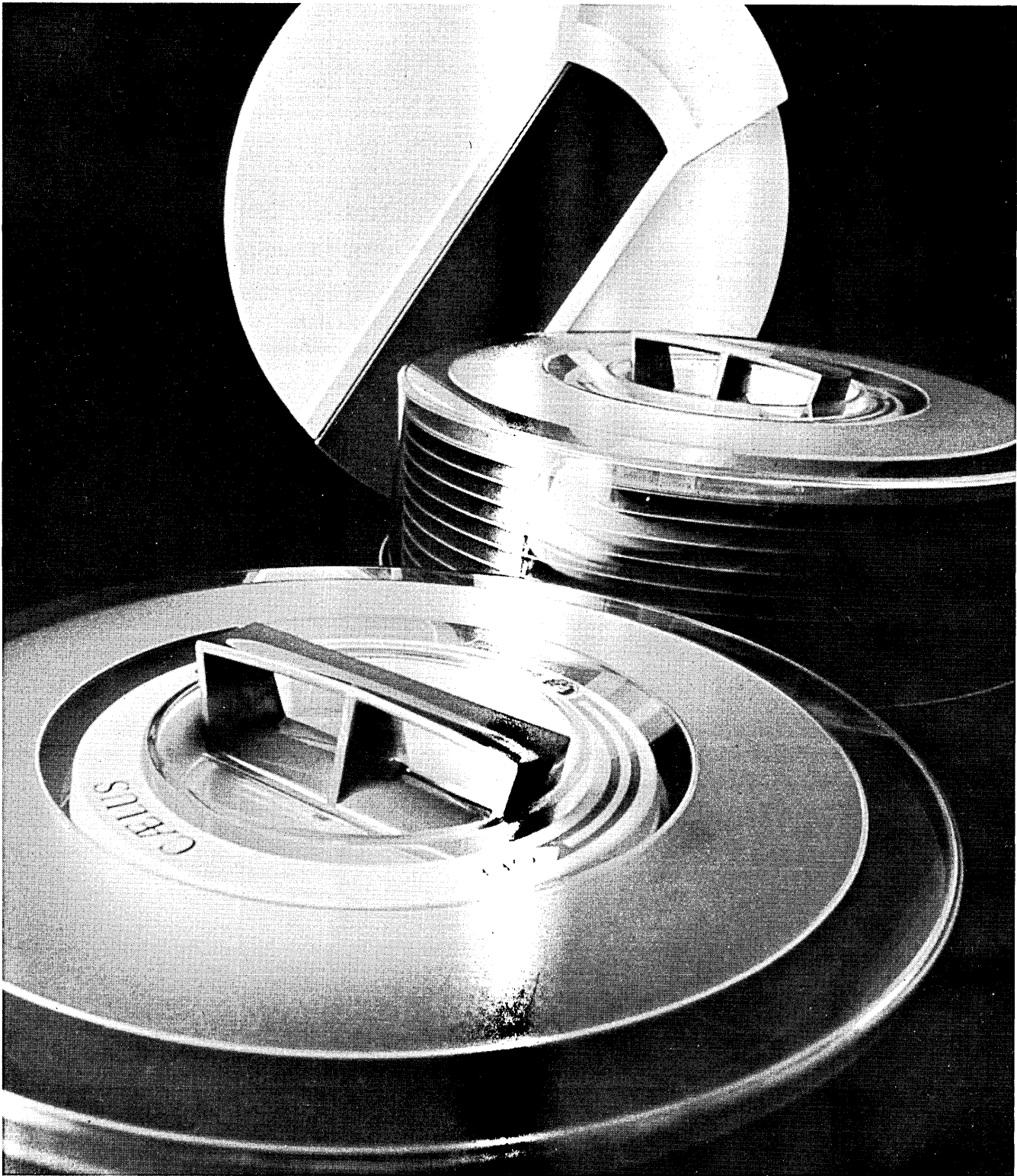


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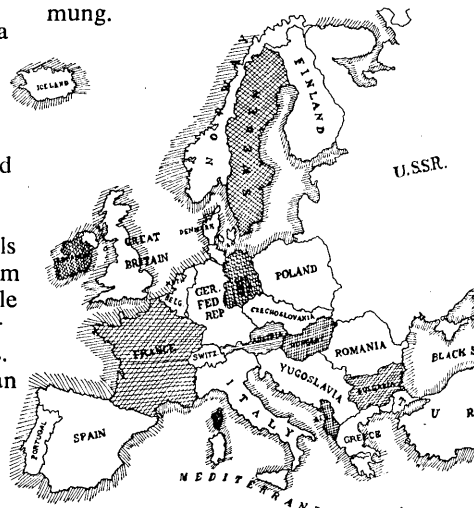
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# DATA<sup>71</sup> MATION<sup>®</sup>

**JUNE 15, 1971**

volume 17    number 12

## **G**ENERAL

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PHIL HIRSCH. The Nixon administration has far-reaching plans for criminal justice information systems, but they are far from complete and face many unresolved problems — not all of them technical.

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CMDR. STEPHEN R. RUTH. It may be a few years before plans for your glittering new system materialize. In the meantime, there ARE things you can do to make the wait less expensive.

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IBM's counter suit against Control Data Corp. could be called an "eye for an eye action." It could accomplish many things for IBM outside of court, says one lawyer. Clean hands are IBM's latest demand of the rest of the industry.

Sole source upgrading of dp systems in the federal government may soon be ruled out. From a number of agencies have come reports, recommendations and rulings which could lead to greater centralization of federal dp management effort, a better break for non-IBM manufacturers and better deals from IBM.

### **About the Cover**

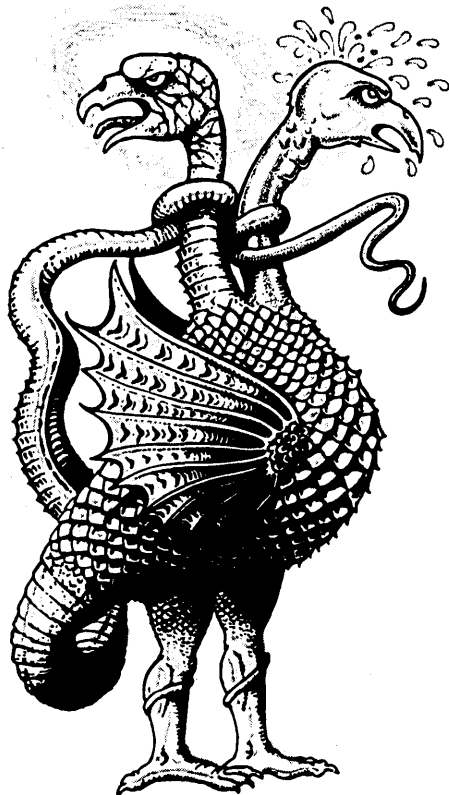
In the struggle to save our criminal justice system, the problem is to automate not justice, but the information systems meant to serve it. Our design is by Barbara Benson.

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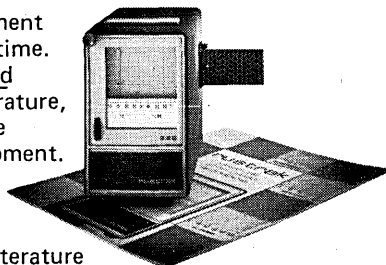
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CIRCLE 48 ON READER CARD

# DATA<sup>®</sup>MATION

## JUNE 15, 1971

volume 17      number 12

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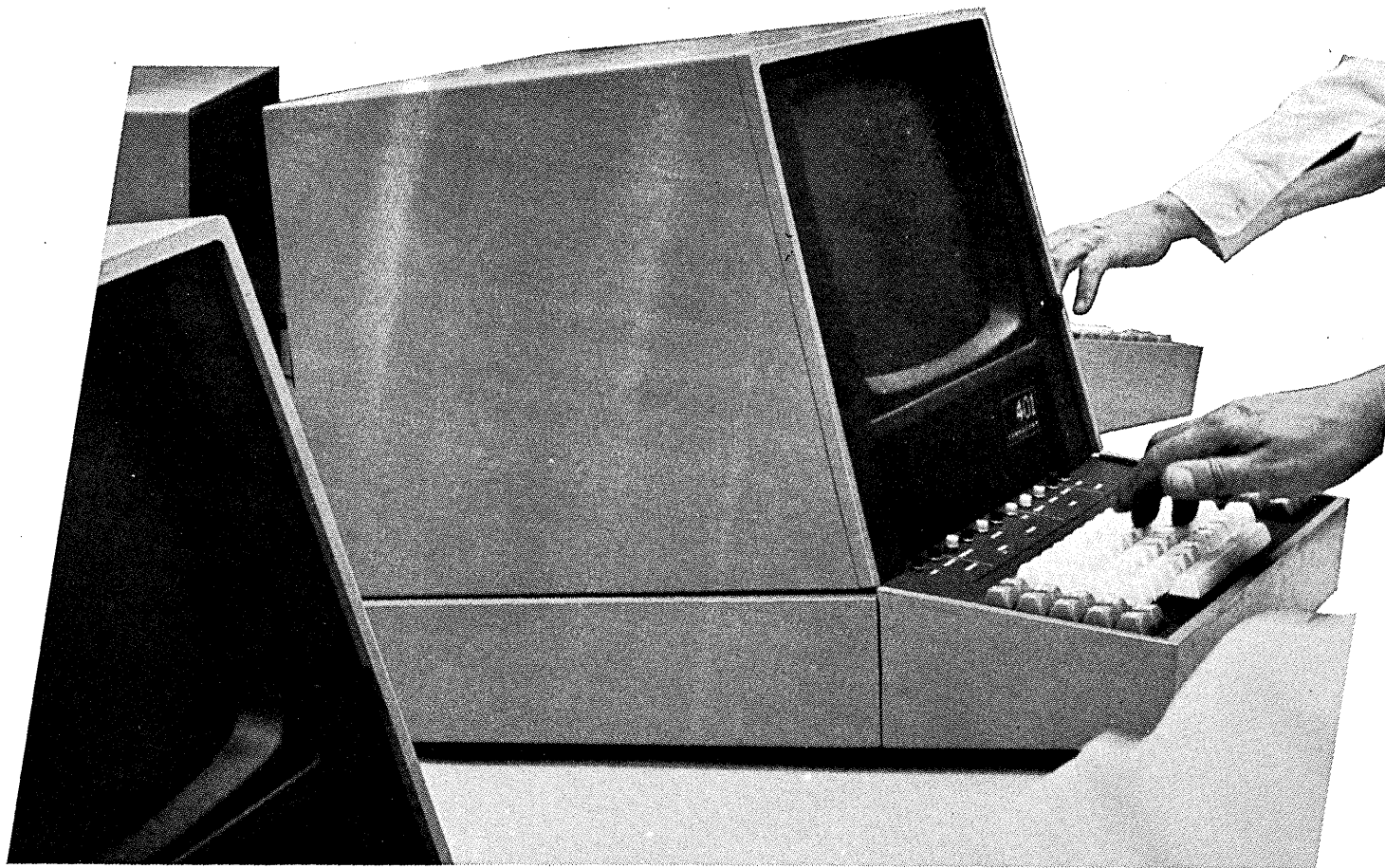


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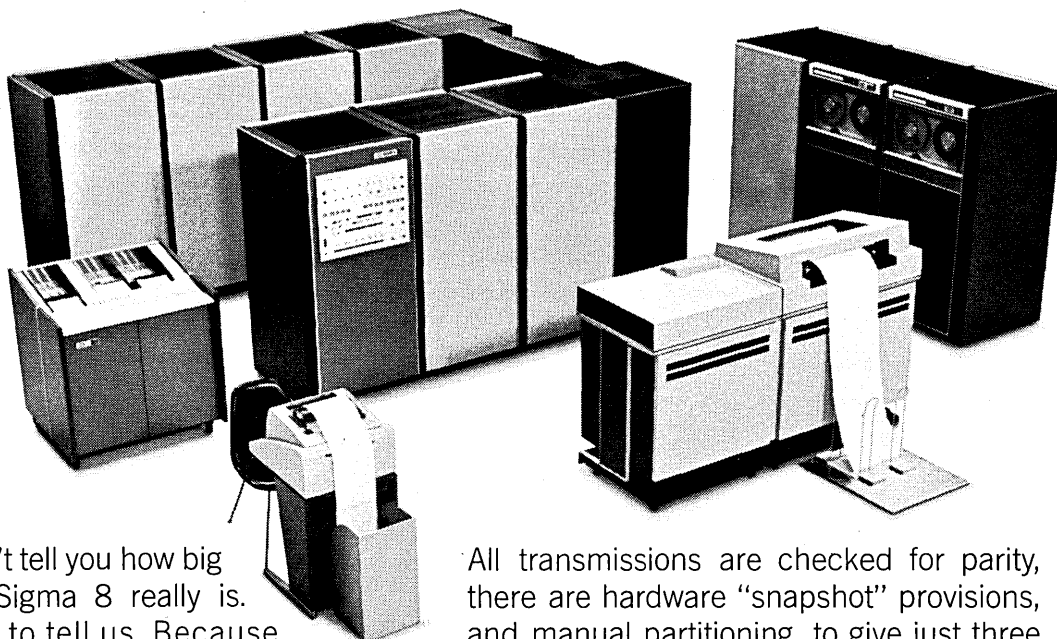
June 15, 1971

CIRCLE 44 ON READER CARD

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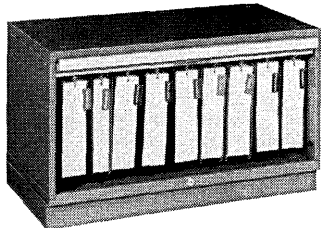
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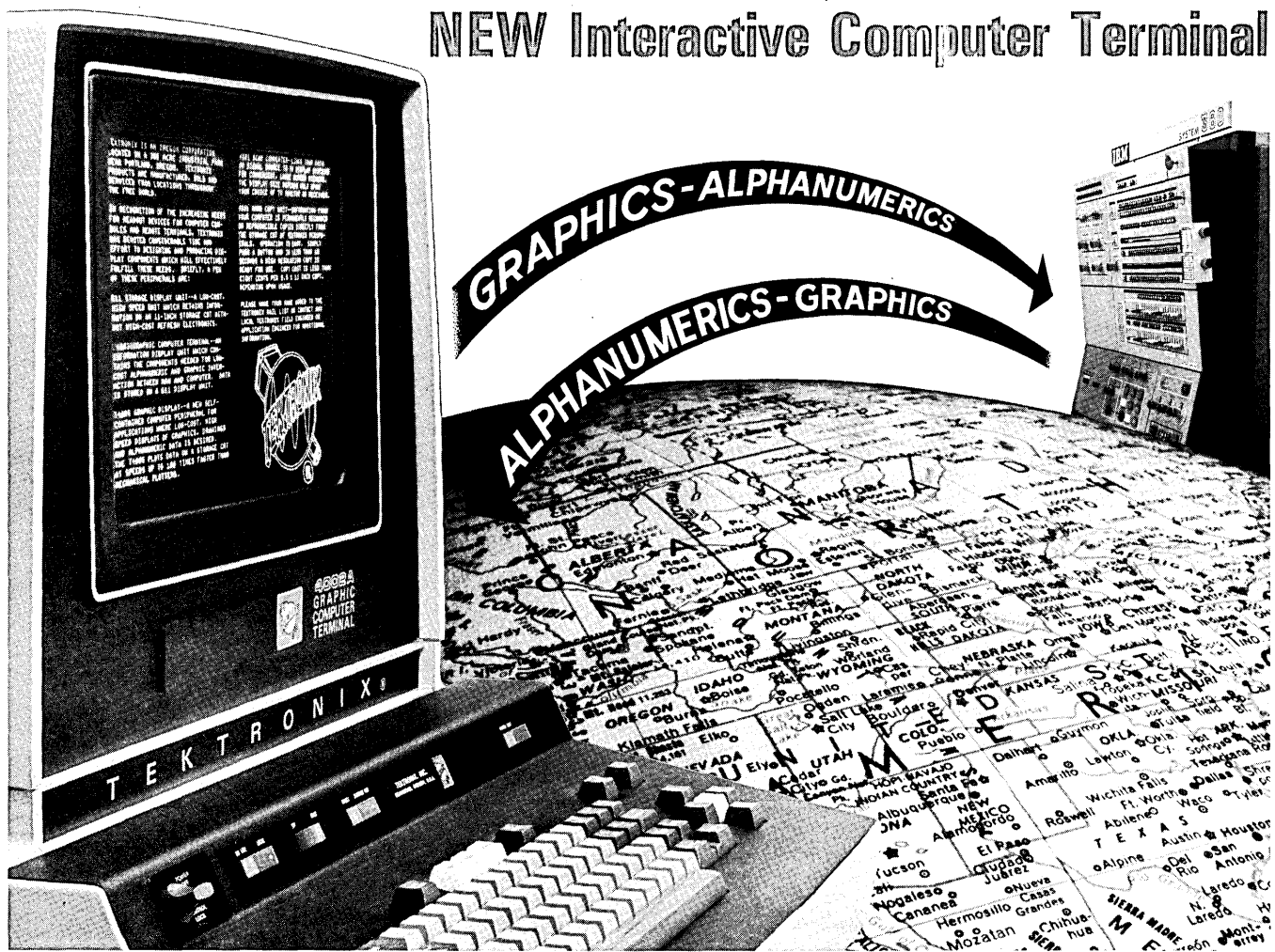
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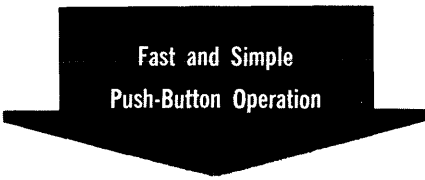
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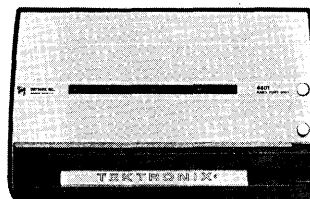
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# LETTERS

## Post boned

Sir:

In your April 15 issue (p. 85), you featured pictures of Dick Baily and John McGeachie in your People column.

Congratulations to both gentlemen on their new posts, but you failed to mention the story behind John.

A. P. WEEKS  
*Los Angeles, California*

John S. McGeachie is the new director of Dartmouth College's Data Processing Center at Hanover, N.H. We thought everybody knew that.

## Aftershock

Sir:

I was pleased to note your recent News Scene article (April 1, pp. 50-51) concerning the L. A. earthquake referenced the dynamic analysis approach for high-rise buildings. This digital computer method, which subjects an appropriate engineering model of a building to simulated earthquake motions, is an excellent structural analysis approach. However, it should be noted that such dynamic analyses are not new, and have been utilized by various firms for some time. For example, the procedure was used in the analysis of a major San Francisco building (43-story) in 1964. Here in Colorado, which is considered minor earthquake country, one of the first multi-story buildings in this rather small city (60 miles north of Denver) was dynamically analyzed by our firm in 1967.

Those engaged in earthquake research have for years been promoting dynamic analysis as a realistic approach to obtaining earthquake-proof structures; your article cannot but help in this regard.

KENNETH MEDEARIS  
*Fort Collins, Colorado*

## Statutory rap

Sir:

While I am not and perhaps never will be of the stature of Dan McCracken in the computing industry, some years of programming, analysis, and management at a reasonably sophisticated level have reinforced

certain obvious truths for me.

Just as with doctors and lawyers, there are good, bad, and mediocre computing personnel. Corollary: A full (yes: no more, no less) 50% are below the median level of competence in any skill area and in any particular mix of skills. Certainly different mixes imply different median levels; however this does not obviate quality considerations even in a high median mix. Would just any brain surgeon be satisfactory?

I have come to know a few programmer/analysts of diverse orientations in other respects who have the common attribute of making inordinately few computing implementation errors: not by their claim alone, but in practice. My contacts are not broad in relation to the industry as a whole; so I am positive that other such people exist.

