purpose of this book is to demonstrate that management of a company's banking relations is a systems problem, and that a specific quantitative technique—linear programming—can be used to make decisions on banking policy. CASH ALPHA is a linear programming model describing all banking activity carried on by a single company. It incorporates the details of the company's agreement with its many banks on the price of specific services performed by each bank, the forms of compensation for these services, and any company policies with respect to one or all of its banks.

CASH ALPHA treats the company's banking activity as one integrated system. A hypothetical company is used as an example of the effects of this integrated approach. In addition to describing the mechanics of the system, the book discusses forecasting, updating and seasonality, and general practicality.

***Automatic Data Processing and Management*, by Nathan Berkowitz and Robertson Munro, Jr. Dickenson Publishing Co., Inc., Belmont, Cal., 1969. 348 pp.**

The authors originally wrote this book in 1965 as a text for their classes at Fairleigh Dickinson University. This new edition includes changes shown to be desirable by classroom experience and contains discussions of new concepts in computer systems.

This book gives a broad overview to the entire subject of automatic data processing and management. It has been written on the building-block principle, i.e., the equipment area begins with the punched-card and unit record equipment, proceeds to computers, and ultimately to on-line, real-time systems. ■

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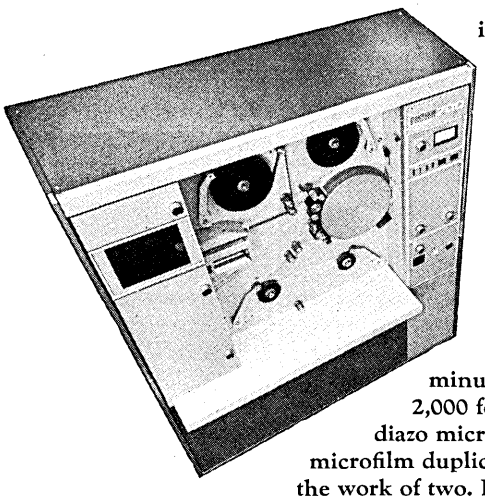
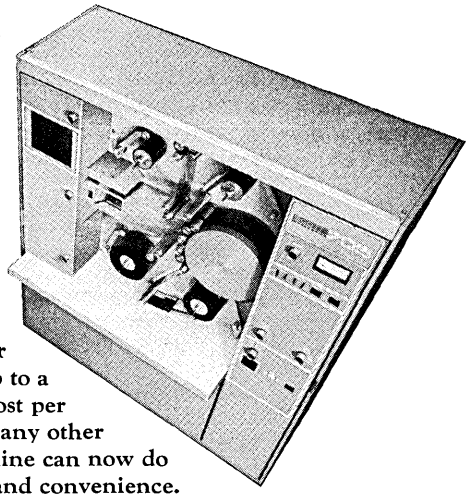
The Scott 700 or 705 Microcopier can really help make your COM system pay off.

They might be the missing links in your information distribution system.



The 705, for example, is the first diazo microfilm copier with the capabilities of duplicating 16mm, 35mm and 105mm (microfiche) film. (The 700 will handle both 16mm and 35mm.)

But that's only the beginning.



These machines are fast! Speeds up to 150 feet per minute. And they'll handle up to a 2,000 foot roll of film. All at a cost per diazo microimage that's lower than any other microfilm duplicating method. One machine can now do the work of two. Economy through speed and convenience.

Here's something else you get with Scott's 700 Series that you just can't get anywhere else; an exclusive integral loop feeder. It folds to one side of the Microcopier for easy loading and unloading and extends to full width for operation. It gives up to 200 feet of continuous loop duplication. And an automatic loop counter stops the winding mechanism when the desired, pre-selected, number of copies have been made.

Add to this a single lamp exposure with narrow aperture for optimum resolution, and an automatic shutter to interpose between lamp and film whenever winding mechanism stops or slows down for protection of your originals, and you begin to get a part of the total story behind the Series 700.

But there is more. Like an automatic tension control that prevents slippage, or the diazo method of microfilm duplicating that eliminates the time and expense of darkroom and wet-processing facilities. And the complete line of Tecnifax Microfilms for all applications.

We just don't have the space to continue. But if you're convinced that a COM system is the answer to the "paper explosion" then let us prove to you what a Scott Series 700 Microcopier can do to make that system even more efficient and economical.

Write today for full details. (There are some surprises we haven't told you about.)

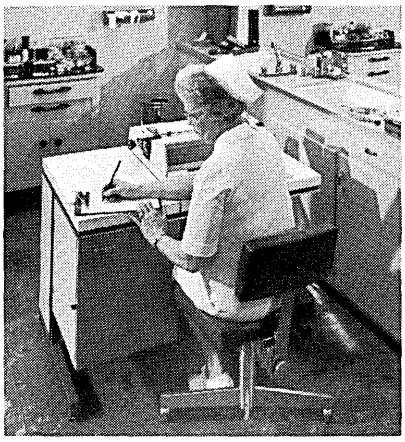
TECNIFAX COMPUTER GRAPHICS DIVISION

THE PLASTIC COATING CORPORATION HOLYOKE, MASSACHUSETTS 01040
SUBSIDIARY OF SCOTT PAPER COMPANY

Singer System Ten. The computer that goes where the work is.