It appears that this skill is independent of intellectual capabilities balance, preferred methodology, and industry orientation of the individual—e.g. logical vs. memory “strength,” flowchart first vs. program first, scientific vs. commercial. Of course neither precision or the lack of it is



limited to the computing professions, but that is what is in question here.

If a group of such people at the various required levels can be assembled, albeit not at a small cost, this group may find itself in demand beyond its initial project and purpose. It may remain together in the usual organizational sense as a valuable resource.

There are special machine shops which do precision work. Their resources are special machines but also the exceptional machinists who are careful in their work and run the machines. If the ABM is desirable to the extent of the dollar costs for hardware alone that are bandied about, would not the government be willing to spend the amount needed to assemble such a group of computer people—people not necessarily distinguished by or expensive be-

cause of any qualification other than the fact that they work with virtually no errors.

For what it's worth, I would be personally willing to bet on their success. Dan McCracken's (and everyone's) desired “technical assurance” can come, of course, only after discarding the notion that specifications could never be defined.

PAUL A. ALBRECHT  
*New York, New York*

## On cruxes

Sir:

In the Look Ahead section in your April 15 issue, there was an article on the new CODASYL DBTG Report. The comments in the item are contradictory; but, paradoxically, point out the exact area of controversy over this report.

The introductory sentence says “another step closer to a universal data description language independent of all processing languages.” Later in the item, a comment is made “this extremely important report also contains COBOL language extensions for describing the data in a data base.”

This is the crux of the entire controversy. I would appreciate it if you can explain to me how a universal data description language that is *independent of all processing languages* can be implemented through *COBOL language extensions*. It would appear to me that if language extensions are necessary, the data description is not independent of processing languages, and vice versa.

The item goes on to state that “the committee hopes this work will be the basis for such extensions in other languages.” If language extensions are required, then what price “universal data description language?” What happens to existing source language programs—must they all be rewritten?

W. D. STEVENS  
*Tulsa, Oklahoma*

To clarify, according to the original DBTG report: “Specification of separate data description and data manipulation languages is significant in that it allows data base description by the data description language to be independent of the host language used for processing the data. Of course, for this to be possible, the host language processors must be able to interface with such independent description of data.” Hence, the extensions. Constructive alternatives, anyone?

(Continued on page 12)

### Taken to task

Sir:

Your April 15 Look Ahead item, "IBM Doesn't Want to Speak the Language," could mislead many of your readers regarding IBM's position with respect to the work of the CODASYL Data Base Task Group.

IBM made 71 proposals, as you report. You did not report, however, that 70 of them were accepted by the Data Base Task Group and included in its proposal. Rather than "contribute to delay," it would appear—by their acceptance—that our proposals improved the report and were substantive.

Based on our technical evaluation of the CODASYL DBTG proposal, we felt an obligation to users to vote "no" on endorsing the proposal as it now stands. The task group report deliberations did not focus on fundamental architectural considerations that are likely to have long-range impact on data base users. For the past year, the task group's ground rules have precluded much needed on-going discussion of these fundamental architectural considerations.

Because data base applications are an area of such vital concern to the future of data processing, we intend to document our areas of concern—both for the industry and the user—and plan to present our technical evaluation of the proposal and alternative suggestions to the Programming Language Committee of CODASYL.

It is unfair to imply that our position on the DBTG report is evidence that IBM opposes or hinders standards activity. IBM has actively contributed to and implemented ANSI data processing standards.

M. C. SCHEIN

IBM

New York, New York

### Ecology hard knocks

Sir:

As I was reading your April 15 issue on ecology, I recalled an amusing scene near Gary, Indiana. A mobile air-pollution monitoring lab was parked on a street determining what was polluting the air and which direction it came from. I believe that if the engineer had stepped outside the lab, taken a deep breath, and looked around at the smoke belching from nearby steel mills, he could have reached the same conclusions at a lower cost to the taxpayer.

Let's face it, most of the major sources of pollutants could readily be identified by asking the local citizens and supplementing this with observations made in light aircraft and small boats. If qualitative and quantitative measures are needed for prosecution, then let the enforcing agencies affix measuring devices on the sewers and smokestacks. I suggest that the major obstacle to the improvement of the environment is the unwillingness of the enforcing agencies to take a hard line and then to hold their ground against the factories, power plants, governmental units, and private citizens who are polluting the environment. As in a manufacturing organization, it is a waste of money to develop simulation, MIS, and data banks when the



real problem is that management doesn't have the "guts" to develop and implement policies to correct problems which it has already identified without the assistance of such systems.

As Mel Weisburd pointed out in his article, there is a need for systems to help local agencies establish and implement an enforcement or pollution reduction strategy. Let's develop software at this level! An MIS approach at this time would just add more smoke to the already hazy issue of ecology.

RICHARD W. LOEHR  
Rocky River, Ohio

### Traffic display

Sir:

Your various articles on edp and ecology suggest various indirect methods by which computers can be used in environmental analysis, but completely ignore the possibility of applying computers directly to existing problems. Now, any major form of wasting energy uses up resources and contributes to pollution by the waste products generated by the method of producing energy. If computers are used to minimize the wast-

ing of power, they will at the same time decrease pollution at the place where that power is produced.

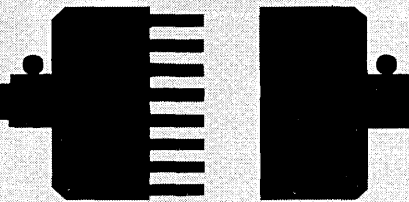
For example, automobile emissions have been reduced in one large metropolitan area by approximately 20% without requiring any changes in any vehicle. This state-of-the-art report was printed in 1969 without commenting upon the effect of the work on environment. In Toronto, an automatic traffic signal control system using a UNIVAC 1107 as a real-time processor had been in use for several years. When they moved the computer they had to switch back to the normal form of signal light control. Of course, they used the results of experience to manually set the lights to near optimum timing (probably far more efficient than any other large city). Nevertheless, their studies showed remarkable differences in commuting times between standard traffic control and computer driven traffic control.

On the average, commuting times were reduced by 20% with some commuters saving as much as one hour through use of the computer. The authors of the article point out that this produced a large decrease in gas expenditures, accidents, and physical depreciation of vehicles. What they fail to notice is that if commuting time is decreased by 20% and gas consumption is decreased by about the same, then automobile pollution is also decreased by about 20%. The net effect of this is similar to reducing smog levels by 20% by removing one vehicle out of five from the roads.

For those interested in a relatively nontechnical description of the application of computers to traffic control, the article mentioned in this letter is "Automatic Traffic Signal Control Systems—The Metropolitan Toronto Experience," by J. D. Hodges, Jr. and D. W. Whitehead, in *AFIPS Conference Proceedings, Vol. 34*, (1969, Spring Joint Computer Conference), pages 529-535. Perhaps individuals interested in environmental improvement might recommend computers for traffic control in their own large city—especially since the saving of commuting time, gas money, and physical and automobile depreciation, coupled with a lower rate of automobile accidents are desirable side effects (from a purely environmental viewpoint).

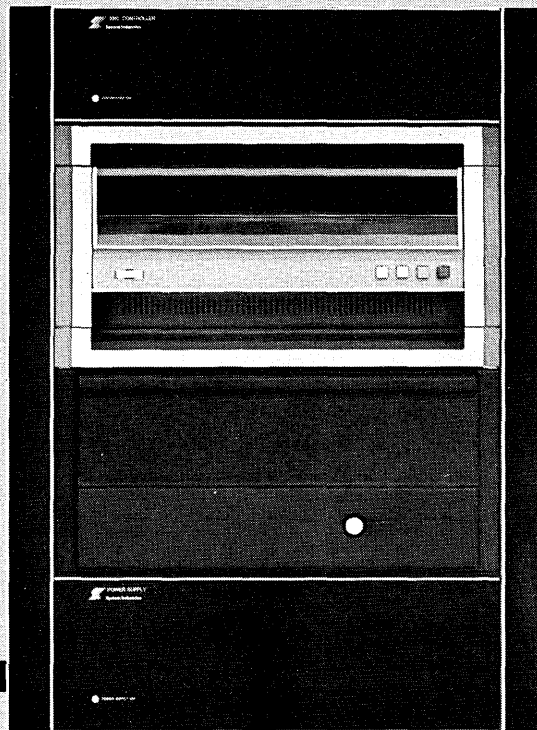
JEROME WENKER  
Los Angeles, California. ■

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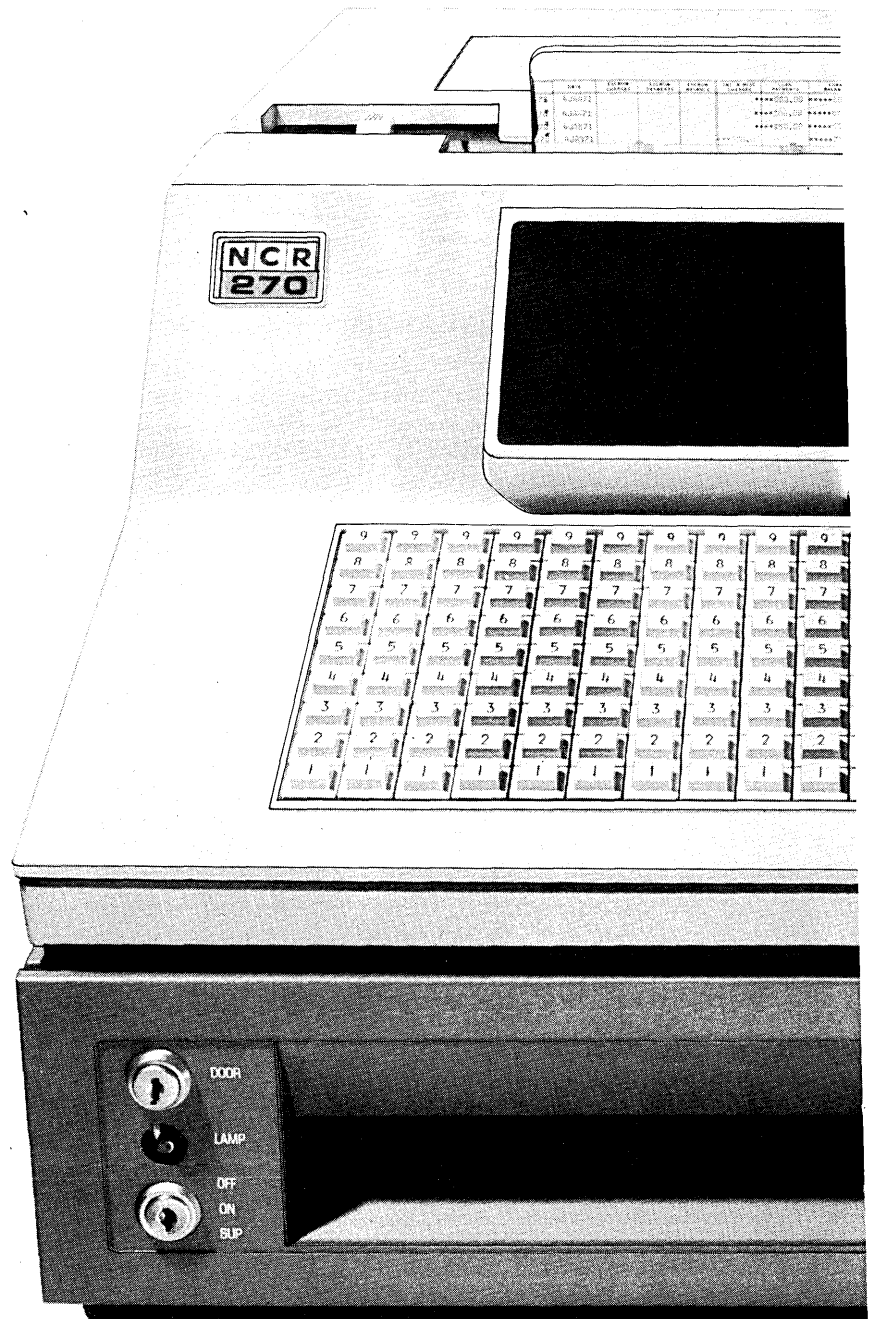
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# 270, its newest terminal. actually teaches as it works.



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interest, even give a detailed report on uncollected funds. Just as fast, the necessary data is relayed back and displayed. That's how the NCR 270 saves your tellers even more steps, your customers even more time.

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**YES! And you can talk back to your computer too.**

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The 4000 answers your call, accepts dual-tone alphanumeric data (from your phone), reads the data back to you *in human voice* and then transfers the verified data into your computer in ASCII. It will also transmit data from your computer directly to you *in human voice*.

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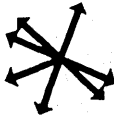
response unit which contains a 36 word vocabulary (all numerals plus alphabet). It's completely compatible with all standard teletype interfaces and I/O software.

An additional 27 word custom vocabulary is available as an option to provide words or phrases to fit your specific needs: order entry, credit and bank account verification, catalog ordering, inventory control, etc.

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INDEPENDENTS EYE IBM  
EAST EUROPE PROSPECTS

IBM-compatible peripheral and core manufacturers are trekking to East Europe to survey prospects there, should the doors widen for 360 or 370 sales. IBM's recent sale of a 370/145 to the Yugoslav Railways (see June 1, p. 56) would indicate NATO countries intend to open eastern bloc sales well beyond the present 360/40 limit. Various sources estimate IBM's force in East Europe at from 350 to 800 people.

AIRLINES SELLING  
OTHER AIRLINES

Actively marketing their automated reservations systems to other airlines are Braniff Airlines of Dallas and Continental of Los Angeles. Braniff's PARS-like "Cowboy" system was sold to Hawaiian Airlines and Texas International. Continental sold its "SHARE" system to Air West, Piedmont, Eastern, and Ozark. Pan American's "Panamac" system is for sale, but is not yet being actively marketed. Meanwhile, in Denver, Frontier Airlines has abandoned plans for its own reservations system and is trying to unload two 360/65s it acquired three years ago under an eight-year lease.

CARRIERS DON'T HURRY  
TO PROTECT LINES

Bell system companies are dragging their feet in delivering connecting arrangements. The delays have forced many switched system users to link independently made modems directly to telephone company lines without going through the data and voice access arrangements specified in the tariff. A major retailer is among the violators. He ordered a type 1001B data access arrangement from a Bell company four months ago and is still waiting for delivery. General Telephone also is reported slow. There is no comment from the carriers.

VENTURESOME MONEY MEN  
STILL LIKE PERIPHERALS

The venture capital specialist who did the Inforex and Storage Technology deals for J. H. Whitney has left that Wall Street firm to form his own company, Ilex Capital Corp., Wilton, Conn. The new firm will provide venture capital and lease financing for peripheral manufacturers. David J. Dunn, president, says top people will continue to leave IBM to form their own firms just as did most of the principals of Inforex, a data entry firm, and Storage Technology, a tape drive maker. Joining them in the new venture is Russell J. Robelen, who headed design of the cpu for IBM's 360/50.

PRINTER IS FIRST OF  
PRODUCTS SEEKING MAKER

Ray Redbeard Larson, remote (Riverton, Wyo.) terminal tinkerer, has left UCC to form LRC, Inc. (for Longitudinal Redundancy Check), a "product investment" firm. LRC will develop products, create or find (and take an equity position in) companies that will make and market LRC products. First is a low-cost (\$700 for oem's) serial impact printer with "unlimited" character capability and a minimum asynchronous speed of 120 cps (they're shooting for 240). Other spec targets: less than 1 cu. ft., less than 15 lbs.,

SCOPE COPES WITH  
PAPERLESS BANKING

132-character line, and print on regular paper with up to three carbons. A prototype is due in August, a working model in November. The price/performance paper specs look good. And Larson might just be able to pull them off. An industry pioneer, he developed the first 2000-cpm card reader and one of the first hand-held digital cassette recorders.

NOW PLAYING  
AT CAESARS PALACE

Paperless entries are on their way in California banking. Following approval of a systems design last month by SCOPE (Special Committee on Paperless Entries), Touche Ross & Co. is proceeding with development of a system which will be implemented by the Federal Reserve Bank of San Francisco working with the Automated Clearing House Assns. of San Francisco and L.A. on a test basis late this year.

HOW THEY GONNA TOP  
THAT IN LAS VEGAS?

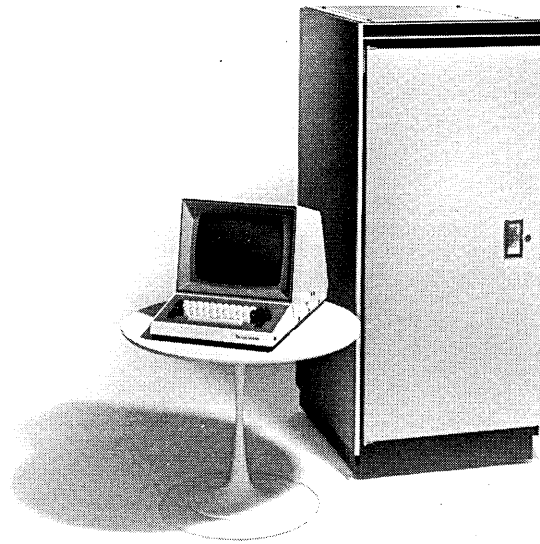
Caesars Palace is installing the first computerized data collection system in Las Vegas. Configured around a Nova minicomputer, it tabulates money, chip, and credit flow at gaming tables. The manufacturer, Centronics Corp., Hudson, N.H., says it is the first of the large "third generation" casino systems for a market which it estimates will reach \$40 million. Centronics has four small systems in operation in casinos in Puerto Rico. The larger one in Las Vegas is called the system 2100.

Red-faced officials insisted they had no idea how it got by. In the first 20 minutes of last month's SJCC in Atlantic City, early birds were treated to an unannounced burst of culture behind a blue-curtained "art exhibit" area of the hall where a naked girl appeared on a television monitor located in front of a screen that had been displaying computer terms. Nearby, a poster proclaimed a "broad jump" contest. It pictured two ladies (clothed) and offered two hours with one of them as the prize to anybody who could jump 83 inches. The "art show," arranged by a Washington, D.C., gallery, obviously had not been previewed for AFIPS officials, who closed it immediately.

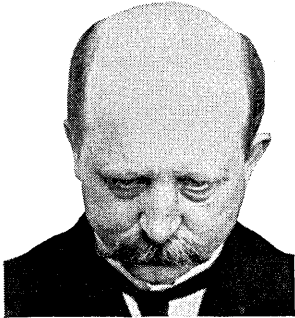
RUMORS AND  
RAW RANDOM DATA

A fiscal year loss of \$180,000, offset by a \$60,000 contribution from AFIPS, is believed to have been suffered by the Association for Computing Machinery, although ACM officials won't talk. The society had expected \$150,000 from AFIPS...Meanwhile, belated discovery of some inept bookkeeping has caused another financial crisis. The ACM bookkeeper is gone, and the auditing firm has assigned a new watchdog for society books...Entrex, Inc., which recently signed with Redifon, Ltd., of England to sell Entrex data entry systems in the U.K. under the Redifon label, is located in Burlington, Mass., next to Inforex and Infoton, two other data entry firms. Says president Barry M. Harder, "If you had a good slingshot you could hit us all. It's a good place for one-stop data entry shopping"...A 370/155 user reports that the system bombed using OS version 20, but 19.6 saved the day.

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MULTIPLE TERMINAL SYSTEM**  
the only 2848/2260 plug-for-plug replacement that...  
...talks directly to the IBM 360/370  
without software modification  
...communicates via multiplexer or selector channels  
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plus stand alone  
...is now operating at customer 360 installations  
at significantly  
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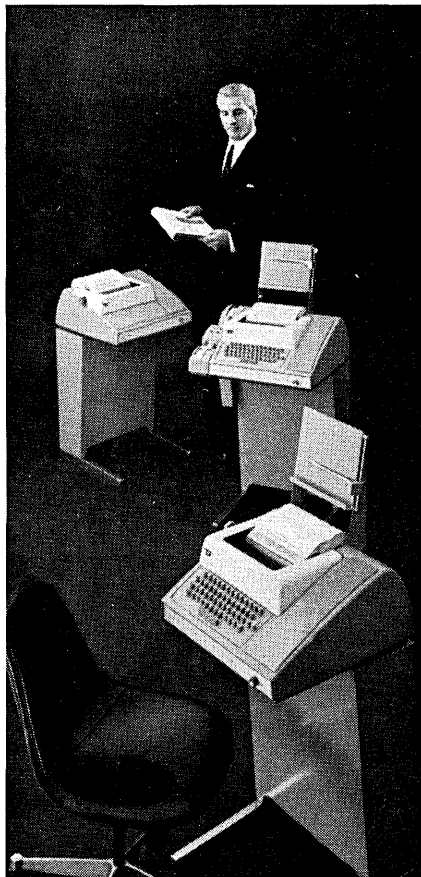


What happened  
to the  
model 19?

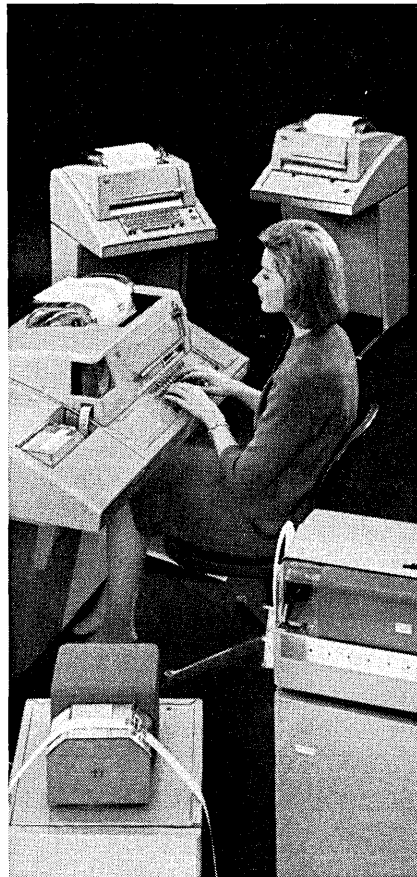
You're looking at some of the Teletype® basics used in building a data communications system. Printer, keyboard, tape sending and receiving combinations in a variety of speed capabilities. Teletype's modular design concept gives you the opportunity to extract the best terminal combination for system

needs today, and refine, add to, subtract and adapt as system modifications are called for. Just as important as the basics, are some of the things not obvious in the photos below. The logic devices, options and accessories that add almost limitless possibilities for making things happen exactly as

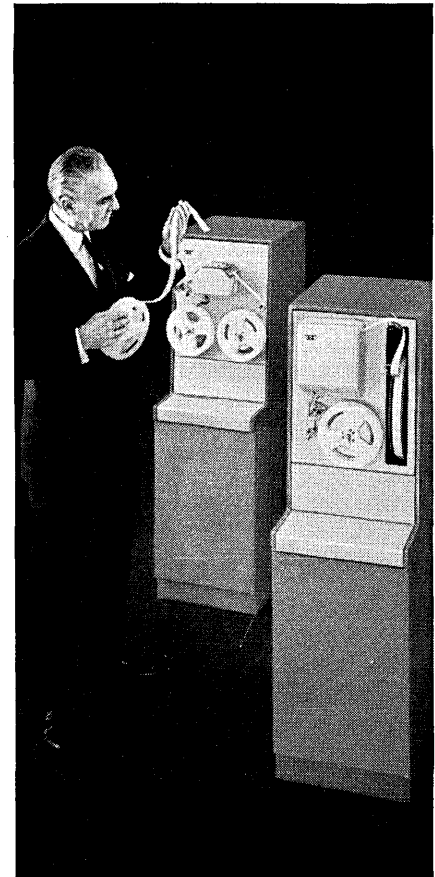
your system requires. We have some solid state logic devices that provide precise control of data traffic. That enable your computer to automatically poll data from a number of terminals and feed each terminal with processed data. There are error detection, correction and signal regeneration options to



*model 33 series: An extremely economical 100 wpm terminal line. Has 4-row keyboard, uses 8-level ASCII code. The most widely used terminal in time-sharing systems today.*



*model 35 series: A rugged, heavy-duty line of 100 wpm terminals. Uses ASCII. Units in foreground are self-contained paper tape punch and paper tape reader.*



*Telespeed™ equipment: A line of high-speed tape-to-tape terminals capable of sending and receiving at speeds of 750, 1050 (shown above), or 1200 words per minute.*

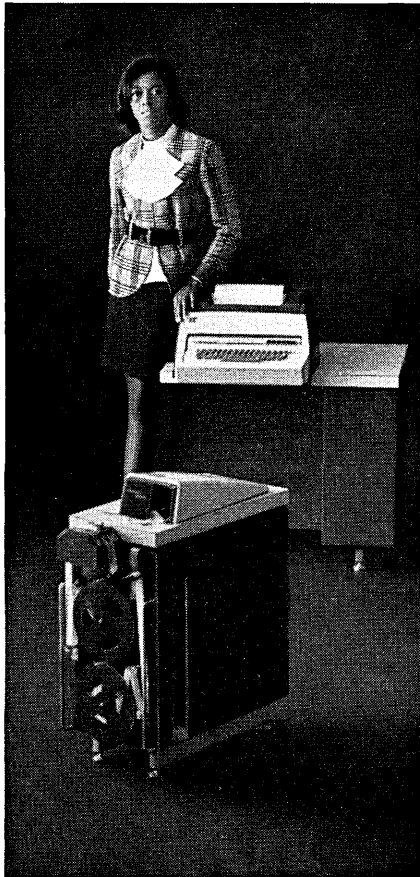
# DATA COMMUNICATIONS

equipment for on-line, real-time processing

keep data flowing faultlessly. Options such as pin-feed platens and form feed controls that make it possible to fill multiple copy business forms on-line. And many, many more. What did happen to the model 19? Believe it or not, there are still some of these old, die-hard terminals around. And that's

another advantage your data communications dollar buys when you specify Teletype equipment. It lasts. Moves data reliably, economically, for a long time. On a price/performance basis, Teletype equipment is in a class by itself.

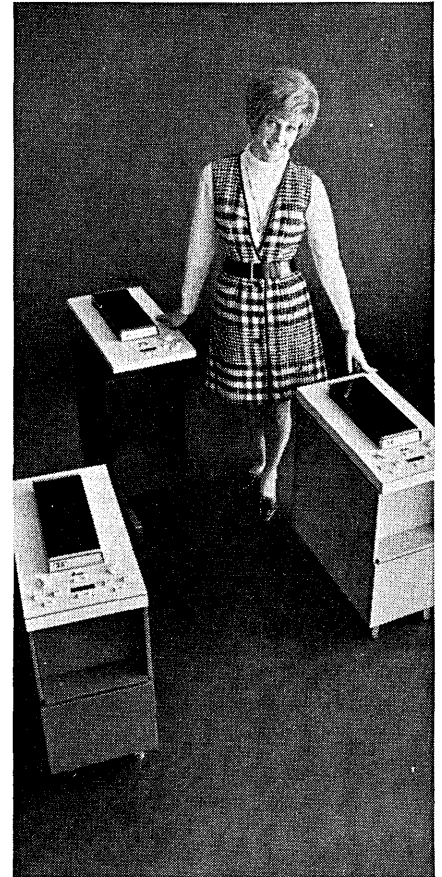
Teletype data communications equipment is available in send-receive capabilities of up to 2400 words per minute. If you would like specific information about any of the equipment described here, write: Teletype Corporation, Dept. 81-17, 5555 Touhy Ave., Skokie, Ill. 60076.



*model 37 series: One of the most versatile heavy-duty terminal lines going. Generates all 128 characters of ASCII. Operates at 150 wpm. Prints in upper and lower case.*



*Inktronic® data terminals: A unique electronic, solid state terminal. Prints up to 1200 wpm. Forms characters through electrostatic deflection (no typebox). ASCII compatible.*



*magnetic tape data terminals: Use compact reusable tape cartridges. Operate on-line at up to 2400 wpm, and connect "locally" to lower speed Teletype terminals using ASCII code.*

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June 15, 1971

**machines that make data move**



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Our R-250 three-speed data recorder you see below has more than enough going for it so it's a standout in any crowd.

As a solo performer, it's a rugged individualist.

But since made to IRIG standards, its character is congenial enough to work compatibly with other components in your system.

(One of the virtues born of its being a member of the large, world-renowned family of TEAC instrumentation products, where synergy is the watchword.)

When put to work by itself or

with other units, in the lab or the field, it provides precise FM recording and reproducing of analog signals from DC to 5kHz at 15 ips.

Its seven-inch reels carry half-inch tape that gives you seven independent record/reproduce data channels.

The eighth channel is an edge-track that takes voiced comments.

While one of the biggest (and best) in our family line, it still weighs in at an easy-to-get-along-with 67 pounds.

Front to back, the R-250 Series is a mere 12", 18" high, 20" wide—

a handsome addition to anyone's measuring instruments system.

Or as a starter of it.

It's not really particular how it's put to use. Or who it works with.

Only *how* it works.

To find out more about how it can work for you, just write or call Ken Williamson, Director of Marketing, Technical Products, TEAC Corporation of America, 2000 Colorado Ave., Santa Monica, CA 90404. Telephone: (213) 394-0240.

He'll give you all the particulars on why there's a good reason to go TEAC.

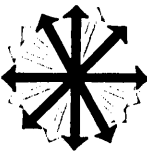
# The particular data recorder that's not particular who it works with.



CIRCLE 22 ON READER CARD

(Remote control unit is optional)





## No Glory in Chaos

"Our courts are overloaded for the best of reasons: because our society found the courts willing—and partially able—to assume the burden of its gravest problems." Pres. Richard M. Nixon.

Wrong.

Though our system of justice is praiseworthy, the courts for decades have been overloaded for the worst of reasons: the system is, to borrow from New York's report on its own plight, "paying for long years of public indifference to criminal justice administration, for the suspicion with which criminal justice agencies regard one another, for the use of legal structures and enforcement strategies that are over 150 years old, and for the absence of nearly everything essential to even minimally sound administration: trained administrators, modern management techniques, basic research, information and data processing systems, modern equipment, and clearly defined system goals."

Information processing systems are listed as a partial solution. This industry has the opportunity to contribute to—and profit from—the improvement of a fundamental institution in our society.

But each new marketplace for automation has seen stages of gross ignorance of the problems, haste and overoptimism, oversell, and boondoggling. The signals indicate it could happen again—because the funds are coming and the pressure is great.

The few experts in court procedure and automation do point to some system successes, but they generally give poor report cards to edp and management consultants. The vendors crow they are "businessmen, not missionaries." The archaic courts know nothing of computers. The quill is their

tool, and they are run by judges, clerks, and prosecutors, acting as part-time administrators.

Serious questions exist about when and where computer techniques should be applied; arguments rage about simulations and studies that start with the premise that edp is the solution.

Consider the problem of glutted courts. A calendar judge may be scheduled to handle 100 cases in a day, though he can only process 30, while a back-up judge waits hours to hear a case ready for trial. This kind of unrealistic procedure has led to countless delays, adjournments and abuses. Defendants without bail await trial in vermin-ridden jails from four to six months in most cities, while the recidivist criminal "works the system" toward case dismissal. The police and witnesses spend fruitless days waiting in court. Obviously both laws and procedures must change.

Simulation of alternative scheduling systems has been tried, but doubters ask if such tools work when laws and methods are in flux, data for input is inaccurate or missing, and the service firm gathering new data for the simulation doesn't really know what to look for.

Certainly a computer can serve as a bookkeeping system, but not until the chaos of court recordkeeping is turned into order. The records are poorly designed and scribbled in pen and pencil. There are no real procedures and no common case-numbering systems to allow reliable information exchange. So a defendant's arrest record at the police department may never contain the disposition of his case; his existence may be forgotten in the melee.

These few examples are inade-

quate to describe all the problems of the courts and the entire justice system, whose real charter is to seek ways to keep people out of the courts. But it's still folly to automate an inefficient system, even if it's been done in the best of circles.

We might begin by studying the few existing good examples, such as the Philadelphia court. It has a pioneering on-line case-monitoring system which tracks current cases, assigns priorities, and will analyze attorney caseloads, adjournments, and other pressing problems. The Office of Crime Analysis in the prosecutor's office in Washington, D.C., put together an excellent team—systems and management analysts, a criminologist, and a statistician—to develop TRACE, a system for reporting and analyzing case events from arrest to disposition. And the federal funding agency, the Law Enforcement Assistance Agency, has some useful projects, including dispatching personnel from systems like the above to consult with other law enforcement agencies.

Finally, there are the schools. The Institute for Court Management in Denver, the only school for court administrators, just graduated its first class in December. In that nine-week course, one week is spent on information systems and includes how to select a consultant. Last month, consultants were given a chance to learn about courts in a one-week seminar at the Institute. That kind of education should be sought by any responsible member of this industry who seeks to work for the justice system.

But best, spend some time in the courts themselves. It's edifying and horrifying. We need to find out at first-hand what the problem is before proposing the solution.

—Angie Pantages

# An inquiry into the state of the art of automated Criminal Justice Information Systems

## Security, Justice, &

**G** Criminal justice is the end product of a group of organizations which *should* function as a system—but all too often fail to do so. (One critic recently referred to the criminal justice system as a “system out of service.”)<sup>1</sup> Just what is the state of the art of automated Criminal Justice Information Systems (CJIS)? What are the barriers to further development of CJIS?

The component organizations of any criminal justice system are: police, prosecution, probation, courts, corrections, and parole. The creation of a single automated edp system to serve all of these users is a challenge for the bravest of system designers and builders. Operational and value conflicts are among

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### Technological problems rate relatively low in a list of barriers to overcome.

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the many problems encountered when interrelating information processing requirements and data base needs. (Technological problems rate relatively low in a list of barriers to overcome.)

For our purposes, we can view a CJIS as consisting of people, computer equipment and related programs, a dynamic data base, and institutional procedures interacting in a prescribed systems pattern. Logically, it is designed to collect, store, update, and facilitate the automated use of data on a continuing basis. Such data and its processing and analysis are related both

to the internal affairs of the criminal justice system and component organizations, and to the external environment. The purposes of such an information system are: (1) to meet operational requirements, (2) to provide various summarizing or analytical techniques relevant to the definition of community problems, (3) to assist in the search for program goals, (4) to generate cybernetic data flows for evaluation and control, and (5) to permit the exchange of information among governmental units (other criminal justice agencies and noncriminal-justice organizations) and with the public.

In part, the stimulus for this article and the others following it was the interest expressed by DATAMATION readers in an earlier discussion of CJIS.<sup>2</sup> A sampling of these earlier research findings are:

1. Of the police departments responding to the questionnaire (251 out of 592 sent, or 42%), a group of 110 (44%) indicated they were using automated data processing.

2. By 1971, this group can be expected to increase to 459 or 63% of the departments responding.

3. A vast majority of the edp equipment being used is computer systems (84%) as compared to electronic accounting machines (16%).

4. Electronic data processing, while not new to law enforcement (21% of the departments with edp were using it prior to 1960), is relatively new to the mass of municipal police departments (60% of the responding agencies with edp started using it since 1964).

5. Within the next three years, some 46% (or 51 of the 110 respondents using edp) will upgrade their

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1. See Gary V. Dublin, “A System Out of Service” (1970), a paper which will form a chapter in his forthcoming text, *New Frontiers in Criminal Justice Research*.

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2. For details see Paul M. Whisenand and John D. Hodges, Jr., “Automated Police Information Systems: a Survey,” *Datamation*, May 1969, pp. 91-96.

# the Computer

by Paul M. Whisenand and George M. Medak

information system with more sophisticated equipment.

Surprisingly, the above findings and predictions now appear to be underestimates. In other words, much ground has been covered by criminal justice organizations in developing CJIS within a fairly short period of time. For example, there are 35 automated criminal justice information and communication systems either shared by or operated within the state of California.<sup>3</sup>

In an attempt to assess the state of development of CJIS in the U.S., one of the authors (Dr. Whisenand) submitted a questionnaire to 371 police departments (185 responded), 167 sheriff agencies (37 responded), 48 state police units (27 responded), 48 state correction agencies (30 responded), 50 attorney general units (19 responded), and 7 federal agencies (4 responded). While not covering the full spectrum of a criminal justice system (unfortunately, the survey did not encompass local prosecutors, probation departments, parole units, and the courts) it did succeed in eliciting a wealth of information about the largest number—in frequency, scope, and size—of organizations in the criminal justice system.

Of those responding, 60% currently are using some form of edp, while 40% are not. Of this 40%, 39.2% plan to implement such a program by 1972, while the remainder either have no plans or no definite time set for implementation.

At the time the initial survey was administered, the percentage of the type of equipment used by all agencies combined was: electronic data processing

30.7%, electric accounting machines 5.6%, and both edp and eam, 63.7%. When analyzing each agency separately on this basis, state corrections appears to be least advanced in terms of utilizing the more powerful equipment. This assumption (erroneous or not) is based on the fact that at the time the survey was administered none was utilizing just edp. Current use of automated data processing in the class categories of Operation, Management, and Management Support is higher than in the same categories for projected or planned for use. However, the planned use for all categories combined is 68%, or 42.2% higher than the current use. One interpretation of this is that a more integrated approach, with total-system development in the utilization of automated dp by all agencies, will occur in the future.

Of the responding agencies, 63% do not have an on-line capability. It is, therefore, not surprising that 94.3% of the agencies' equipment performs off-line or batch processing operations, and only 5.7% are exclusively on-line systems. The most diversified, in terms of type of computer operation, are the police departments, with 46% in-house, 32% time-shared, 8% public service bureau, 12% private service bureau (commercial corporations), and 2% other. The estimated average per agency annual budget allocations for edp for all agencies between fiscal years 1969-72 reveal that 8.4% anticipate no revenue, 32.4% less than \$50K, 13.5% \$50-100K, 9.3% \$100-250K, 22.2% \$250-500K, and 14.2% more than \$500K. An analysis of each agency category shows that the police are highest in the less than \$50K range with 41% of this category. (Unfortunately, the FBI did not respond to the survey, so the National Crime Information Center figures are missing.)

As with nearly all technological and scientific inno-

3. For those wanting the entire inventory, see the pamphlet **Automated Criminal Justice Information and Communications Systems**, 1970, California Crime Technological Research Foundation, 1108 14th Street, Sacramento, Calif. 95814.

vations, CJIS developments will not come easily.<sup>4</sup> Of the many barriers and/or challenges to existing and prospective CJIS, data standardization, privacy and confidentiality, and system security loom large at present. (Note that while these will be discussed separately, they are inextricably connected.)