A computer on every desk. In shipping and receiving. In the stockroom. In billing. In payroll. In the Office of the President.

And in the budget.



It's the Singer System Ten. The computer that goes wherever your people need data processing, or you need data input. And it's designed to be understood and used effectively by nearly everyone.

System Ten goes so much further and does so much more because we've designed it with seven important advantages especially for business applications:

1. The workstations can be located virtually anywere in your office or plant.
2. The system can process up to 20 jobs simultaneously. Including batch processing. 20 jobs, no waiting.
3. The system has mass storage. 10K built into the CPU, expandable to 110K and an additional 100 million characters is available with disc drives. Room for all.
4. Time-sharing control is built in with hardware. So no expensive executive software is needed.
5. System Ten uses simple assembler-language programming. Anyone can do it.

6. Data communications capability to interface System Ten with other on-site or remote computers.
7. Total modularity, leading to remarkable cost economies. Total flexibility of size and configuration now, expandability for the future. For a new application, just add a new workstation.

In addition to these functional advantages, System Ten hardware needs only minimal environmental control. And the simple two-wire connections eliminate the need for expensive false-flooring to conceal heavy cable.

Find out more about the computer system of the decade. Call where the System Ten people are, your nearest Friden office. Or write: Friden Division, The Singer Company, San Leandro, California 94577.

SINGER
FRIDEN DIVISION

CIRCLE 67 ON READER CARD

HIGH SPEED COMPUTER DISPLAYS
COMPATIBLE WITH NEW HARD COPY UNIT

The Tektronix 611 Direct-View Bistable Storage Unit displays complex graphic and alphanumeric computer outputs. This low-cost, high speed storage unit eliminates costly refresh memories and minimizes the information rate requirements of the data source. In most cases the high speed display rate of the 611 is faster than the computer algorithms producing the display. Resolution permits displays of 4000 clearly legible characters.

After the display is written once, it is retained and may be viewed for at least 15 minutes without refreshing. This means full-time flicker-free displays with part-time computer attention. To you this means:

- new savings in display & programmer time
- new display convenience & versatility
- new savings in computer core requirements.

PERMANENT COPY—when a permanent copy is needed, the new Tektronix 4601 Hard Copy Unit will produce an 8.5 x 11 inch permanent, reproducible copy in just 18 seconds.

With this new hard copy capability and the 611 Storage Display Unit, your computer may seldom have to write the same display more than once.

For a demonstration, contact your nearby Tektronix field engineer or write: Tektronix, Inc., Box 500, Beaverton, Oregon 97005. See your 1970 Tektronix catalog for specifications.

Type 611 Storage Display Unit $2695
New 4601 Hard Copy Unit $3750

Available in U.S. through Tektronix lease plan.

U.S. Sales Prices FOB Beaverton, Ore.

TEKTRONIX®

committed to technical excellence

(611 Mod 162C pictured with 4601)

See The Tektronix Display At WESCON Booth 160 - 161

WORLD ROUNDUP

ICL GETS FOOT IN SOVIET DOOR

ICL has delivered four Systems 4s worth $5 million to Russia. The largest is a 262K Model 70 which went to the Institute of Management Control, dp adviser to a number of central state departments and industries. Another machine went to the Soviet Central Economic Planning Authority. Most important is the official accreditation granted to ICL by the Soviet Ministry of Foreign Trade. This gives ICL the rare advantage of being able to set up permanent offices in the Soviet Union and take on Russian personnel for administrative work and for computer training. Perhaps the biggest benefit will come from having Russian employees available to help with the detailed work of submitting tenders correctly.

SIEMENS JOINS THE FRONT-END CROWD

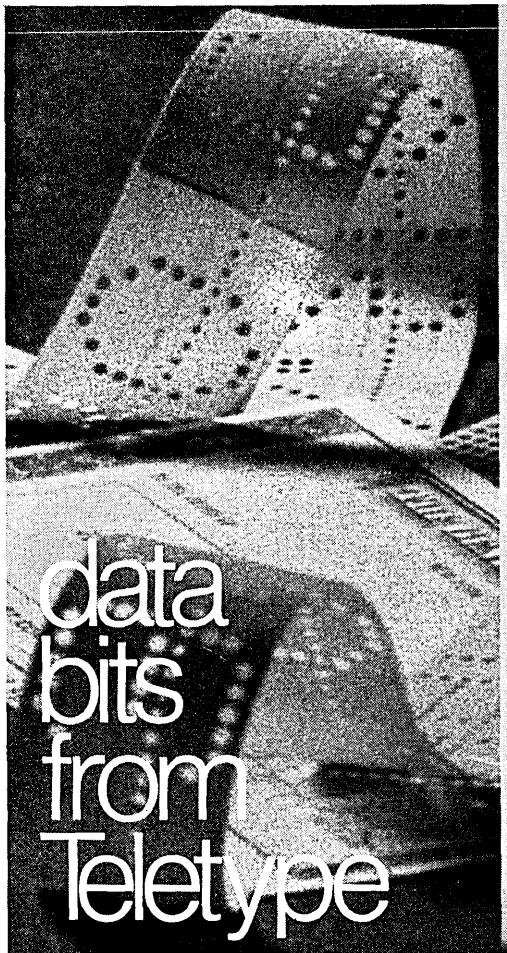
Siemens has joined the crowd hooking small processors as "front-enders" to special computer-communications systems. The German firm has produced the only processor, the DC100, specifically designed for such purposes. It's a trend summed up in Europe by the phrase, "any similarity to DEC is purely intellectual." The latest installation planned with a DC100 is for a specialized service in Copenhagen called Fourth Market Systems which carries information on international share-trading activities for big institutions involved in worldwide investment. The service is called Isabel (for international stocks and bonds electronic linkage) and it uses a Siemens 4004/45 main processing unit. The purpose of the front-ender is to automatically actuate customers' terminals when data of special interest is available.