The importance of data standardization, whether in the form of statistics or data elements, is recognized

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**. . . those who seek to destroy or disrupt our society have discovered that when attacking its formal organizations, the edp center is both sensitive and vulnerable.**

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by designers and analysts alike. The inability to move data between CJIS components or from one CJIS to another would be a serious system limitation. National, state, regional, and local CJIS would be largely ineffective unless they were able to automatically transmit to or make file inquiry of their counterparts. Three highly significant documents on the subject of system interaction and/or integration have been generated by Project SEARCH: (1) *Standardization Data Elements for Criminal History Files* (Technical Report No. 1, January 1970); (2) *Designing Statewide Criminal Justice Statistics Systems—the Demonstration Prototype* (Technical Report No. 3, November 1970); and (3) *Name Search Techniques* (Special Report No. 1, December 1970).<sup>5</sup>

The confidentiality and privacy issues attached to large scale people-oriented information systems are, by far, too complex and lengthy to discuss within the confines of the space allocated to this article. The issues range from individual freedom to the need for information on a person's present status and past history in the criminal justice system. In essence, we are dealing with a trade-off relationship between the need to know on the one hand and the right to privacy on the other. Many CJIS users are attempting to build sufficient locks and keys into the system to preclude unintentional errors, misuse of data, and intentional data change. One need not dwell long on the possibilities of horizontally linking CJIS's with welfare, IRS, and other people-data bases before one feels either trapped or threatened, or both. Yet, according to Paul Wormeli's article on Project SEARCH (p. 32) certain vertical systems ought to be linked. Where to start and stop such linkage remains the paramount and unresolved decision. (For the latest thinking on this subject, see *Security and Privacy Consideration in Criminal History Information Sys-*

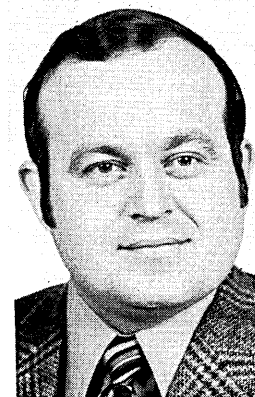
*tems*, Technical Report No. 2, July 1970.)<sup>6</sup>

Finally, those who seek to destroy or disrupt our society have discovered that when attacking its formal organizations, the edp center is both sensitive and vulnerable. Reaction to this on the part of dp managers has varied from zero to rapid hardening of the potential target site. Apparently the glass showcase days for dp centers are over—at least for awhile. The older dp facilities are being mortared in or moved to a more secure location. Further, many of the new facilities are being buried below ground with major physical and personnel security methods being included in their design and operations.

That the search for a secure computer site, as well as an improved criminal justice system, will continue with increasing fervor in the foreseeable future seems certain. Total security, like absolute justice, will always remain an illusory goal. Wisdom would seem to lie in finding that delicate balance between the fish-bowl and the Maginot Line, between the efficient exchange of necessary information concerning criminal behavior among the various levels of law enforcement and the right of the individual to be secure in his own privacy. The finding of such a balance could mean not only survival, but survival within the bounds of a society man can still call free. ■



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4. In this regard see Charles P. Smith, "Coordination and Control of Computer Technology in State Government: Constraints and Strategies," a doctoral dissertation, School of Public Administration, USC, 1970. The authors consider this one of the most outstanding contributions to the literature in 1970.

5. These reports can be obtained from Project SEARCH, California Crime Technological Research Foundation, 1108 14th Street, Sacramento, Calif. 95814. For statewide standards and procedures, see the *Long-Range Master Plan for the Utilization of Electronic Data Processing in the State of California*, State of California, Office of Management Services, Sacramento.

6. This report can also be acquired from Project SEARCH (ibid.). Also of significance: Annette Harrison, *The Problem of Privacy in the Computer Age: an Annotated Bibliography*, The Rand Corp., Santa Monica, Calif., 1967.

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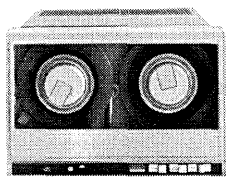
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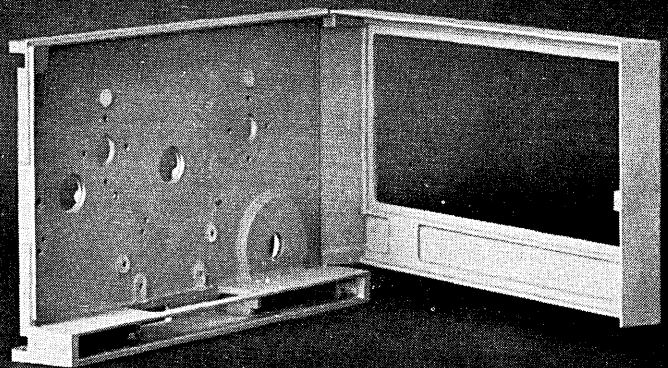
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## There are still many dark alleys in the federal search for safe streets

# LEAA: Who Guards

**G** Defined vaguely, drafted hurriedly, and managed badly, the Nixon administration's safe streets program stumbles onward, if not forward, into an increasingly murky future.

Last year, according to one estimate, \$20-50 million in federal funds was spent on criminal justice information systems and related communications under the Safe Streets Act, a bill passed originally in 1968 to upgrade the nation's police, court, and corrections services. Garland Morse, president of Sylvania, has predicted that by 1975, law enforcement agencies will be putting \$500 million annually into electronic gear—assuming, of course, that Congress in the meantime doesn't become disenchanted with the Law Enforcement Assistance Administration (LEAA), which dispenses the federal dollars for safe streets projects. Another result could be federal restraints on data banks—those operated by law enforcement agencies as well as by others, public and private. If that happens, additional dp markets would almost certainly be affected.

LEAA's basic difficulties are reflected dramatically in Project SEARCH, an on-line system designed to give state and local police departments quicker access to criminal histories. SEARCH is the largest single information system funded by LEAA so far; it consists essentially of a computerized central index, plus individual criminal history files and user terminals (typically ttys) located in each of several participating states. The index is queried when a police officer brings a suspect to the station. Name, age, and other identifying information is input through a terminal and passed against the index. If this index contains a matching reference, the officer gets back a message telling him which state has the corresponding criminal history. Then, via Teletype, he can request, and obtain, a copy of the record. (For a more detailed description of SEARCH, see p. 32.)

SEARCH was launched as a demonstration project in July '69. Ten states contributed records and money, and five more joined as observers. In July and August, 1970, the prototype was tested. This November, SEARCH is supposed to become operational. The central index, initially located in Michigan, will then be at FBI headquarters in Washington. The feds have invested \$3.2 million in SEARCH to date, and the states, \$1.087 million.

"The basic problems facing SEARCH in the demonstration period have been solved," reported assistant LEAA administrator Richard Velde last March. He was addressing a Senate subcommittee headed by Sam Ervin of North Carolina.

But, according to a SEARCH user, the demonstration has been "a waste." Its main accomplishment was to show the feasibility of accessing a central data base from remote terminals in state and local police departments, he explained. The FBI has been doing this ever since 1967 through its National Crime Information Center (NCIC), an on-line system which indexes state records relating to wanted persons and stolen property. Furthermore, the SEARCH participants were a subset of those using NCIC.

Data Dynamics, Inc., a system consulting firm specializing in law enforcement applications, evaluated SEARCH last December, and mentioned a number of shortcomings Velde failed to include in his testimony before the Ervin subcommittee. There is at least an implication in the DDI report that, contrary to what Velde said, "the basic problems facing SEARCH in the demonstration period" have *not* been solved.

An "immediate goal," reported DDI, was to establish and demonstrate a "multistate prototype system" based on a compatible record which police, prosecution, court, and correction agencies could use. Actually, only one court agency had a terminal during the demo, and according to the report, the participation of court and correction institutions was "very lim-

# the Guardians?

by Phil Hirsch, Washington Editor

ited." It added that the need to develop an operational system by July '70 "essentially limited the (demonstration) to . . . police requirements." Integration of court and correction agency information requirements is now among the "intermediate and long-range goals" of the operational phase, scheduled to begin this year.

Ten states officially participated in the demonstration, but only New York made "any extensive operational use" of the system, and a total of only five states conducted any demonstrations. One of the nonparticipating "participants" was Michigan, which operated the SEARCH central index. The B5500 that handled the index also had to support LEIN, the in-state information network through which Michigan police communicated with SEARCH; the B5500 couldn't accommodate both leads at the same time.

SEARCH met its demonstration objectives "from a conceptual point of view," said DDI, but "did not achieve much operational success" because of design compromises, "lack of an updating capability for the central index," and failure to develop record formats acceptable to all users, among other reasons.

An automated fingerprint classification system would be "invaluable" to SEARCH, says DDI. Another knowledgeable source agrees, but adds that LEAA "missed the boat" by not investing \$3-5 million in fingerprint search technology a couple of years ago when the demonstration was being planned. Prints, he explains, are virtually impossible to fake. So they give police a way of tracing the suspect who uses another name and carries false papers. SEARCH and NCIC both bomb out frequently in such cases because the suspect's alias isn't in the file, even though his record may be there, somewhere. "The small fry, the guys who aren't smart enough to change their ID's frequently, are caught, says our source, "but the big fish are often able to beat the system."

How many offenders beat the system is anybody's

guess. NCIC finds records on only about 6% of the wanted persons whose identifications are sent in; conceivably, if NCIC-indexed records could be searched, even semiautomatically, on the basis of a

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## LEAA "missed the boat" by not investing \$3-5 million in fingerprint search technology . . .

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suspect's fingerprints, the ratio would increase significantly. Tests run by state and local police departments, using semiautomated techniques, have correctly identified unknown prints in better than seven out of ten cases, reports an FBI official.

Los Angeles County is now installing an Ampex system called ORACLE which shows the current state of the fingerprint searching art. It's designed to send prints, in video image form, from remote terminals to a central location by microwave; at the receiving end, the prints are recorded on video tape, displayed on a TV screen, and manually coded by a technician to describe key characteristics; these codes then are passed automatically against a fingerprint card file and all the records having similar characteristics are extracted; finally, the unknown prints and the extracted ones are manually compared to find a match.

ORACLE and similar systems are expensive, and have limited capabilities. For example, they can't accommodate really large files like the huge FBI collection in Washington, which contains about 200 million fingerprint cards. But LEAA's critics insist that if the agency had put more seed money into the technology a few years ago, there would be more fingerprint searching systems on the market today, more installations being tested, and, at the very least,

the problems would be better defined.

Why didn't LEAA take this gamble? One possible answer was suggested by Charles Rogovin, a former LEAA administrator, when he recently told the L.A. Times that the agency's failure to provide strong leadership is a serious problem.

Lots of reasons are advanced for this nonleadership—the most valid ones include lack of ideas at LEAA headquarters, and lack of aggressive people to carry them out; a clear mandate in the agency's charter which bars federal interference with the "direction, supervision, or control" of any state or local law enforcement agency, and, possibly most important, pressure from Congress and the White House to come up with results in a hurry. But the basic question is whether LEAA could be doing more to rationalize its

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### Apparently no one has thought about establishing user groups...

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program, and whether the problems—which many officials of the agency recognize—are likely to be attacked effectively in the future.

LEAA's systems analysis division provides part of the answer. The aptly acronymed SAD consisted of two people when this article was written (three more were authorized), and is buried deep within the National Criminal Justice Information and Statistics Service, one of four major LEAA subdivisions.

"All SAD has been able to do is put out fires," says one LEAA official. Many of these fires consist of requests for technical assistance from state/local criminal justice agencies. Reportedly, SAD plans to develop regional seminars at which LEAA clients can get information about systems and problems specifically related to their needs. Apparently no one has thought about establishing user groups, but there is at least an awareness of the need for standards—sample RFPs, for example, and documentation of model systems.

By providing technical assistance, SAD is competing with private consultants, meanwhile avoiding a job that probably offers a far greater payoff, and one that no one else can do—system standards development, encouragement of state/local system cooperation and consolidation.

The law under which LEAA operates could be a big help. It requires the agency to give "specific, prior approval" to any dp equipment acquired by state or local participants in the program.

"I want LEAA to train us to do a better job," says Richard Wertz, who oversees Maryland's participation in the program. Criteria for evaluating dp system proposals would be particularly valuable, he adds. Maryland, along with other states, has taken preliminary steps toward consolidating its auxiliary police services, including data processing. LEAA has responded to this initiative by "reinventing the wheel," as one critic puts it.

This year, the agency plans to contract out a cost-effectiveness study which will evaluate the benefits of consolidation and develop "model consolidation policies." Dp systems may or may not be included, and

the study—one of several being planned—has relatively low priority; at the very best, it will be a long time before anything is generated that state and local system operators can use.

Meanwhile, a number of law enforcement agencies are sharing systems technology voluntarily. CLEAR, an on-line information system installed originally in Hamilton County, Ohio (Cincinnati), has been copied by San Francisco, West Palm Beach and Fort Lauderdale, Fla., and by the state of South Carolina. San Francisco spent about \$70K on modifications, but reportedly saved at least \$500K. Comparable savings were obtained by the others, according to a source close to the project. Recently, an interstate CLEAR users group was organized, possibly the only one in the country that encompasses users of dedicated, independently operated law enforcement systems.

Until recently, LEAA—despite apparent shortcomings—hasn't had much trouble from Congress, but the climate is changing rapidly as the program grows. Since 1969, the first full year of the Safe Streets Act, LEAA's annual appropriation has increased from \$63 million to \$480 million, and in FY'72, the agency probably will get \$700 million.

Dp suppliers currently are selling an estimated \$42 million worth of hardware and software per year to criminal justice agencies. Sales will grow about 2½ times by 1975, according to a major supplier's chief law enforcement systems salesman. He believes the biggest growth areas will be court systems, police command and control, and expansion of NCIC—"there are 40,000 police jurisdictions which could tie into that system, but only about 4,000 have done so."

All the dp suppliers we talked to agreed that the industry, overall, is doing an adequate job for crimi-

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**"There are 40,000 police jurisdictions which could tie into that system, but only about 4,000 have done so."**

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nal justice agencies. There seems to be little interest in making a greater effort to promote system standards and user education programs, despite the users' apparent need for help in both areas. As one sales official put it: "We're businessmen, not missionaries." But this attitude may boomerang if Congress decides that LEAA money is being wasted.

One harbinger is S400, a bill introduced by senator William O. Saxbe of Ohio, and three cosponsors; it would establish a "criminal justice reform administration" to improve state and local police, court, and related procedures. Basically, the bill lists standards in each of these areas; a state that agreed to meet these standards over a four-year period could receive federal grants covering up to 90% of the costs.

S400 doesn't mention dp systems specifically but they would almost certainly be affected. One standard, which requires defendants to be tried within 60 days after arrest or imprisonment, must be implemented partly by improving court procedures. The



bill also requires states to study consolidation of their law enforcement agencies.

Although S400 allows the states to determine how they upgrade their criminal justice systems, it gives the Criminal Justice Reform Administration far more clout than LEAA has under the Safe Streets Act. Meanwhile, the Nixon administration has unveiled a "revenue-sharing" program aimed at giving the states more control, instead of less, over LEAA and other federal aid.

The battle between proponents and opponents of greater state/local control is still shaping up, so it's difficult to predict the winner. But it seems likely that two congressional subcommittees, currently taking a critical look at the LEAA program, will play a decisive role.

Recently, the General Accounting Office (GAO), in response to a request from a House Government Operations subcommittee headed by congressman John Monagan of Pennsylvania, began investigating LEAA. One question GAO is trying to answer is whether the feds, and the state planning agencies (SPAS) that receive LEAA money, are doing an adequate accounting job.

LEAA officials admit they're not, after pointing out that they lack enough staff. Last year, reports one official, the agency checked the books of only 10 of the 55 SPAS it does business with. A shortage of state- and local-level personnel thoroughly trained in the design, engineering, and evaluation of complex information systems compounds this problem. It seems likely, in other words, that GAO's report to the House GovOps subcommittee will be critical.

Meanwhile, senator Ervin's Judiciary subcommittee has been looking into data banks. Among those who testified before his group was senator Charles Mathias of Maryland. Last year, Mathias persuaded Congress to add an amendment to the Safe Streets Act which requires LEAA to submit legislative recommendations for "protecting the constitutional rights" of all persons "affected" by criminal justice information systems.

Mathias told the Ervin subcommittee that Congress should "act now" to establish rules governing these systems. "Some argue that the needs of law enforcement are so great that new technology should not be fettered by precious concerns for privacy . . . In response, we must consider Juvenal's question . . . 'But who guards the guardians?'"

Assistant attorney general William Rehnquist, another subcommittee witness, said "self-discipline (by) the executive branch will answer virtually all of the legitimate complaints . . ." He added that the Justice Department, LEAA's parent agency, "will vigorously oppose any legislation which . . . would effectively impair" the current surveillance and information-gathering activities of law enforcement agencies supported by federal funds.

Dr. Robert Gallati tried to bridge this gap when he testified before Ervin's group. Gallati directs the New York State Intelligence and Identification System (NYSIS). "The basic question," he said, is whether information processed and disseminated by data banks is "reasonably related to advancing the general welfare . . . of society. . . . The maintenance of a free society is more important than any other argument for efficiency."

NYSIS apparently practices what Gallati preaches, but other systems don't, as he indicated later, in discussing "controversial issues." One such issue is whether, and to what extent, personal files should be purged of data that is no longer relevant. Another involves access to dossier-type data banks by "secondary users"—those outside the criminal justice community, including nongovernment organizations.

Gallati endorsed a remedy which many civil libertarians advocate—the creation of an overall data bank governing agency with power to enforce its regulations. But he clearly prefers more voluntary measures.

One of these is a set of privacy guidelines developed, under Gallati's chairmanship, by a SEARCH task force. He thought the guidelines, together with a

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**"The maintenance of a free society is more important than any other argument for efficiency."**

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model state statute being developed by the same group, would convince operators of law enforcement data banks, and legislators, to do what's necessary. Another goad will be the "stringent criteria" likely to be promulgated as a result of the Mathias amendment to the Safe Streets Act, he said.

Gallati is probably too optimistic. LEAA is apt to propose weak criteria, rather than stringent ones, and civil libertarians in Congress will have trouble changing them, given the administration's opposition as stated by assistant attorney general Rehnquist.

Although all participants in the SEARCH project have reportedly promised to abide by the Gallati group's guidelines, we were told by one source who visited a number of participating state agencies that "they aren't doing anything more than they were doing before." When SEARCH goes operational, users presumably will install additional safeguards, but there's no assurance this will happen. Furthermore, the guidelines aren't perfect.

The committee that drafted them emphasized that Project SEARCH, and by implication, similar systems, should be used "exclusively for the service of the criminal justice community." But the committee also recognized that "this principle of exclusivity may create severe difficulties." The upshot is that states participating in SEARCH have a good deal of discretion in deciding whether to process information requests from secondary users.

This temporizing is understandable. Until the contending forces can agree that the threat to individual privacy justifies some limitations on presently permitted activities of law enforcement agencies, no one really can be expected to develop effective privacy safeguards.

Gallati suggested the only proper way to end the argument when he said "the maintenance of a free society is more important than any other argument for efficiency." It would be a good idea to post his statement inside every police department in the country, and require every employee of the Justice Department to memorize it. ■

## **Fifteen states are hard at work developing a prototype system for electronic analysis and retrieval of criminal histories**

# **The SEARCH for...**

**G** The purpose of Project SEARCH (System for Electronic Analysis and Retrieval of Criminal Histories) is to develop a prototype computerized information system to determine the value and feasibility of an automated criminal offender data file and statistics system created and maintained by individual states and providing for interstate transfer of data.

Fifteen states are participating in the project: Arizona, California, Colorado, Connecticut, Florida, Illinois, Maryland, Michigan, Minnesota, New Jersey, New York, Ohio, Pennsylvania, Texas, and Washington. The California Council on Criminal Justice is coordinating the project through the California Crime Technological Research Foundation.

The project began in June 1969, when the Law Enforcement Assistance Administration (LEAA) held what amounted to a bid competition, inviting the states to participate in this national experiment. Six states were chosen to be the initial grantees, and nine others have been added as the project progressed. Ultimately, all states and several federal agencies are expected to participate.

Project participants set two specific objectives:

(1) Establish and demonstrate the feasibility of an on-line system allowing for the interstate exchange of offender files in the states based on compatible criminal justice offender records, integrating police, prosecution, court and correctional offender data.

(2) Design and demonstrate a computerized criminal justice statistics system (e.g., offense and arrest statistics, court statistics, probation and parole statistics, etc.) which would be made available to LEAA and to police, court, correctional, and planning agencies.

For the exchange of criminal history data, each state is developing its own internal system meeting minimum requirements developed by a Standardization Task Force which was responsible for standardizing interstate terminology, definitions, data elements, etc.