AS DISSENTING NOTES SOUND IN UK

An interesting sidelight has developed in the planning of Computer 70 to be held Oct. 5-9 in London and currently shaping up as the biggest computer show outside of the JCC's. Dr. Barnes Wallis, approached as a possible opening speaker, balked on the grounds he believes current trends in computer usage could stifle creative imagination. Dr. Wallis, an aircraft designer who produced the first swing-wing models in the early thirties, is still designing though past his seventies. He sees danger in the proliferation of terminals which he feels could chain a potential inventor to his console in a kind of intellectual wilderness. Dr. Wallis has an indirect sympathizer in Dr. Christopher Strachy of Oxford Univ. who, while he gave one of the first treatises on time-sharing at a '59 conference, has been labeled in recent years as a time-sharing opponent. His criticism is aimed at systems which attempt to "carry every bell and whistle"—general-purpose systems on very large machines which can keep only a handful of people occupied at one time.

AND COMPUTER 70 TAKES SHAPE

Computer 70 will include exhibitors from Belgium, Canada, France, Germany, Holland, Israel, Italy, Poland, the U.S. and the U.K. Conference sessions are being run in two parts as a series of management seminars for one and more practical workshops on operations and applications for the other.



data bits from Teletype

payout time cut from week to 24 hours

A large insurance company with over twenty benefit paying offices across the country has slashed payment authorization time from seven days to 24 hours or less using Teletype® equipment and a computer.

Local offices put benefit application data on punched paper tape. The tape is placed in a Teletype terminal's tape reader at the end of each day. Then the home office computer automatically polls each unattended terminal during the night. The entire data collection process runs about 1½ hours.

The computer sorts incoming data by policy number and produces all of the significant facts required to make accurate payment decisions. This data is transmitted to the local offices where it is reproduced in easy-to-use page copy form by Teletype automatic send-receive sets. Helping the insurance company provide the type of payment service policyholders really appreciate.

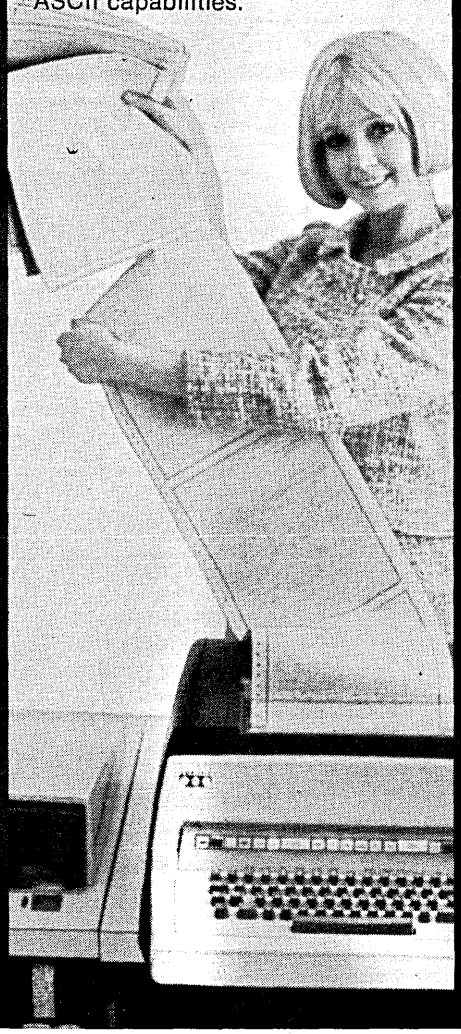
finicky forms filled on-line

The model 37 has a large number of interesting data communication capabilities. One that means business to many people is its ability to produce multiple copy business forms on-line.

This heavy-duty terminal has: horizontal and vertical tab stops that can be set on-line by operator or any remote terminal using ASCII code. Full and half-line space (forward or reverse). Optional pin feed platen and form feed out control. Types in upper and lower case. Sends and receives data at 150 wpm. It really makes form filling operations fly fast.

With the model 37 it is even possible to add up to 32 special characters to the normal compliment of letters, numerals, symbols and punctuation marks found in its typebox.