The statistical system concept consists of the creation of a set of transaction-based statistical data, the analysis of the data, and the generation of illustrative reports. A Statistical Methods Task Force has developed guidelines for the individual states, indicating the specific data to be included and the output formats for the presentation of statistics. A 15-man Project Group, consisting of one representative from each participating state, is responsible for the conduct of the project.

The first phase of the project formally covered July 1, 1969, to December 31, 1970. The total project budget exceeded \$2.5 million.

The requirement for a computerized system of access to criminal histories is fairly obvious. Offenders convicted of serious felony crime in one state can easily be released or given minimum penalties in another state if the prior record is not available early in the criminal justice process. The trend in the courts is to encourage speedy arraignment and disposition of offenders, and to provide the maximum amount of information possible in carrying out the judicial function. At the present time, it can take from 10-14 days to obtain the detailed criminal history of an offender. By then, in many misdemeanor cases, the offender has been sentenced and released.

High-speed file access is the only logical solution. The problem is, therefore, more appropriately stated in terms of system design, i.e., file content, location, file interaction, system access, and so on.

A rather extensive effort was made in Project

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**... it can take from  
10-14 days to obtain the  
detailed criminal history  
of an offender.**

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SEARCH to obtain a broad spectrum of user input to system design. Task forces and committees representing the participating states met frequently during the course of the project. A basic system concept was developed for implementation during a demonstration period in July and August 1970.

The system concept is based on the maintenance of individually state-held files and the existence of a central index, directly accessible by each state and containing summary data on each state-held file. The central index will respond to an inquiring state by providing personal descriptors and identifying numbers (shown in Table 1), an abbreviated criminal profile and the name of the state or agency holding the full criminal history record (Agency of Record). The requesting state may then directly access the desired file from the Agency of Record.

When a criminal justice transaction (arrest, adjudication, etc.) takes place between an offender and an agency in a state other than the Agency of Record,

that state becomes the Agency of Record, the criminal history file is transferred from the previous Agency of Record, the file is updated and the central index is updated to reflect these changes.

The central index has the capability of conducting a file search based on (1) FBI number, or (2) operator's license number, or (3) Social Security number,

draft Uniform Offense Classifications.

In developing the file design, the most difficult decisions were associated with the type of criminal history summaries that were to be included in the central index and state files. Many alternatives were possible, and the actual operational requirements of all the various users are still rather poorly defined.

# Automated Justice

by Paul K. Wormeli

or (4) miscellaneous identification numbers, or (5) name, sex, and date of birth.

There are several reasons behind the choice of this system concept for the prototype. One of the critical elements is the approach of using criminal history files created, maintained, and controlled by the individual states. The central index then becomes more of a directory of where to obtain additional information. This approach is an alternative to a national data base containing complete information on all offenders.

There are many tradeoffs to be considered in choosing between a single national data base and an inte-

The joint decision of the project participants was based on an intuitive understanding of user requirements.

The central index, containing a count of arrests and convictions by major offense category, was considered to be sufficient for answering inquiries by officers in the field needing a quick response as to whether or not a person was in the system (has a prior record) and some brief indication of prior offenses. The index "points" to a state file which is designed primarily to allow investigative and other less immediate needs to be satisfied. The state file indicates dates and agencies where the subject has had prior involvement with the criminal justice system, allowing a more refined "pointer" for obtaining further information.

There was a general belief that the criminal summary contained in the central index would satisfy over half of the inquiries, avoiding the second inquiry to the state. The state inquiry should then satisfy a major portion of the remaining needs, minimizing the effort required in contacting numerous local agencies for more detail on the offender.

The system was tested and evaluated during a period of system demonstration in July and August. The demonstration included an on-line operational system test. The state of Michigan, through the Michigan State Police, provided the central index for the period of the demonstration and also provided message switching capabilities to handle the state-to-state inquiries. A single telephone line connected each state to the Burroughs B-5500 computer in Michigan. Both 2400 baud and 110 baud lines were used during the demonstration. The computer-to-computer interface allowed each state to set up as many demonstration terminals as it chose to show the system to users in each SEARCH state. Seven of the states (Arizona, California, Florida, Maryland, Michigan, Minnesota, and New York) were on-line in July and August. Connecticut was on-line for inquiry only via a terminal to the New York Computer.

One of the primary purposes of the demonstration was to involve a large number of actual potential system users in determining the extent to which this system concept meets operational needs. During the period of the demonstration, the central index contained close to 100,000 offender records. Each state was committed to entering at least 10,000 offender records. This was obviously not a sufficient data base to expect a large number of actual hits. However, since the states were concentrating on the records of relatively active offenders, a number of hits actually

## STATE FILES AND CENTRAL INDEX

*Name	Visible Scars, Marks, Tattoos,
*Sex	Amputations or Deformities
*Race	Miscellaneous Identifying Numbers
*Place of Birth	*State Identification Number
*Date of Birth	*FBI Number
*Height	Social Security Number
Weight	Operator's License Number
Hair Color	Fingerprint Classification
Skin Tone	

\*Elements indicated by an asterisk are the minimum required for the entry of a record in the central index.

Table 1. Identification data elements for SEARCH files.

grated and coordinated set of state systems. Although economic considerations and the difficulty of updating support a national file, the project participants believed that the desirability of state-held files was sufficient to warrant testing this more difficult approach in the prototype system. The project has conducted a study of felon mobility in an effort to estimate the extent of record exchange which would be required beyond adjacent states. The study showed that a relatively small percentage of offenders are really mobile in a national sense. This fact argues for regional systems interfaced between states rather than a national data bank.

The full criminal history files maintained by the Agency of Record will include a set of required data plus other optional data for internal state use. The data includes a minimum set of personal descriptors and identifying numbers (Table 1) and a record of each criminal justice transaction between the offender and the involved criminal justice agencies. These transactions for felonies or gross misdemeanors will include information on, and outcomes of arrest, pre-trial hearing, trial, sentencing, correction (including probation/parole) and post-conviction.

Offense terms to be included in the files are based on the National Crime Information Center's (NCIC)

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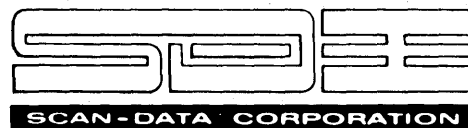


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## SEARCH for Justice . . .

occurred.

LEAA also had access to a terminal for demonstrations to legislative and other federal officials. The records accessible by the terminal in LEAA were entirely simulated, in that artificial records were generated solely for demonstration purposes to officials not directly involved in the criminal justice system.

One of the primary considerations in developing the system concept will continue to be a comprehensive concern regarding the protection of individual rights in developing the data files and the security precautions in providing access to the files. The project participants are well aware of the implications of creating this national data base, and are taking strong steps toward insuring that individual rights are protected in the final system design. The Project Group in SEARCH has established a special committee, chaired by Dr. Robert Gallati of the New York State Identification and Intelligence System, to concern itself exclusively with the security and privacy issues related to the development of this system. The committee has already drafted a code of ethics which was adopted by the project participants, and has issued a special report on the issues of privacy and security.

The committees working on the statistical part of the project came to two conclusions early in the effort:

(1) The facts that describe each state's administration of criminal justice and the processes used against adult criminal defendants are scattered throughout the files of local police, county prosecutors, different levels of courts, and various state and local correctional agencies.

(2) It will not be possible to describe how effectively the criminal justice system is working unless the presently dispersed facts on individuals exposed to prosecution can be brought together to portray the justice system in each state.

Therefore, it was proposed that the project develop a reporting scheme to permit developing information that will join the segmented bodies of information now kept by the separate criminal justice agencies. The facts developed would provide an example of how each participating state, if properly financed, could routinely describe its separate system of criminal justice.

The approach taken was to ask each participating state to trace a select group of adult felony defendants from entry into the criminal justice system at the point of arrest to their point of departure. Each administrative agency, its procedures and decisions affecting the defendant's progress through the justice framework were identified.

The individual at the point of arrest, not the number of charges, was the accepted unit of count for the purpose of building the statistical model. Each of several multiple charges lodged against single defendants at the time of arrest was traced through the system and identified with the responsible defendant. Multiple defendants involved in single events were counted separately.

In applying this concept, a minimum of 250 adult defendants (in each state) arrested on felony charges during the past several years were traced from the point of arrest to the point of departure from the system. The major focus of the analysis was on the "fall out"—defendants leaving the system. The analyt-

ical plan identified departure points and time intervals for each state by the characteristics of the criminal offenders.

In addition to those specific project objectives which are directly related to the construction, demonstration, and evaluation of the prototype system, a number of specialized efforts were undertaken by individual grantee states to address certain critical problems which will be encountered in the future development of a full-scale (50-state) system:

*Integrated record development.* A special project is being carried out (by California) in an effort to link information concerning individual offenses, the offenders involved, and the criminal justice processes through which the offenders proceed. Feasibility of construction of such integrated records in a form capable of producing complete criminal justice system statistics is being tested by means of a pilot project involving approximately 10,000 record entries from 12 counties of the state.

*Specialized consideration of court and prosecution needs.* A detailed study of the requirements of courts and prosecuting attorneys for individual offense and offender records as well as statistical data is being performed (by Maryland). In addition to the data requirements analysis, an analysis of the court and prosecuting subsystem is being performed to allow determination of the most effective and efficient locations within that subsystem from which to collect criminal justice information for other users.

*Specialized probation and parole requirements.* A detailed study of the requirements for statistical information is being conducted (by New York) and will lead to a statement of the statistical data required for effective planning, management, and program evaluation in the area of probation and parole.

*Simultaneous statistics/history generation.* Connecticut's unique contribution to Project SEARCH is an attempt to design a file and establish a system of offender-based data collection which will permit nearly automatic and simultaneous generation of statistical data and criminal history files. They will closely document and monitor their efforts so that the feasibility of programmatically generating statistical data from offender records can be determined.

*Transaction utility in status file maintenance.* Texas is concentrating on a "subject-in-process" approach. They are establishing an offender-based file that will reflect the dynamic composition and characteristics of a criminal justice system. Each record in the data base reflects the history of each arrest and the current status of an offender while he is in the criminal justice process. Each record is updated as an offender moves through the process, and when the record of his arrest has proceeded to a point of exit from the system, a summary of that record is created to update a criminal history file.

*Feasibility of intrastate indexing—regional files.* Washington is testing the feasibility of establishing a computerized offender history file in a metropolitan region. It is anticipated that Washington will ultimately be served by approximately four regional information centers, each of which will have the capacity of making automatic inquiry of the others through a combined index maintained at the state crime information center. An inquiry from outside the state to the center will likewise automatically query the re-

gional centers.

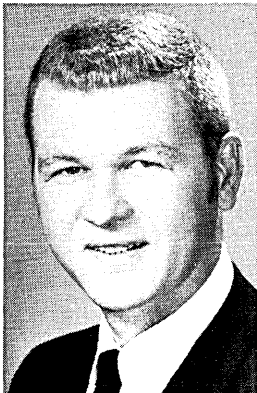
*Facsimile equipment demonstration.* A demonstration of facsimile fingerprint transmission between the states of Maryland, Michigan, Minnesota, and New York was conducted.

The demonstration and evaluation (concluded in December) made it quite clear that this basic capability was required by criminal justice agencies. There is no longer a question as to value, and the on-line prototype system answered most of the questions as to feasibility. Based on these findings, the Department of Justice has decided to task the FBI (through NCIC) to operate a national criminal history exchange system. The fiscal year 1972 budget request from the FBI will contain a line item of \$1.3 million for this purpose. The service to be provided by the FBI will primarily consist of the basic central index described earlier, although the final data content and file interfaces have yet to be worked out.

To prepare for this operational system, the participating states have been awarded a continuation grant from LEAA, providing sufficient funds to convert a minimum of 300,000 records as a start-up file.

A major technical obstacle to full utilization of this system remains. If the computerized files are to be useful in court processes, and in substantiating other actions taken by the criminal justice system, it will be necessary to develop a way to positively verify the identity of a subject of inquiry. Two improvements to the classical fingerprint-based identification process are needed: first, the high-speed transmission of prints, and second, the high-speed file search and match. The SEARCH project is exploring the feasibility of using a satellite to transmit the print, and of high-speed recognition equipment for matching. An experiment, using existing satellites, is being planned for the spring of 1971.

One very important aspect of SEARCH is keeping all states informed on the details of SEARCH development and progress to provide for their eventual interface to the system. This is being handled on a general basis through correspondence and a monthly newsletter. Also, a national symposium was conducted. The most important requirement of other states, however, is the detailed content of the system. To meet this requirement, technical reports are being prepared for general distribution. ■



Mr. Wormeli is currently vice president for program development, Public Systems, Inc. His responsibilities include identification of research and equipment projects through analysis of operational requirements of criminal justice agencies. In addition, he is the project coordinator for Project SEARCH. He holds a BS in electronics engineering from the Univ. of New Mexico, and a Master of Engineering Administration from George Washington Univ.

## Increased crime rate and population growth jeopardize our criminal justice system

# Can the Computer

**G** The agencies responsible for the administration of justice over the past decade have been plagued by growing crime rates and increasing population. The increased crime rates severely tax the capabilities of the existing system, while the population growth increases the number of noncriminals who depend upon the criminal justice system to provide them services—mainly public safety. Just trying to handle one or the other alone places the system under a severe strain, but when both the increased crime rate and population growth combine, the current system of criminal justice is indeed in trouble.

In partially coping with this complex problem in contemporary society, prompt and accurate information is needed. Two of the most vital components in the criminal justice system are the prosecution and the courts. The computer can aid both by providing information which often is not now available or, at best, is recoverable but at an extremely high cost. The author has identified below a few of the numerous areas to which a computerized information system can be utilized effectively.

### Prosecution

The primary concern of the prosecutor's office is prosecuting cases. The prosecutor's staff must furnish administrative support of the prosecution function and collect statistics for external and internal use including administrative control. The latter will aid significantly in the management of the prosecutor's office which will, in turn, improve support given to the prosecution function. By better management there may be a significant improvement, for example, in the utilization of attorneys by scheduling cases based on statistical analysis of average trial lengths

# Save Our Courts?

by George T. Felkenes

whereby attorneys will be scheduled for court appearance at certain times for a specific, predictable time limit. Also, analysis of attorney inputs and outputs in the number of cases tried, number of cases on hand, status of cases, and attorney history of failures or successes in certain types of prosecutorial functions also would be available to management.

*Case history module.* A case history module would be of immediate benefit in the prosecutor's office. Such a file would include a method of positive identification of a defendant or a suspect. The file would permit various identifiers to match up with a suspect.

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## ... the current system of criminal justice is indeed in trouble.

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The file would permit various identifiers to match up with a suspect. The file would show the defendant's current status including arraignment dates, preliminary examination dates, and any motions filed which referred to the specific defendant up to the time of the trial.

The following data elements would be included in the case history: (a) name of defendant, (b) date of motions, (c) time of motions, (d) results of motions, (e) location of case, (f) level of proceedings (preliminary hearing, trial, or appeal), (g) trial dates, (h) jury selection, (i) number of jurors called, (j) arresting officer, and (k) lawyer.

This information has many other management pay-offs—time between motions, time taken to get to trial, etc., assists in future case planning. It is clear from the nature of the data that most of it can be obtained

as a byproduct of a court management subsystem.

*Case location by court index.* To aid in the management of the prosecutor's office, certain information should be available to him on a daily basis to permit him to maintain an overview of the prosecutorial function as it pertains to the entire judicial system. A case location by court index file would permit the prosecutor to identify every criminal and civil case entered into the judicial system by type of offense, location of the files (probation, district court, etc.), and the defendant's plea. These are only examples of the types of information contained in this file which would be available to the prosecutor on a daily basis. The file also would contain arraignment dates in courts, witnesses present, the facts necessary to seek indictments, preliminary hearings, etc. Again, the needed data are available from a court management subsystem.

*Attorney assignment file.* The attorney assignment file might list each attorney within a jurisdiction who has either a criminal or civil case. The file should include the case status, the type of case, the trial date, defendant, and other necessary identifying data. From this information, a case suspense file could be set up whereby the prosecutor is able to determine that on a certain date attorney X has a criminal case in Y court. The data will aid the prosecutor in opposing a motion for a continuance if the attorney recently scheduled another type of legal proceeding at the same time in another court. From an over-all aspect, the entire judicial system would function more properly by having a file to manage its operations. This file would greatly cut down the number of "no shows" by attorneys and, therefore, would speed up trials and cut down on the number of continuances granted, often for frivolous reasons.

The suspense file also would serve a dual function

## Save Our Courts . . .

by assisting the defendant by indicating the time length a case is in process. A speedy trial would be insured by allowing the prosecutor to have, on a daily basis, an up-to-date situation of a particular case.

A suspense file of this nature also should be available to the police department to aid them in scheduling police witnesses from the department. The dates of the trial, and hopefully, the time of the trial could be predicted with reasonable certainty so that officers would not waste unnecessary time in waiting to be called as a witness. The suspense file would serve several elements of the criminal justice system.

### Courts

*Case cross-index.* A cross-indexing of cases tried in the court system should be developed. The index should be alphabetical by case title and contain the case docket number. The index is brought up-to-date in printout form on a monthly basis.

It is recommended this file include the following:

1. Plaintiff name and identification.
2. Defendant name and identification.
3. Type of case.
4. Length of time in process.
5. Time to try.
6. Status of case.

Obviously, this file is a select portion of the case file previously discussed. It shows certain elements to be used by the court in performing the following functions:

1. Determining case load.
2. Determining trial times for planning, jury, non-jury.
3. Case status.
4. Aid in expediting probation reports, etc.
5. Expediting the case through the criminal justice system.

*Jury selection.* A better method of selecting, informing, and collecting jurors must be found. Programmatic selection of jury candidates from election lists might be expanded county or regionwide and selection programs held under court control to assure truly random selection of candidates.

Consideration should be given to calling a number of jurors to a central location for daily jury selection for specific trials. This will speed up the entire process, once it is known how many cases are going to trial on a certain day, assuming the information in the cross-indexing list is available as suggested.

A predetermined number of jurors can be called for a specific case. If past experience has shown that, in order to select twelve jurors plus one alternate in X case, one hundred individual jurors had to be summoned, then this information could be transposed into a series of notifications to one hundred individuals to be available on a certain day at a certain time. By examining case histories, reasonable predictions can be made to notify prospective jurors on a realistic, preplanned basis. Long delays and unnecessary manpower utilization in calling several hundred people individually to give them one or two days' notice would be eliminated. An automated system also could be developed whereby prescheduling cases for several days in advance would automatically trigger a system which would identify days in advance the type of case, the average number of jurors required, and a

system to notify automatically the X number of jurors to be available on such and such a day. Again, the amount of time spent in notifying each individual prospective jurors would be reduced.

*Court statistical module.* The court statistics presently tabulated in response to statutory requirements in many jurisdictions represent only a small portion of the statistical data envisioned for this module. Identification of the types of occurrences which result in delays, and amounts of time spent in hearing motions of various types versus time spent in trials proper, will provide statistical data for work load prediction and procedural changes.

A court statistical module also will provide a quantitative basis for measuring activities within the system at any given time. For example, current work loads as of a specific day would be available. The inputs into the system, as well as the outputs, would be immediately available to top administrators. Backlogs in various courts could be predicted and identified to insure better management of the system. By automating, an over-all view of the activities in the consolidated judicial system would be available on short notice.

Most data for the statistical module will be available from operational files of the court management subsystem.

*Profile of clientele file.* Under this, a bank of data on each individual entering the system could be compiled. This file would aid the judges in sentencing of routine cases. Examples of information which are necessary are simple biographical and work data, prior criminal history, and identified personal traits. Secondly, such a file would provide a means of evaluating the corrections system. For example, if individual A has a certain group of indicators in his background which show that he is amenable to a specific type of corrections training program, then the sentencing judge would know this and would sentence the individual to the type of program which, in all probability, would be the best for the individual. The corrections element also can evaluate the identifiers to develop training programs to best handle individuals possessing a certain grouping of indicators. The information in the profile of clientele file could be collected throughout the period of time the defendant is in the judicial system.

This file is obviously an extension of the case history module established in the prosecutor's subsystem. It demonstrates the building block, or information sharing, of a criminal justice information system.

*Attorney scheduling file.* With a large number of attorneys in a jurisdiction, a scheme for identifying each attorney, the names of cases assigned to him, the types of cases, and the tentative trial dates would aid a court administrator in insuring the proper scheduling of each attorney. That is, if attorney A is scheduled in court X at a certain time on a specified date and the case he is trying averages two days in length, then a case in court Y involving the same attorney could be scheduled based upon the probability that he will be available within two days after the initiation of the previous case. The attorneys would be responsible for keeping the court administrator informed of his individual case loads, types of cases, etc.

*Consolidated calendar.* In the future, a consoli-



dated calendar could be developed for all courts within a system, providing an attorney file and an up-to-date, accurate record of current criminal cases in the system are maintained.

The hardware necessary to automate court scheduling of cases in a trial court already is in existence but has not received the widespread use which the complex system of court scheduling procedures require. For example, the Municipal Court in Los Angeles County makes use of an IBM 360/40 to aid in management of its functions. Investigation has revealed that the IBM 360/40/50 would be more functional because of the multiplicity of uses which the hardware provides.

Scheduling alone is too restrictive when discussing an automated system of court management. As an estimate of the types of hardware required to handle the various files described in the above narrative, the following are needed:

1. One medium-speed, small core computer.
2. One high-speed printer.
3. Six tape drives.
4. One reader/punch.
5. One high-speed disc storage unit.
6. Two low-speed mass storage devices.
7. Sufficient hard copy terminals for effective service.
8. Sufficient video terminals and control terminals.
9. Line and data sets.

Quite obviously the magnitude of the judicial system dictates the kinds and complexities of the hardware. The package is speculative but such a combination of theory and hardware is an absolute necessity to modernize our "creeping" judicial system.

The entire system of criminal justice is at a crossroads today. Police and corrections agencies are under fire by the citizens as well as the government. Each is making progress to better utilize modern techniques of management. Only recently has there been a major drive spearheaded by the Chief Justice of the United States, Warren Burger, to encourage innovation in an archaic judicial system. To assist in solving at least some of the problems the new and innovative must be tried. Computer usage and automation appears to be the contemporary approach best suited to effect immediate results. ■



Dr. Feikenes is professor and chairman of the Dept. of Criminology at California State College, Long Beach. He has served as a research associate with the Long Beach College-based Institute for Police Studies, and as a consultant for LEAA and several California police agencies. He holds the BS and Doctor of Jurisprudence degrees, the Univ. of Maryland; the MA, California State College, Long Beach, and will be awarded the Doctor of Criminology from UC, Berkeley in June, 1971.

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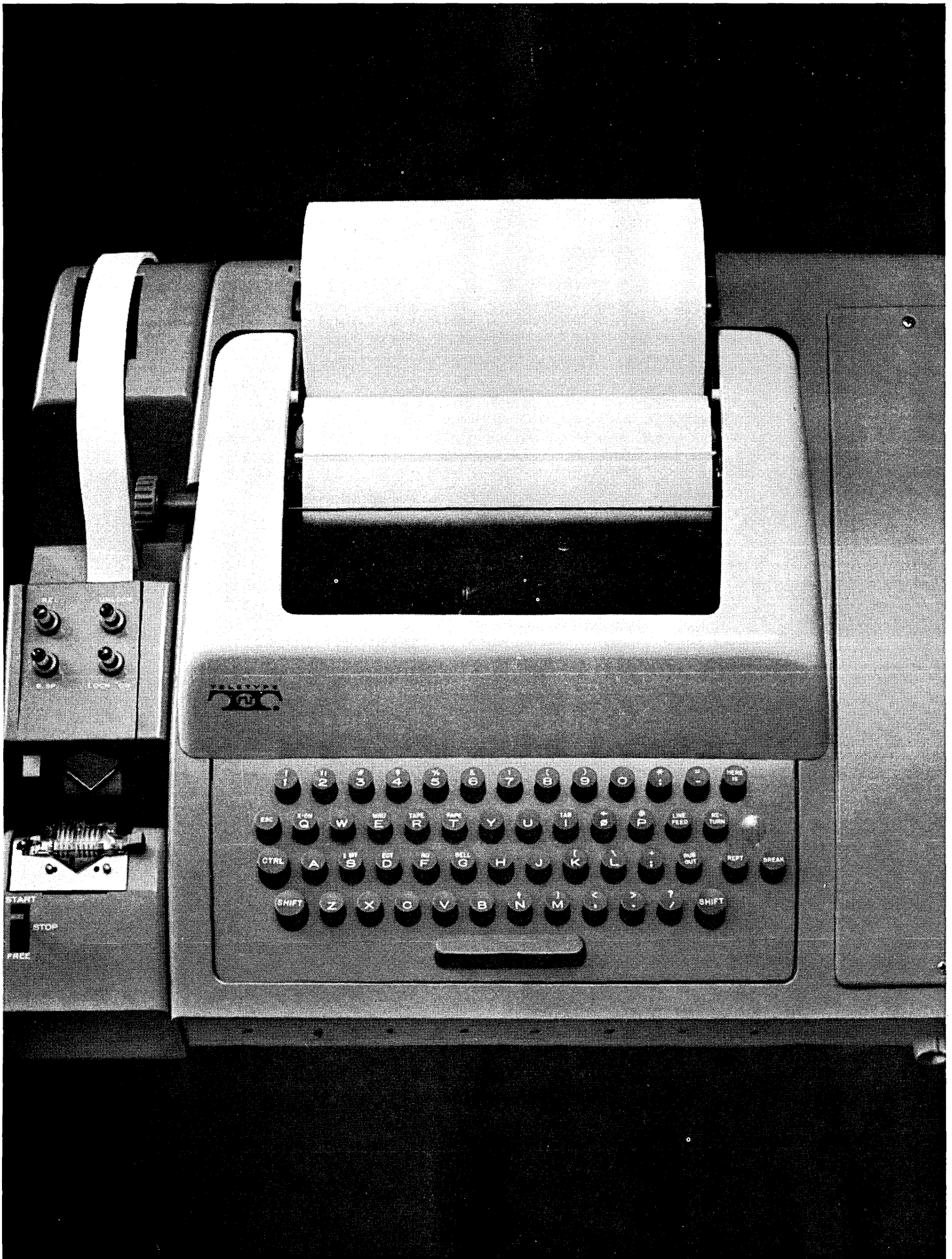
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## Simple ways to update while waiting for the latest Whiz Bang

# The Love and Care of

**M**any of our data systems in government and industry are virtually "antiques" because we have been using them for a few years. The aging process is accentuated by the knowledge that new and dazzling products and approaches are surfacing every day. While many of us who work with large data systems want all the latest new products, we are often forced to stay with the current environment for longer than we would like.

In government computer systems there is a rather detailed cycle involved in the evaluation of new system plans and the time from request to ultimate environment change is often several years. Since this is not a situation unique to the government, I'd like to suggest some areas which can make the wait somewhat less expensive than it might be—for all users. While the primary emphasis will be on large, business-oriented systems, the concepts are also applicable to more modest installations.

Let's assume the worst case—for the next few years we will, for many of several valid reasons, be constrained to retain all the systems now installed—including human systems. This means that there will be no change in: system design, computer, computer operators, programs, programming language, programmers, support procedures, output requirements, and peripheral devices.

In other words we expect that our system won't be changing very much at all for quite a while. Also, just to make it even more Spartan let's exclude any kind of exotic source data automation, consultants, or any other more exciting possibilities. We're dealing with a system that is plain, unglamorous, devoid of break-

throughs or even radical management techniques. It's also a system which may cost upwards of a million dollars per year to run, including personnel costs. Now where can we look for savings? Let's start at the console in the computer room.

Why there? In visiting a large number of computer rooms, some industry and some federal government, I found what seems a very unusual thing. The manual console log and the console printout have some inter-

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**...some systems which operate in real-time mode often require as much as an hour to bring up the real time part of the system.**

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esting but seldom used data. For example, from these console printouts it was easy to discover that some systems which operate in real-time mode often require as much as an hour to bring up the real time part of the system. The console sheets record in detail the steps, the starts and aborts which were necessary just to accomplish this seemingly simple act. It also turned out that some operators could do this task three or four times faster than others. In other words, here is a necessary job which is frequently done which may cost thousands of dollars or a lot less over the course of a month, depending on who is doing it.

Granted, that's a very small thing and may be at

# Antique Systems

by Commander Stephen R. Ruth

most a few hours per month for potential savings. But it illustrates two points. First, the operator's ability can drastically alter the savings equation. Second, the basic times required to bring up real time were seldom challenged. They were assumed to be endemic with the system. There was no particular quarrel with the manufacturer. It was simply taken for granted that these times were reasonable.

The console data gives other insights. For example, it usually records faithfully when tape units are called for, when questions require answering and, of course, when such questions are answered. It is usually possible to know how long a tape unit mounting request should require for response. In fact a norm for almost every message response is possible. Using such a norm at several installations recently, it was found that as much as eight minutes every hour were involved in an activity which could be called unnecessary wait time. But eight minutes out of an hour is over 10% of the time.

Polar case? Maybe. It was possible to isolate this problem just by looking into those dreary looking console printouts. Quite often, in the same room or not far away, it's also possible to get a reading on reruns which are due to operator error. There are some very clever systems for ascertaining the real responsibility. One such system indicated that, on the average, about 30 hours per month were attributable to reruns because of operator error.

By taking the worst of all these cases which I've looked at in government and industry there is perhaps 25% more computer time available simply by using better, faster, more efficient procedures in the com-

puter room. Even if it's only 10%, it's very easy to find. And 10% of a million dollars is still worth the trouble.

There are several tradeoffs which managers may want to consider based on such data. The most obvious one is the cost of operators vs. the cost of the system. If adding another operator will reduce the system delay time or rerun time by some amount, a suitable economic analysis can be made. Also, the

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**... there is perhaps 25%  
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faster, more efficient  
procedures ...**

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training of the operators may be worth the marginal increase in potential run time. Further, there is a possibility that greater visibility of such data may lead to a plan by management to pay a slightly higher price for the knowledge of the impact of such seemingly mundane matters on his environment.

There are several questions which are important in analyzing the efficiency of the computer itself:

Is there a suitable balance between input and output? In other words, are the two being allowed to happen simultaneously by good channel scheduling procedures?

How often and in what quantity is core, the fastest,

most expensive memory in the system, being used?

How often is the computer in a "wait" state, expecting data or a command but still awaiting its arrival?

There are several ways to get such data. Recently there has been considerable discussion in the computer literature about hardware and software analyzers. The latter are routines embedded in core, which keep track of I/O balance, program functions, and other CPU tasks and sequences in order to spot serious inadequacies. The disadvantage of the software analyzer is its requirement for added core and usually a tape unit or two to record data. Hardware analyzers can be used to get such information too and have been increasingly popular. Some manufacturer-provided logging and accounting programs will also compile these data. It's even possible to get a fair idea simply by watching the lights on the computer.

But what sort of payoff is possible by doing this kind of scrutiny of your computer? A recently formed hardware analyzer users' group has reported that CPUs in many varied systems are in wait state over 80% of the time. Some banks of memory are in use less than 1% of the time! Some I/O balancing is so bad that a large computer becomes a glorified printer interface or telecommunications link rather than

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### Some I/O balancing is so bad that a large computer becomes a glorified printer interface . . .

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doing its expected task of computing. Often the corrections are simple, like changing channel allocation. I won't comment on the potential of such findings because it's obvious. And the speedups do not necessarily come in tiny little chunks. They can come in such volumes that doubling or even tripling throughput becomes a possibility, occasionally a reality.

Before leaving this topic, another word about I/O. In a recent case I observed some systems which had dual density capability of 556 and 800 bpi were only using 556. It can be such a simple thing that it cries out for change. Once the necessary adjustments were made to some programs and the file handler, the 800 bpi capability was used exclusively. Savings were in the 15-20% range across the board. That means that all tape programs which were I/O bound went about that much faster than before which also suggests that 20% more tape programs can be run. Savings? If a system costs \$300 per hour and even half of its work involves tape programs, a savings like that is worth the time to make the change.

The installations which I have visited are using vendor supplied operating systems and utilities. A number of government agencies have made some major changes to such operating systems to achieve greater efficiency. The Navy's Stock Point System, using modular programs at all major supply centers and Industrial Naval Air Stations, has drastically redone a manufacturer's operating system to attain a much more efficient, individualized operating system package. Such packages have a cost, of course. An

interesting question, though is, "What is the cost of the current operating system?"

How much does it cost, for example, to seek a record? The latter question is not answered by giving the manufacturer's access time for a given device. The user is concerned with the time required from the time the program issues a seek to the time the record is available for use. Recently on another of the Navy's systems we found that a program was running at the rate of one transaction per second. We felt that it should be far faster. By writing some relatively simple coding to trap typical timings for this process we discovered that the manufacturer's software was requiring 500 msec to bring an overlayable segment into core. It required the same 500 msec even if the desired overlay was already in core! Knowing this, we had several choices of action, not the least of which was to confront the manufacturer with this large waste in his system. The point is that we found a problem which was costing us large amounts of computer time by simply probing some of the manufacturer-provided software. In this case, the problem cited was so bad that it represented a potential speed up of two or three times for a widely used program.

Some systems with excellent job stream capabilities are not using them in the fullest way. Job streaming programs is not very new but there is considerable improvement possible with their use. Sometimes these very obvious capabilities are relatively unexploited in large systems.

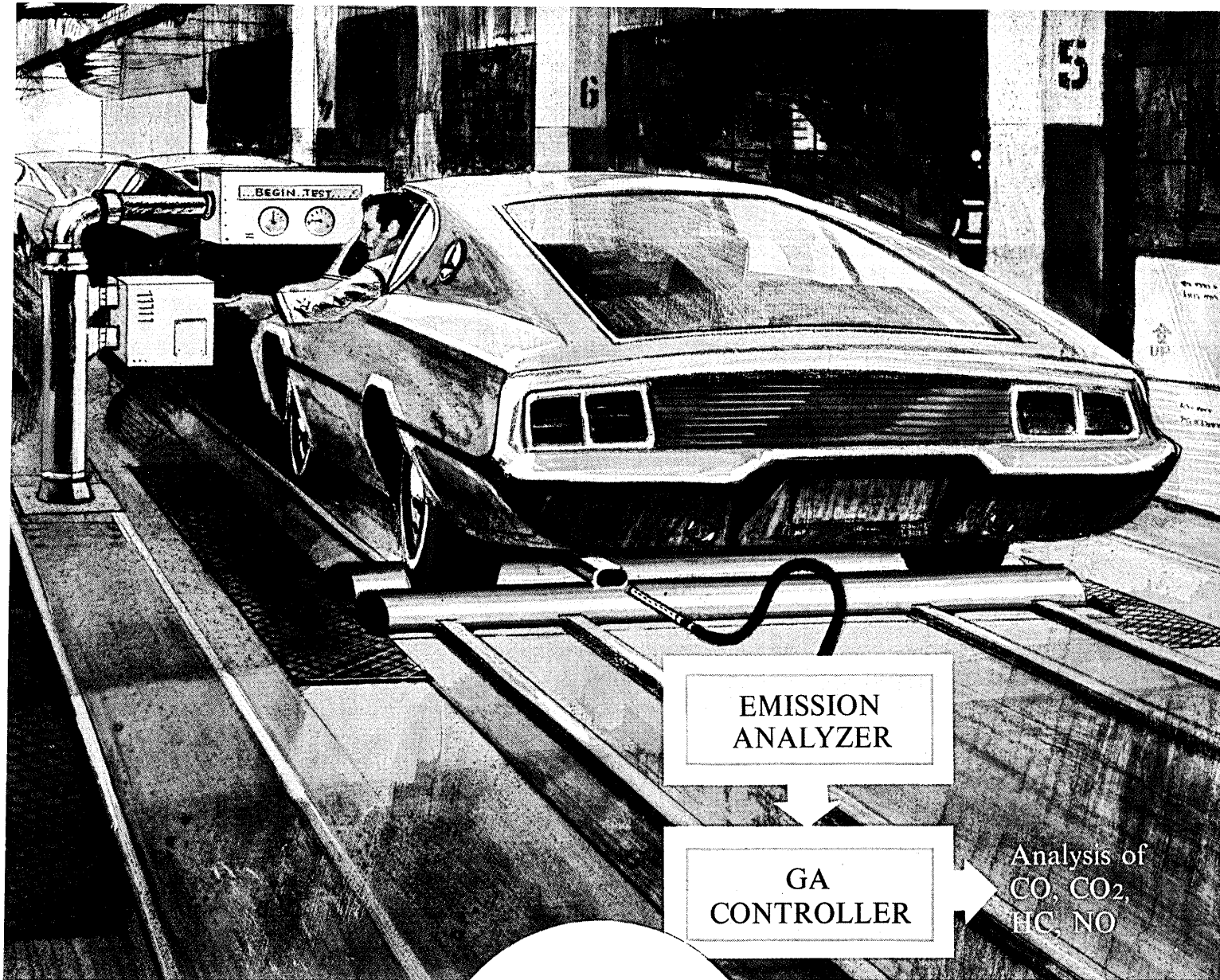
Implicit in all this is some determination of the overhead of the operating system. If you have to live with it you can at least try to use its best points and avoid (or complain about) the weak ones. In some gross cases, like the 500 msec one mentioned earlier, you can appeal for immediate support to the vendor. In the more typical case, this takes a lot of time and you must decide the interim strategy yourself.

I'm only suggesting that this area is one which is worth the manager's attention. There are several ways of getting quantitative data on the operating system's performance. A hardware analyzer, cited earlier, can help. But you can also use short counter programs, written in house, to evaluate the time which critical operations require. The applications programs themselves could have "traps" added for calculating times required for certain repetitive tasks. Some vendor-supplied logging and accounting programs also give data of this type.

At the beginning it was stipulated that we won't change the programs or the language for quite a while. But we can take a look at both to see whether there are any savings possible. Each manufacturer's implementation of procedure oriented languages varies widely in the power of the various elements. The ADD verb in COBOL, for instance, can generate as many as 30 or as few as 3 assembly instructions, depending on the compiler. Indexing can be much more rapid than using subscripting in COBOL. In one manufacturer's compiler, a program runs 25% faster using indexing, all other things held constant.

The size of a program can be a good example of suboptimization. A giant program which is very optimal in itself may levy an unacceptable cost on the total computer system—a cost of excessive run time and facilities dedication—which can be very unoptimal.

*(Continued on page 46)*



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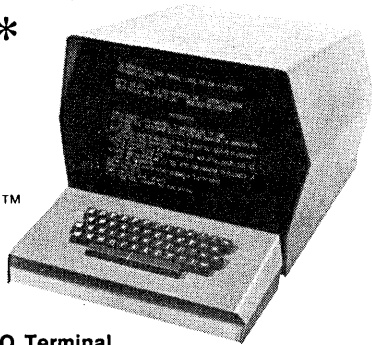
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**Antique Systems . . .**

If a program has too many or too few checkpoints there can be severe costs in either rerun or total run time. The issue may be dormant for years but it's worth a brief look now and then. The same applies to facility utilization. Some programs may run beautifully with six or seven tape units. Yet the more tapes, the less potential for multiprogramming. It may be

**A giant program which is very optimal in itself may levy an unacceptable cost on the total computer system . . .**

worth another look at the program to see if it can get along with fewer tape units.