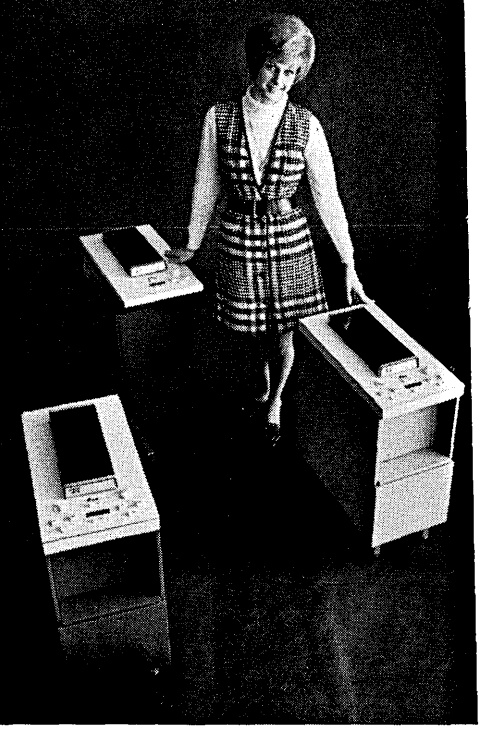
It's a great time-sharing tool, too. The first terminal that enables you to take full advantage of ASCII capabilities.

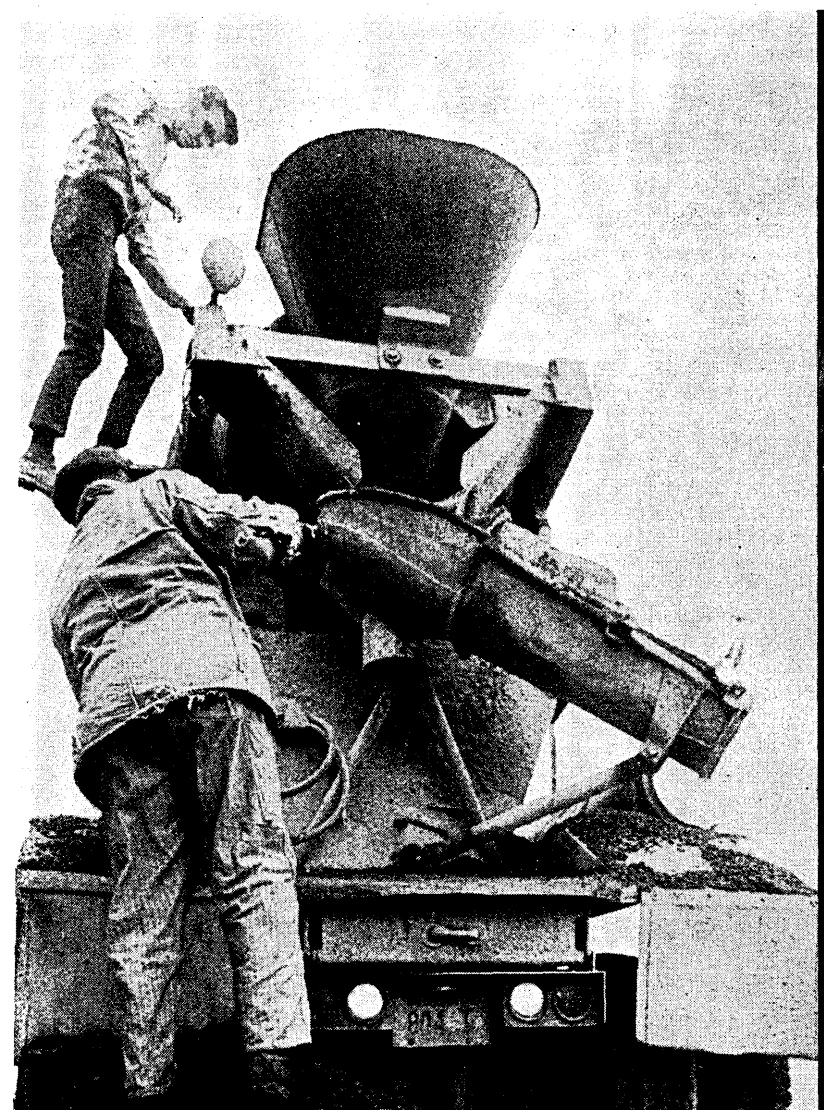


new magnetic tape data terminals

Visualize 150,000 characters of information tucked neatly into a compact 3″ by 3″ by 1″ tape cartridge. Making data easier to use, move, handle and store. A reusable tape that brings new economy to communication system operations. Teletype magnetic tape data terminals give you these important benefits, plus on-line speed capabilities of up to 2400 characters per minute.

These magnetic tape terminals are compatible with Teletype model 33, model 35, model 37 and Inktronic KSR equipment. Will send and receive data at both high and low speed. Tape recording, loading, message search, editing and other related functions are extremely simple.





fast data flow keeps cement on the go...

One of the nation's largest cement and building materials producers uses Teletype equipment and a computer to help keep its vast marketing complex under control.

Company manufacturing facilities, warehouses and sales offices span from Hawaii to Florida. Teletype tape-to-tape terminals and automatic send-receive sets are used to move order, billing, and shipping data, as well as administrative information. Teletype terminals are also used as a management tool to generate financial, statistical and marketing data using a time-sharing computer.

Taped order information sent to manufacturing and distribution centers is received by Teletype equipment that produce it on multiple-copy business forms. Making possible far faster customer service and improving operational efficiency.

recommended reading

Teletype has a number of brochures on equipment, applications, and case history data. A short description of what is available is contained in: "How to get answers to your questions about Teletype equipment." Write for your copy.

Teletype data communication equipment is available in send-receive capabilities of up to 2400 words per minute. Included are hard-copy, magnetic-tape and paper-tape terminals, error control devices, options and accessory equipment to fit most data communication system requirements. For information, write:

TELETYPE CORPORATION
Dept. 81-14, 5555 Touhy Ave., Skokie, Ill. 60076

machines that make data move

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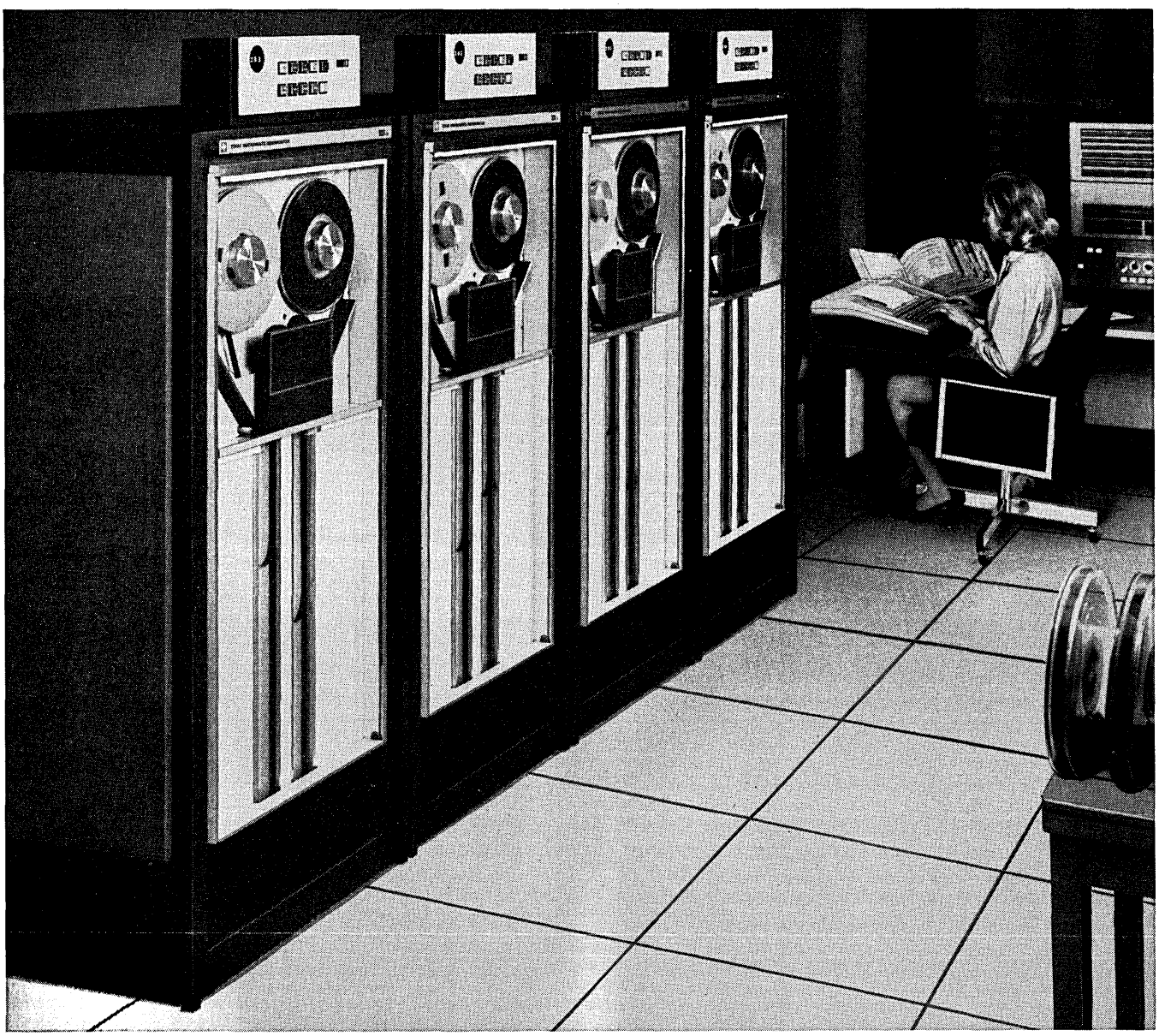
Low cost plug-for-plug replacement of System/360 original tape units from TI!



Unplug the original tape units, plug in the Series 924 Magnetic Tape units. Your System/360 gets better performance at lower cost. Whether you lease or purchase, the new Series 924 units offer a lower price than original equipment (as much as 50%), and better performance in tape and data handling.

Your tapes will last longer, data transfer will be more reliable and routine maintenance requirements will be lower. If you are considering updating or enlarging your System/360, or if you simply want to reduce costs and tape-unit downtime, get the facts from Texas Instruments!