While discussing programming it would also be a good idea to take a look at documentation. I won't suggest an automatic flow charter, since that, again, is a management decision, but I will suggest a look at the total system documentation to be sure it is really transferable—that the standards are clear and unambiguous. For large systems it might be worth a look to see whether any of your programmers are devising identical or nearly identical utilities without knowing of the existence of alternatives. If the documentation is clear enough such information can be exchanged through very simple means; like an in-house, exchangeable software directory.

One other item in this unglamorous list—the use of called subroutines. Within programs there may be a series of exits to such subroutines. If they are basically quite similar there may be some huge time and core savings possible by using one parameterized subroutine rather than a large number of nearly similar ones.

Programming may not be a good area to look for savings—yet there may be one of the functions mentioned above where a very modest investment could yield some significant improvements in computer time. The costs/benefits analysis would have to prevail. As an afterthought one of our programmers recently used such an analysis on a program which he thought would run much faster by exchanging a binary search for a sequential search in one of its parts. The change, which required perhaps one man-week of effort, including testing, resulted in a reduction in program run time from 7 hours to 20 minutes. Anyone who works in programming will recognize this as being possible in large systems once they are scrutinized. The implication here is not that such reductions by an order of magnitude are typical, but that they are occasionally possible and worth looking for.

Several of the methods mentioned earlier will give a good idea of the amount of multiprogramming which your system is doing. Logging and accounting programs (when available), analyzers, and operators' logs will all give a reading on concurrent processing. Experience visiting installations as well as comments of other users lead me to the conjecture that concurrent processing is vastly underutilized. A recent article stated that many systems are operating in multi-

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programming mode only 30% of the time.<sup>1</sup>

Whatever the concurrency potential of a computer it can usually be affected by these variables: core utilization by each program, facilities used by each program, power of vendors software and the ability of the computer operators. Three of these four are directly controlled by the manager of data processing. The other one, the vendor's software, is not controlled by him but I have suggested that this performance can be known and its severe discrepancies corrected through management's complaints.

The analysts and programmers are responsible for the programs, and therefore control core utilization and assignment of facilities. The operators who make many of the decisions for running programs concurrently also come under the same administrative chain of command. The suggestion here is that increases in multiprocessing, if feasible, can be attained by management's action within, rather than outside, the normal channels.

Aside from all the areas mentioned previously there are many others which should merit consideration as potential time and money savers. Again, assume no big changes in the system. Testing may be very costly if it is not controlled. If there are many programs which operate on common files, there should be some kind of common test file which all programmers use

---

**... some kind of common test file which ... reflects all the experience of bugs caused in all programs.**

---

and which reflects all the experience of bugs caused in all programs. Many programmers still have their own unique tapes which must be loaded into the test system rather than using a previously established file. The cost of such a load is appreciable.

Testing can also be scheduled with considerable efficiency and run in the job stream if instructions are clear and operators alert. The total number of times and hours required for a test (by programmer), the number of times a programmer insists on being on site for the test; in fact, the total number of hours required for testing of all programs—these are statistics which are easily gathered and which may give a hint of the real potential for saving time in the testing environment. The simple act of requiring the visibility of such data may cause a dramatic decrease in time required for testing.

A related issue is the backup provided for a system. In industry and in government, I have encountered some which not only have the typical grandfather-son tapes; they also maintain great-grandfather and great-great-grandfather tapes. On the other hand, some systems are living with only father-son backup. In many cases, the costs and tradeoffs of such conditions can be the basis for some important savings decisions.

Security, in the environment which today's large computing centers face, should be a basic part of our life. Yet there are still installations, especially in non-government computing it seems, which permit easy

entrance of anybody who looks (or acts) like a CE or SE. There still are some which store all their backup tapes in the same room with updated tapes. In effect they are risking destruction of an entire data bank with no real means of recouping.

There is beginning to be a greater awareness of the potential for data compression in large business systems. The term generally refers to any technique by which the size of the data file returned to the storage medium is reduced. Simple compaction, recoding, blank suppression, and redundant zero elimination are all forms of this technique. In many cases, the size of storage required for such compressed or compacted records is reduced by 50% or more. There are more elegant schemes for compression which involve mathematical techniques for redundancy checking and there are devices which claim to compress by relatively simple electronic methods. Yet, the more standard techniques, if used where the marginal return is greatest, can give a handsome payback without vast reshuffling of programming or analyst manpower. Remember, the basic premise is that we don't make any changes to the system. Compression can be used within, rather than in addition to, existing systems.

I have suggested that there are considerable improvement and savings possible by using the same system carefully and economically. Somehow, I feel that there may be greater benefits in our learning to use all the advantages of the current technology with our current systems rather than racing away to get new ones. In any case, it is the duty of any manager who is evaluated by results, to use his systems, human and machine, in an efficient way. Efficiency, of course, is the ratio of what could be done to what is done.

These suggestions relate to the "could be" part and involve no new technology. The implication is for greater use of the ideas of marginal analysis. If the increment of improvement, measured in an appropriate way, yields a larger increment of benefit than of cost, the project deserves to be considered. Most of the ones cited here can be considered at the margin in the same way new equipment is evaluated. The point is that such an analysis will, in many cases, yield striking benefits with the same antique system you've used for years. ■



Commander Ruth is director of the Navy's Computer Environment Division at the Fleet Material Support Office. He received his BS from the U.S. Naval Academy in 1955. He holds an MS in Computer Science and has nearly completed all requirements for the PhD at the Univ. of Pennsylvania.

1. Wiener, J. and De Marco, T., "Tuning for Performance," *Modern Data* January 1970, p. 54.

**Before you check out the latest data access method, consider this technique for getting the most out of ISAM**

# The Hidden Speed

**T** For a number of years the Indexed Sequential Access Method (ISAM) has been called everything from inefficient to devastating and now software vendors have announced "plug-to-plug compatible" access methods. The new access methods are advertised as 20% to 70% faster than ISAM and at first glance this appeared to be a wonderful new discovery.

But before we start evaluating the new products, let's see if the access method we have is really inefficient. Possibly the best way to get my point across is to relate my experiences with ISAM and let you make up your own mind.

Some time ago I was assigned the task of improving the performance of ISAM in our Data Center. Using all of the available IBM publications, I learned a great deal about the organization of an indexed sequential data set and how to access it, but not how to make it efficient. I found myself with an ISAM file and one very slow update program that accessed the file randomly (BISAM).

The first real problem of the BISAM update program was, the more new accounts we added, the slower it ran. After a couple of weeks I found that the most inefficient mode of processing for ISAM is the addition of new records.

In the overflow areas ISAM creates chains of records with each record pointing to the next. To add a new record in an overflow area that already has 100 records, the access method must search the entire chain starting with the lowest key, testing each record to see if it is the last one. When the end of the chain is reached, the new record is added. The next new record will then require a search of a chain that is now 101 records long, etc.

There are two methods to improve the processing of new records. The first method is to apply the input transactions in descending order. The advantage to this method is that the overflow pointers in ISAM point to the lowest key in the overflow area and, if the records are added in descending order, this pointer will point to the end of the chain. This eliminates a lengthy overflow search.

The second method for improving the processing of new records is to create the data set with "dummy" records. This is only possible if the data processing department controls a majority of the keys assigned to new records that will be processed. The presence of these "dummy" records will allow a normal read and rewrite to process new records without the need for overflow processing.

After implementing the second method of processing new records, we enjoyed an increase in through-

put, from 8,000 transactions per hour to 12,000 transactions per hour.

At this point I was pleased with the immediate performance improvement. But, needless to say, I was not thrilled with an access method that could only process 12,000 transactions per hour.

The next improvement was the addition of the first level master index. This immediately improved throughput by eliminating an extensive search of the cylinder index, and our BISAM update program now processed approximately 16,000 transactions per hour.

Still not impressed, I continued to search for new methods of improving performance. I had now learned that BISAM requires three I/O events to find a record: (1) read master index, (2) read cylinder index, and (3) read track index. With a little more study I found that ISAM will search the master index in core storage thus eliminating the first I/O event. The master index was immediately brought into core storage and our BISAM update program now processed about 22,000 transactions per hour.

Now BISAM was somewhat livable, but further improvement was necessary.

After a few weeks of getting nowhere, I decided that the only way to push more transactions through BISAM would be to bring the cylinder index into core. This would eliminate two out of the original three I/O events needed to find a record and possibly increase throughput by 30% to 45%.

I reloaded the data set, and eliminated the master index. After a couple of test runs to make sure that the index sequential access method would load the cylinder index into core, I was ready to clock this improved version of the update run. Off I went to our computer room with my stop watch in hand. The program started running and by clocking the number of input blocks read from tape, in two minutes time I was excited to find that BISAM was now processing 34,000 transactions per hour. Half way through the run I took another reading and found that BISAM had slowed to 28,000 transactions per hour and by the end of the run BISAM had dropped to 22,000 transactions per hour. Knowing that the program was not processing any overflow records I was thoroughly confused as to how the program could run slower with each minute it processed. Two days later, while going through the ISAM coding, I found the problem. The access method module that executes the in-core search of the indices does a serial table lookup and, with my transactions in ascending order, the search was very efficient for the first part of the run and very inefficient for the last part.

To solve this problem a binary search routine was

# of ISAM

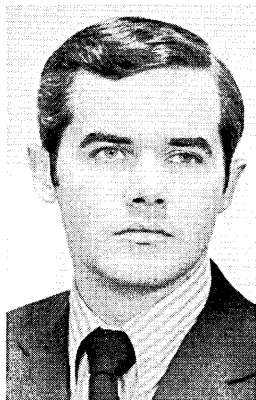
by Frank T. Coyle

developed to find the index required. The search routine is called by the application program prior to issuing each read or write macro. Once the proper index record is found, the address of the index record is placed in the field of the data control block that normally points to the beginning of the in-core table. Now when the access method uses this new pointer for its serial lookup, it finds the index record desired on the first compare.

It's been a long, hard road but we now enjoy the throughput of 33,000 transactions per hour with BISAM as compared to 8,000 transactions some time ago, and I was satisfied for a time. Satisfied that is until I started reading about the 20% to 70% performance improvement we might attain with the new plug-to-plug compatible software. Off we went to evaluate these new and wonderful access techniques. The results of our findings are as follows:

1. To this date we have not found a replacement access method that can process 33,000 random updates per hour.
2. Sequential processing with the new access methods will be 20% to 40% slower than QISAM.
3. The performance improvements enjoyed by the majority of those installations which have purchased the new access methods could have been attained by using some of the techniques mentioned in this article.

We enjoy a 400% improvement in performance without buying new software and I only hope that the time we have spent and the techniques we have used can be of help to others fighting the ISAM problem. ■



Mr. Coyle is currently supervisor of technical support for the Uni-Card Division of the Chase Manhattan Bank. He is a member of the DPMA and current chairman of the ISAM Task Group, Cobol Project, for Guide International. He has been involved in many aspects of data processing for the last six years, having previously worked for IBM and Doubleday and Co.

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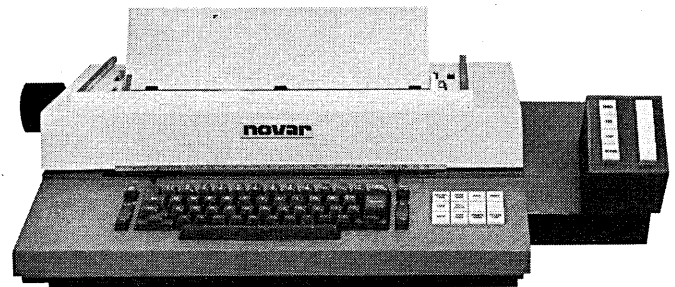
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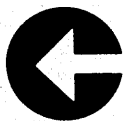
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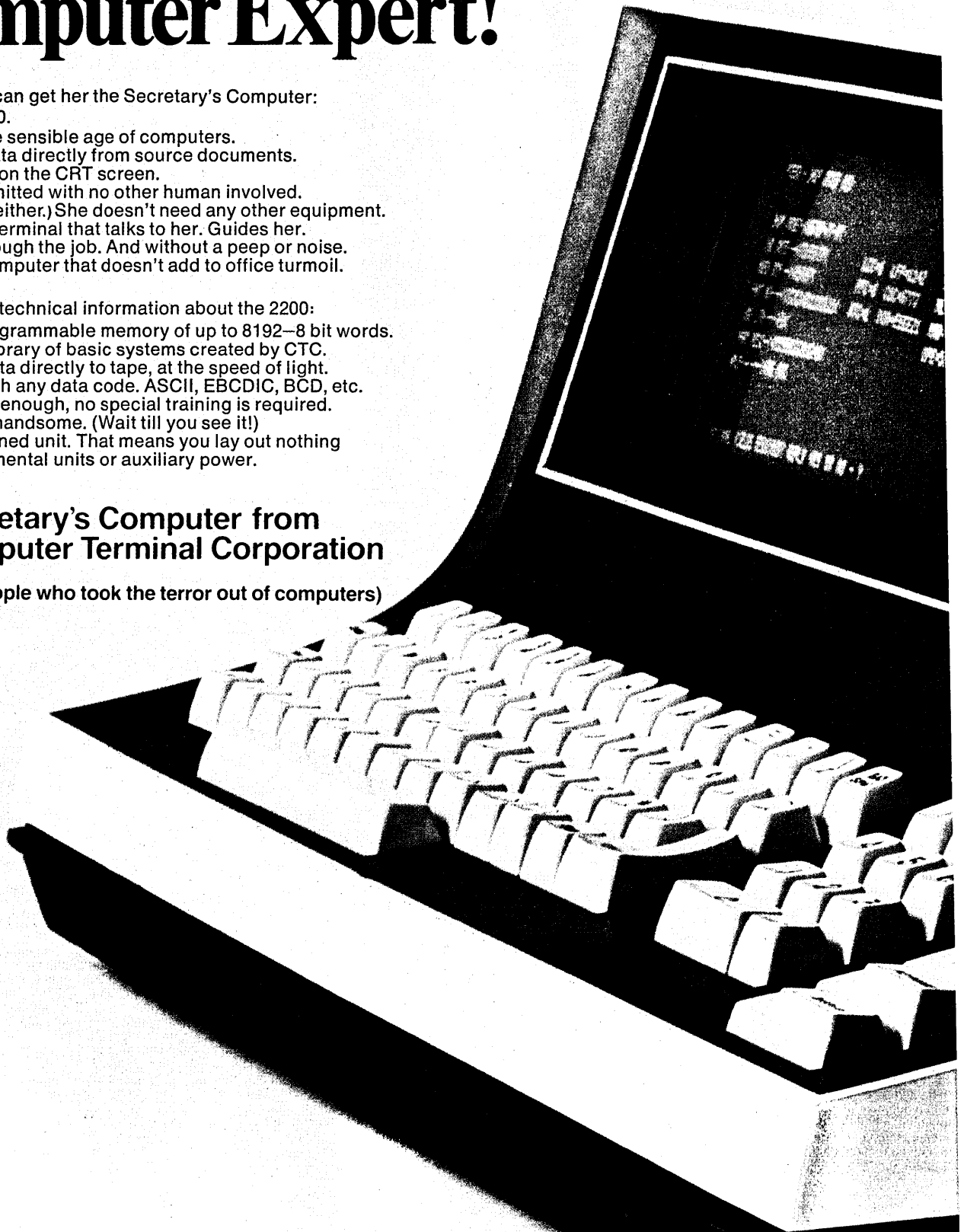
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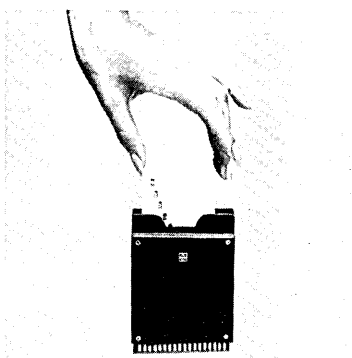


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# PERSPECTIVE

an interpretive review of significant developments

## IBM and CDC in Federal Court; Kettle Calls the Pot Black

How significant is the IBM counterclaim against Control Data Corp. and its subsidiary, Commercial Credit Corp.? Though the claims aren't the same, the scope is as broad as CDC's antitrust suit against IBM.

It's an eye for an eye.

IBM accuses CDC of reciprocity practices, participation in a "disguised" international cartel, acquisition of 50 firms to restrain trade and lessen competition, and deception in its financial relationship with Commercial Credit Corp. The major relief IBM asks — divestiture of Commercial Credit — is as atomically destructive as CDC's prayer that IBM be broken up. It should be noted for both cases that divestiture or separation is seldom granted in private cases. The Justice Dept. has the power to accomplish that and is trying to through its monopoly suit against IBM.

Now the "benign monopoly" seems to be trying to give the Justice Dept. a new perspective on its competitors and their antitrust practices.

At writing, Judge Phillip Neville was wrestling with CDC's motions on the IBM counterclaim, which he permitted to be filed in the Federal District Court in St. Paul, Minn., this April. Primarily, these motions ask that either the suit be dismissed or that it be severed from the main antitrust case against IBM, thus staying prosecution until that case is decided. But even if the judge dismisses the claim, the chapter won't be closed. IBM is likely to ask for a rehearing and maintain its offensive.

The counterclaim could conceivably accomplish many things for IBM outside of court, says a lawyer. One is to force Control Data to drop its antitrust suit. But other sources say that CDC president and chairman William Norris had to be restrained from delivering a blistering counterattack on IBM at the recent CDC annual meeting. The enmity between the firms is reported to be so fierce now that the legal battle could take on Viet Nam proportions.

Just as IBM discovered what it

considered illegal CDC practices in the mutual pretrial "discovery" proceedings that occur in an antitrust claim, CDC may in turn now amend its complaint on the basis of its examination of IBM documents. (IBM's answer to the suit so far is that CDC has not been specific.)

The IBM counterclaim is also viewed as a tactic to scare domestic and foreign firms from joining the organization publically known as International Data, and which IBM calls "the Club." Formed last fall by CDC, International Computers Ltd. of the U.K., and Compagnie Internationale pour l'Informatique of France, it was announced as a study company which initially would develop standards for the future product lines of all three companies — and any other dp manufacturing firms that wished to join. IBM says that was a disguise; the intent is a cartel which will develop and market a single product line in an effort to restrain trade world-wide. Under foreign commerce law, no U.S. firm can agree with any company to divide a market geographically or by product.

### The Club Expands?

A series of bilateral agreements between CDC and foreign and domestic competitors led up to the study organization, IBM claims. Not the least of these was an accord that ICL would not build its own large-scale system but would market CDC's 6000 and 7000 series. IBM quotes extensively from CDC's memoranda on international meetings and says that CDC has "solicited at least five domestic, eight European, and three Japanese data processing equipment competitors and at least 13 foreign governments to join, participate, and support the deliberate anticompetitive activities of the Club."

Numerous reciprocity violations are noted in the 66-page counterclaim, whose narrative and dialogue quotations from CDC memoranda bordered on the entertaining. CDC allegedly pressured investment and brokerage firms and insurance com-

panies to buy CDC equipment in return for its business. CDC vice president Harold Hammer is quoted as telling Dean Witter & Co. that they were "our investment bankers so long as we obtained the pending computer order and that . . . If it was not forthcoming, I must work with another investment banker . . ."

The suit said Dean Witter refused and CDC's relationship with Witter ended in November of 1967.

### CCC a 'Prime Example'

Control Data bought Bendix and SCM as customers by buying their losing computer operations, the suit alleges. IBM lists some 50 CDC acquisitions and combinations, costing \$900 million, which were intended to restrain trade and commerce in the dp industry and lessen competition. Purchase of Commercial Credit in 1968 was used as a prime example of that, providing "the funds and the financial power necessary" to carry out CDC's "illegal plans." CDC and Commercial Credit are also accused of combining to practice reciprocity. For example, Hammer is said in the suit to have offered to help Avco Corp. obtain a \$30 million loan from CCC for one of its subsidiaries if another Avco subsidiary would select a CDC rather than an IBM computer.