Write or call Digital Systems division—Houston. Texas Instruments Incorporated, P.O. Box 66027, Houston, Texas 77006 (713-526-1411). Ask for data about the Series 924.

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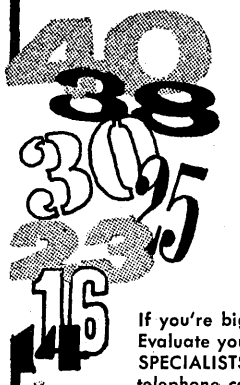

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PEOPLE

A couple of perseverin' women have made good. **Muphen** (that's right) **R. Whitney** has become executive vice president of Princeton Informatrix, Inc., N.J. computer service organization, where she will have responsibility for long-range planning in capitalization and expansion as chief executive officer. Miss Whitney had her own computer consultancy before joining PIi (sic) as a marketing manager, worked as a systems analyst in Washington, Oregon and Massachusetts, where she also was active in politics. . . . Chairman of the board is now the title of Miss **Jacqueline Sher,** who was already president of Madjac Data Co., Inc., a dp complex based in New York's Jackson Heights. Madjac is publicly owned (OTC). . . . **Clifton W. Sink** has been elected president/gm of Digitronics Corp.'s division of the same name, an Albertson, N.Y., manufacturer of data acquisition and communications equipment. He succeeds **Richard W. Sonnenfeldt,** who is going on to an executive post with another undivulged organization. . . . While DPF&G continued presidentless as it looked for somebody to replace recently resigned **Harvey Goodman,** the board elected **Norman W. Usher** to be vp of leasing, the more profitable part of its operations. Usher joined the company two years ago after a 10-year hitch with IBM. . . . Wang Laboratories, Tewksbury, Mass., has appointed **Joseph H. Nestor** to be vp of its technical division. He was previously in Europe for two years, opening Wang's 15 offices there. **Dr. C. A. Christy** has been named president of a Wang subsidiary, PHI Computer Services, Inc., software consultant and system marketer with a data center in Arlington, Mass. He was the designer of TELEBATCH remote batch processing service. . . . **Donald J. Birmingham** will be responsible for new hardware and software products as vp at Data Pathing, Sunnyvale, Calif., manufacturer of source data collection systems for industry. He was in at the founding of DPI in 1965, previously served with GE in Phoenix. A leasing operations subsidiary, DPI Systems, Inc., will be under president **Peter J. Davis,** formerly vp/gm of Delaware Industry Financial Corp., who also has IBM and Remington Rand experience. . . . **Frank S. Wyle** has stepped aside as president of Wyle Laboratories, in L.A., to let **Stanley A. Wainer** be promoted to that position. He remains chairman of the board and chief executive officer. . . . In Dallas, Computer Dimensions has shifted exec vp **Edward F. Verdesca** to be president of the firm's L.A. timesharing subsidiary, Action-On-Line, and has secured the services of a 27-year Chrysler veteran, **Lester W. Piot, Jr.,** as president of Investment Controls, Inc., a recently acquired subsidiary in Detroit. Piot was marketing manager of Chrysler's parts division. . . . In Kansas City, Mo., **G. Jack Lorenz** has been promoted to president of United Computing Systems, Inc., nationwide t-s firm. He succeeds **Darwin H. Deaver,** who remains an exec vp of parent United Utilities, after the resignation of other exec vp **Douglas Gleason.** . . . **Lester A. Probst,** 37, has been elected president of Numerax, Inc., an Englewood Cliffs, N.J., software and consulting firm that has developed, among other things, a quick rate service for avoiding tariff snafus in the shipping and transportation industries. He succeeds **William D. Smith,** 34, who will now be treasurer. Probst previously was with RCA, as manager of communications software support, and prior to that at Auerbach. . . . The project supervisor who was in charge of the development of ENIAC, **Dr. John G. Brainerd,** has resigned as director of Univ. of Pa.'s Moore School, although he will remain at the school as a professor. He is succeeded by **Dr. Harvey L. Garner,** formerly professor of electrical engineering and communication sciences at the Univ. of Michigan. . . . The newly created post of deputy managing director of the American National Standards Institute has gone to **G. F. Hohn,** ANSI's manager of technical operations since last year. It was regretfully learned that **Charles E. Ginder,** who had been in charge of ANSI's information processing section, and responsible for standardization activities, died of a heart attack while attending a Berlin international standardization meeting.

In the beginning...

The birth of a contract creates an exciting atmosphere for professionals. Opportunity, a chance to show what you can do, room to grow; these are the working conditions that everyone is looking for, but few find. Honeywell's Marine Systems Center has recently been awarded a major portion of the Navy's DD-963 shipbuilding program and is offering this and more; a place to live as well as work. Located in West Covina, just twenty freeway miles east of Los Angeles, Marine Systems Center lies in the center of the most versatile living area in the country. Skiing or surfing are both less than one hour away. The excitement of the city or the peace of the country provide residential areas that are convenient to your work. What's required of you; the ability to perform with excellence and the desire to succeed. Interested? We have a challenging future for:

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J. A. Laurin, Employment Supervisor, Personnel Office, Honeywell, Inc., Marine Systems Center, 1200 E. San Bernardino Rd., West Covina, Calif. 91790
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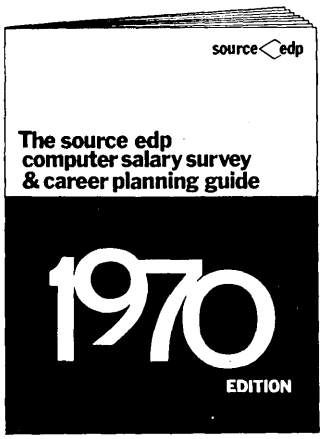

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Gap wideners welcome.

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The field: large, time-sharing multi-function, multi-user operating systems.
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We are vitally interested in EDP professionals who can design computers and the software for them, so that we can stretch our substantial lead. With some emphasis on software design automation.
If the idea of staying out in front of the industry has a special interest for your far-reaching mind, come help widen the gap.
Your experience should be in any of the following: programming; language processing; control systems; operating systems; utility systems; communications systems; micro-programming; field sales and system support; education or product planning.

Write to: Mr. Thomas Beckett, Dept. 18,
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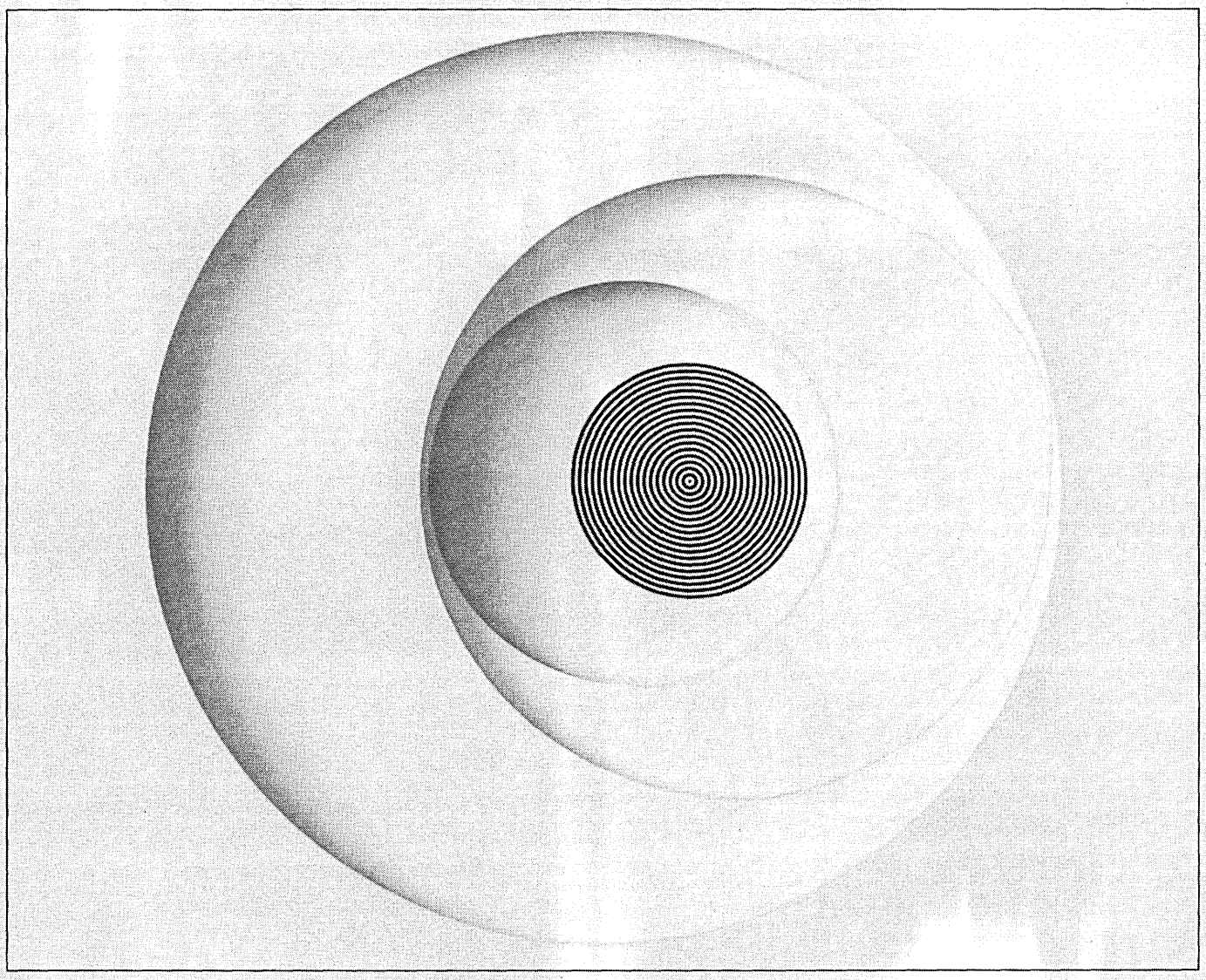

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FOR VIATRON CIRCLE 95 ON READER CARD→

THE SECOND IN A SERIES OF SYSTEM 21 REAL-LIFE SUCCESS STORIES

VIATRON VITALIZES DATA CENTER.

For Internal Datacenter, Inc.

System 21 guarantees 100% accuracy, saves 30% on overhead, and reduces labor by 25%.

The beginning

Ronald S. Terry, president and founder of Internal Datacenter, Inc., Palo Alto, California, had been aware of the wonders of VIATRON for some time. But like many, he had questioned all the claims he had heard and read about VIATRON'S System 21. He wondered about the claims of low cost, greater throughput, zero error rates, ease of operator training, and all the rest. Today, Ron is a true believer in the VIATRON Distributed Data Processing concept.

Why?

Because all the things you've read or heard about VIATRON's product performance capability are true. Witness what Ron Terry says today about these claims:

Low Cost

"After checking out the production of traditional keypunch methods and comparing them to System 21, I realized my overhead would go down by 30%. And it has."

Greater Throughput

"The fantastic increase in throughput with System 21 has been a key in attracting many of my larger clients. Without System 21 this would not have been possible."

Zero Error Rate

"With System 21 IDI now offers the impossible guarantee: 100% error free output."

Ease of Operator Training

"It took only eight hours of training by ADATA (a Viatron Dealer in San Jose) to develop productive operators."

The VIATRON equipment which has produced these results includes four Model 2111 Data Management Stations equipped with Card Reader/Punch Adapter feature for outputting directly to punched cards. IDI is soon to increase their flexibility by a Computer Compatible Tape Recorder which will further decrease their turnaround time.

The ease of rapidly changing from one format to another allows IDI to guarantee their 100% accuracy despite a wide range of source documents. In a given day IDI operators are faced with credit application forms, prescriptions, program coding sheets, hospital charge slips, and a variety of accounting documents for several large electronics firms.

From a single VIATAPE cartridge an operator can automatically call in any one of over 200 formats. This function allows an easy, fast transition from coding sheets, to prescription forms to credit card applications.

With VIATRON's "fill in the blanks" capability inexperienced operators produce error-free output without the necessity of several hours experience with the same form. If an operator senses she has made an error a quick glance at the screen indicates the character in question and she then merely rekeys the correct character.

By retaining the customers' data on VIATAPE cartridges, IDI is always able to recreate automatically any files customers deem necessary for security or audit trail reasons.

IDI is cashing in on the unique flexibility of System 21 by utilizing all of its advantages. Its basic dependability. Its low cost. Its ease of operation. Its cost savings. (IDI conservatively estimates that some 200 man hours a month are saved by using System 21.) Its faster throughput and decreased turnaround time. (Data can be entered and manipulated faster and more accurately.) In fact, Ron Terry of IDI is so impressed with the many advantages and uses of System 21 that he's already made plans to phase out other equipment and replace it with VIATRON. He is also planning to install a VIATRON computer in the summer of 1971 so that he may offer his clients still more service.

What's IDI?

Internal Datacenter, Inc. is a new (just under one year old), rather unique data processing service company. Actually it's two organizations in one. IDI is a keypunch and data entry service bureau offering low-cost keypunching, key verifying, key tape and advanced data entry services. Internal Datacenter Institute (a division of IDI) is an education center which recruits and trains qualified applicants in all facets of data entry operations. The Institute is the only known school that makes a specialty of teaching minority groups and handicapped individuals the use of distributed data processing techniques. And Ron Terry is a man among men. He has built IDI entirely on his own without any outside help. He's making it a success. VIATRON is an important part of that success.

Who profits?

Everybody profits from VIATRON's Distributed Data Processing concept. The user, in this case Ron Terry and IDI, because of the increased throughput, unmatched accuracy and low cost. The VIATRON dealer, in this case, Hersch Hood and ADATA, because he knows that as soon as System 21 goes on-line there's another satisfied VIATRON customer. And VIATRON, because we know that we have developed the first truly modern, low-cost approach to data entry and that it will help all of us realize the tremendous potential of large-scale computerization more quickly and more economically in the years to come.

Yes, VIATRON has literally given new life to Internal Datacenter, Inc. and it can do the same for your business. Contact your local VIATRON dealer and ask him about the System of the 70's. He'll analyze your needs and recommend the best solution. You'll find a complete listing of authorized VIATRON dealers on the following page.

VIATRON

SYSTEM 21

The standard of the 70's

Here are the VIATRON dealers who can help you put new life in your data processing.

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Beltsville, Md. 20705
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SYSTEM 21

The standard of the 70's

***Certified by VIATRON to provide customer training on System 21.**

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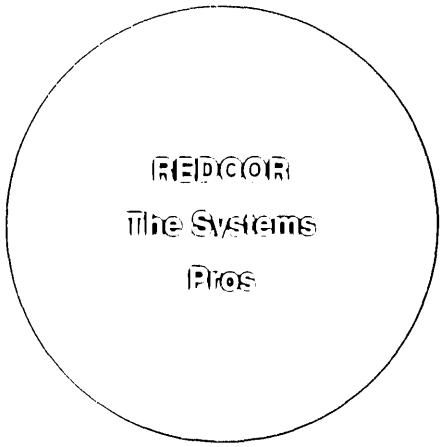

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