IBM put the bug in the Justice Dept.'s ear about the CDC-Commercial Credit combine by delineating the way CDC has used Credit's finances to its own advantage. Generally, Justice investigates acquisitions of that size, so its silence about the combine was considered "approval." But, says IBM, Commercial Credit, "soliciting required consents from its institutional lenders . . . specifically agreed to accept severe restrictions on its right to finance Control Data's data processing business." CDC intentionally exceeded those restrictions, using "complex financial transactions to siphon off and divert Commercial Credit's substantial financial power." For example, through transfers and leasebacks, CDC "has been able to utilize for its own purposes \$146.9 million of Commercial Credit's financial resources as of Sept. 30, 1970 . . ."



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## PERSPECTIVE

yielding to Commercial Credit only the prime rate plus an interest in speculative residuals and representing the financing by Credit of substantially all the domestic lease base of a single manufacturer . . ."

That is a mere glimpse of what is in that claim. Some industry reaction to it was jocular. "Why I can name you

several manufacturers that are doing the same things—especially reciprocity," said an observer.

If that is true, IBM has served another subliminal notice to the industry—if you must sue IBM, be sure you come to court with lots of money and impeccably clean hands.

— **Angeline Pantages**

### **GSA Speaking Softly, May Get Bigger Stick**

New rules limiting sole-source upgrading of federal dp systems were about to be unveiled at press time by the Office of Management and Budget (OMB). All computers in the federal inventory will be covered, but the chief aim, according to a knowledgeable source, is to discourage 360 users from acquiring 370s without first considering alternatives — including other computer makers.

Meanwhile, the General Accounting Office (GAO), in a recent report, told Congress the feds could cut costs substantially by converting many one-year system rental contracts to multi-year leases. GAO also believes the General Services Administration (GSA) ultimately should procure all dpe on behalf of federal users. To start the ball rolling in this direction, Congress was advised to put more money into GSA's revolving fund now.

Details of the upcoming OMB policy statement weren't available at press time, but it's learned they will be similar to those of a DOD directive issued last March. That document requires military dp users to consider three alternatives before deciding to upgrade an existing system to a newer, more cost-effective model supplied by the same manufacturer. One alternative is "competitive replacement" of all or part of the system. The others are reconfiguration of the system and purchase of the existing system by GSA's revolving fund. In the latter case the user would then lease the system from GSA at rates below those charged by the manufacturer.

OMB, like DOD, is anxious to make the upgrading of existing systems a major competitive procurement exercise. A related aim is to extract price

concessions from IBM. The basic strategy is to get more vendors into the bidding derby so that Armonk, in self-defense, will have to offer better terms.

Whether this strategy works, though, will depend on how a number of questions are resolved. For example, it hasn't yet been decided by OMB whether users will have to include system conversion costs in evaluating alternative ways of upgrading their installations. Enforcement is another problem. If the agency evaluations aren't closely monitored, it is possible, if not probable, that users who are reluctant to change suppliers will still be able to have their own way.

#### **GAO vs. GSA**

The eventual impact of the GAO report also is murky. GSA already has drafted legislation which could produce a massive increase in the number of multiyear leases negotiated by the feds and a corresponding decrease in annual rental contracts. But the chances of enacting this legislation don't appear to be bright.

Congress traditionally has been skeptical of such proposals because they reduce its control over expenditures. The GSA bill also faces a special problem. As one congressional source put it: "They (GSA) will have to demonstrate they're making effective use of their existing authority before we give them any more."

This source feels that before additional multiyear leases are financed out of the revolving fund, federal procurement procedures and policies must be improved. Specifically, better performance measurement tools

have to be developed and the effort to increase software compatibility has to progress much further. He also contends that until GSA assumes a more active managerial role, it doesn't make sense to either increase the size of the fund so that more systems can be procured, or to lift the restrictions that now prevent large-scale multiyear leasing.

The GAO report uses almost identical language. It says "GSA should, by taking a more active role in contracting for adp equipment, make sure that multiyear leases are used to the extent lawful and practicable." The report explained that even with the present restriction on use of the adp revolving fund, more multiyear leases could be negotiated with systems manufacturers. Five firms — RCA, Burroughs, CDC, GE, and NCR — now offer such plans under terms that do not require federal funds to be tied up more than a year at a time. Yet, beyond notifying users that such plans are available, says the GAO report, GSA has not taken "any specific action to promote (their) use . . ." GAO believes that GSA should assume a more active role by requiring agencies to submit for its evaluation their decisions to acquire adp equipment under short-term rentals.

Similarly, GAO implies that GSA is missing a big money-saving opportunity by not doing more business with third-party lessors. According to the report, there are about 100 non-manufacturing suppliers in this business. GAO found 195 IBM systems in the federal inventory being rented a year at a time which it says could be leased from third parties for three years at potential savings of \$44 million or for five years at potential savings of \$85 million.

It seems likely that the federal dp management effort is headed for greater centralization relatively soon. One possible result is that third-party lessors and non-IBM manufacturers of compatible hardware will gain a bigger market. Another possibility is that IBM will be forced to offer better deals. It also seems likely that GSA will begin reviewing short-term dp rental agreements before they are renewed by the agencies. In at least some cases, users will be told to negotiate multiyear leases instead.

— **Phil Hirsch**

## Competition May Score Firsts at IBM's First

Not only has IBM's first 370 installation — at the Zayre Corp. in Framingham, Mass. — become the first 370 installation to hook up with an independent disc drive manufacturer (Memorex Corp.), it just might become the first 370 installation to lose out to another mainframer (RCA).

When IBM announced the installation of its first 370/155 with great fanfare at the headquarters of the retail store chain in February, the installation was remarkably clean. There was no non-IBM equipment visible. Now, however, Memorex has successfully displaced two IBM 2314s with a Memorex 3660 disc file subsystem. In addition, Zayre, which has been scheduled to take delivery of an IBM 370/145 in August, revealed that it is considering dropping the 145 in favor of a machine from another mainframe manufacturer, probably RCA.

"Getting the 3660 was strictly an opportunistic move on our part," says Robert M. Bozeman, Zayre's assistant vice president of management information systems. "We needed the system for just a few months, and none of the other independents offered us a system for a short period. Most important to us, though, is the fact that the 3660 saves us \$25,000 over the 2314 for the five-month period." IBM had two 2314s installed at Zayre — an eight-module unit with 240 million bytes for the 155, and a six-module unit with 180 million bytes for use with Zayre's 360/50. Memorex supplied the same configuration, but at a lower cost.

Several weeks after the late-March installation of the 3660, Bozeman said the Memorex equipment had been working smoothly, and he added that the firm was delighted with the independent disc file, although he conceded he had been somewhat worried about taking the non-IBM equipment at first.

The drama only increases, however, when one considers that the 3660 is scheduled to be removed in late August to be replaced with an IBM 3330

disc drive with a total of 800 million bytes. IBM, of course, can be expected to do its best to see that the 3330 is delivered, thereby knocking out the Memorex system. On the other hand, Memorex can be expected to attempt to keep its 3660 at the Zayre site long enough to replace it with its own version of the 3330. "This could be a real fight," says Bozeman.

Memorex is expected to be in a position to begin deliveries of its equivalent of the 3330 around the end of the year, and Bozeman indicated it was possible Zayre would wait for the Memorex unit and forego delivery of



BOZEMAN OF ZAYRE: "This could be a real fight."

the IBM 3330. The whole issue is complicated somewhat by the legal suit between IBM and Memorex. IBM seeks to retard delivery of Memorex's new disc drive. Memorex has filed a countersuit against IBM.

As for the 145, it was originally planned to replace the model 50 and to handle future growth at Zayre. "Actually, the problem in part is caused because our 155 is working so well," says Bozeman. "We've been shifting over from DOS to OS, and OS is working so well that we may be able to schedule more work on the 155 than we had hoped for." Furthermore, Zayre wants to install an in-house time-sharing system, and Bozeman is not sure the 145 will meet his needs. He wants a virtual memory machine for the in-house system, and RCA is the only mainframe manufacturer that has announced virtual memory machines. Bozeman said he has been talking "on and off" with RCA, and he

conceded that it is possible Zayre might go with RCA.

IBM has not announced virtual memory for the 145, but many industry observers expect the computer colossus to introduce it eventually, possibly later this year or next year (see Feb. 15, p. 18). The 145 is said to contain features necessary for virtual memory — hardware and firmware relocation, paging capabilities, as well as an integrated controller that could handle a drum. Many observers believe IBM is ironing out the bugs on the software before the virtual memory capability would be announced. IBM does not comment on any possible future announcement.

Zayre's 155 has given "admirable performance" since it was installed Jan. 27. It was down only once — for about 48 hours three weeks after it was installed. IBM was unable to hook it up to the highly touted on-line diagnostic repair service in Raleigh, N.C. The problem eventually was diagnosed as a faulty printed circuit board, Bozeman said.

## Firm's Discs Jockey for Market Position

A leasing company entered the disc manufacturing business recently when Computer Financial, Inc., acquired Datatron Disc from Datatron, Inc., changed its name to CFI Memories, Inc., and moved all leasing activities to the manufacturing location in Anaheim, Calif. CFI was put together about three years ago by Bill Lenartz, a former IBM salesman, with backing from Boothe Computer (which now owns 25%) and Union Bank, and was among the first firms to lease disc packs. Now, they have their own.

CFI is looking forward to the IBM 3330 disc drive because they have the capability of making the 3336 pack that goes with the drive. "We've been making one like it for a couple of years," says Joe Ludka, manager of marketing. The disc is 75/1000 inches thick, has 200 tracks per inch, with a capacity of 4400 bpi. However, the

firm fully expects a continuing market for the 1316 and 2316 packs and will keep on producing them (they claim a 90% yield on manufacture).

And they're one of the few production firms on a four-day work week, and a novel one at that. Monday through Thursday one week, Tuesday through Friday the next, making for a four-day weekend every other week. "The only trouble with it is," says Ludka, "I'm not on it."

## DPMA '71: for the DP Manager, a New Image

A new image for the data processing manager should emerge from the 20th annual Data Processing Management Assn. Convention to be held this month in Houston.

It's an image that's been taking shape for some time. The new data processing manager wants to shed the aura of mystery that too often has surrounded his job. He wants to communicate upward and downward within his organization, say DPMA conference organizers. In today's cost-conscious business world, in which costs of data processing are escalating rapidly, they note, the need for such communication has become dramatically apparent.

This year's conference and exhibition, to be held June 22-25 in Houston's Albert Thomas Convention & Exhibit Center, will reflect the organizers' desire to answer this need. And the more than 2,500 expected registrants will be a far cry from the handful of "tab executives" whose informal lunches together in Chicago's Merchandise Mart in 1949 were the beginnings of DPMA.

A conference first this year is a full day seminar for non-data processing corporate executives. It will be limited to 50 participants who will be recruited from the ranks of members' companies on a first-come, first-served basis. Organizers describe it as a seminar form of a book DPMA published last January called "Executive Briefing on the Control of Computers." The book was written by Leighton F. Smith of Arthur Anderson & Co., a Rochester, N.Y., consulting firm which will conduct the seminar.

A quick scan of the list of regular

seminar topics further reflects the dp manager's involvement into a company man as well as a dp man. The traditional technical topics are there, but there is an increased number of such company-oriented session topics as: Manager-Employee Communication Techniques, Employee Motivation — Why and How?, Cost/Control Profitability Accounting, Management of Personnel: Organization Patterns and Techniques, and Managing Yourself.

Conference registration opens at the Thomas Center June 20. The corporate briefing is scheduled for June 22, and seminars will be held June 23-25. The seminar format has been streamlined to provide opportunity for attendance at a greater number of them and for more exhibit viewing time. Where a seminar series formerly consisted of three 2 1/2-hour sessions over a day and a half, this year's seminars will consist of two one-hour sessions in one-half day.

Additional session topics include Planning for Computer Installations, Managing the Systems Function, New Techniques in Systems Design, Packaged Software vs. In-House Programming, Project Scheduling, Managing the Computer, Operation Planning Techniques, Minicomputers, Applications of Microfilm Technology in Data Processing Systems, What Is a Management Information System?, Methods of Structuring a Management Information System, Preparation for and Implementation of Real Time Systems, Data Communications, Data Processing Training for Management and Users of Computer Systems, In-Service Education and Staff Training, EDP Systems Audits, EDP Systems Controls, Time-Sharing Techniques, Information Storage and Retrieval, Facilities Management, Guidelines in the Selection of Data Processing Personnel, The Role of Computers in Urban Problems, and The Computer and Environmental Problems.

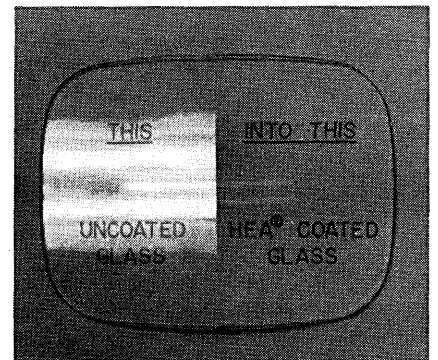
The 75 firms who will exhibit this year is down from the 95 who participated last year in Seattle, but organizers said registrations should exceed Seattle's 2,500 "because Houston is more accessible to the bulk of our membership." Seattle's exhibits attracted some 12,000 viewers, and this total, too, is expected to be higher in Houston. The fact that DPMA's 30,-

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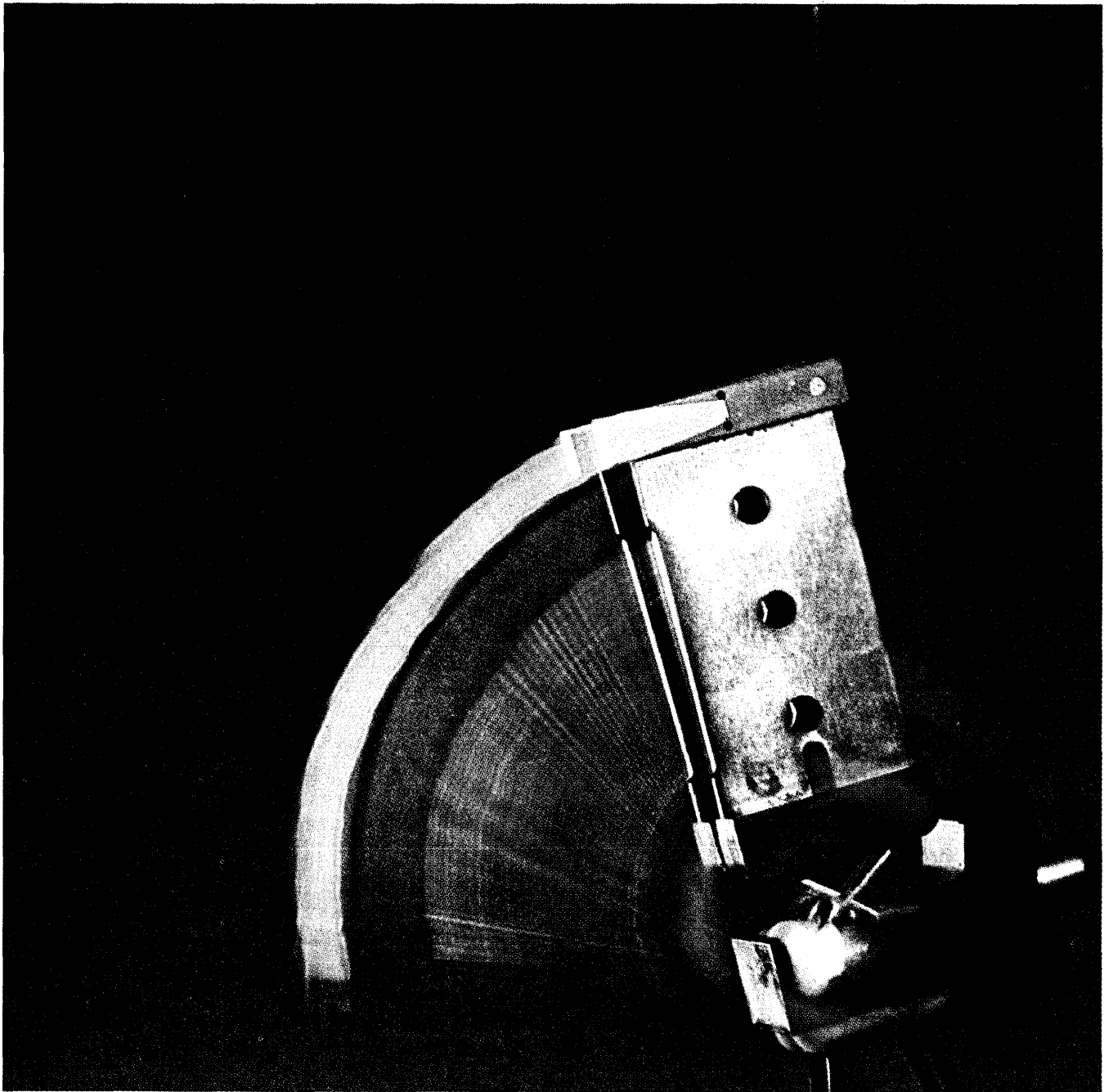
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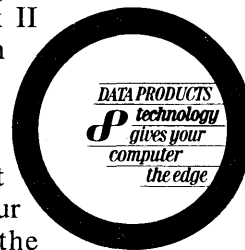
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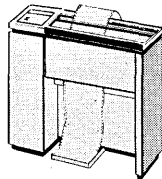
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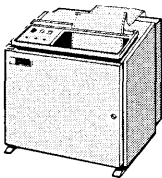
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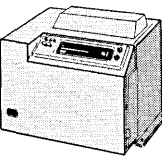
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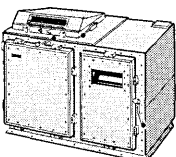
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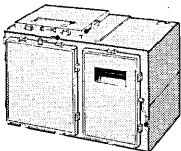
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CIRCLE 38 ON READER CARD

June 15, 1971

## NEWS SCENE

000 members are most heavily concentrated on the eastern seaboard bodes well for the 1972 conference which will be held in New York City. This will be followed by conferences in Chicago in '73 and Minneapolis in '74.

### World Information System for Scientists

A world-wide science information system which would eliminate duplication in research and put vital scientific data at the fingertips of scientists in both developing and developed countries may be on its way.

Such a system moved into the blueprint stage with publication of a report covering three years of feasibility study by a committee from the United Nations Educational, Scientific and Cultural Organization (UNESCO) and the General Assembly of the International Council of Scientific Unions (ICSU).

The study, called UNISIST, determined that "a world scientific information system... is not only feasible but is desirable and necessary if the information needs of the world's scientists are to be met in the future."

As an early step, the committee recommended establishment of a computer-based international registry of scientific journals. The French government has offered to advance 1 million francs, and negotiations are under way to get it going. The study report makes 22 specific recommendations under six general group headings: tools of system interconnection, effectiveness of information services, responsibilities of professional groups, institutional environment, international assistance to developing countries, and organization of UNISIST.

A first step toward implementation of UNISIST will be an Intergovernmental Conference for the Establishment of a World Science Information System Oct. 4-9 in Paris. The International Federation for Information Processing (IFIP) is among the nongovernmental groups which have been invited to send observers.

Copies of a synopsis of the study, published in English, French, Spanish, and Russian, are available on request

from the Office of the Foreign Secretary, National Academy of Sciences, 2101 Constitution Ave. N.W., Washington, D.C. 20418. Copies of the complete study are available at \$4 each from the UNESCO Document Distribution Center, P. O. Box 433, New York, N.Y.

### New Pressures for EDP Consolidation in Calif.

Pressures were building up in several quarters in Sacramento last month to get the state of California's \$80 million-plus/year edp operations consolidated — and fast.

The state's legislative analyst, A. Alan Post, in his analysis of Governor Reagan's 1971-72 budget, was sharply critical of efforts made to date toward consolidation and called for creation of a new data processing services department which would take over management and ownership of all state computers exclusive of those belonging to the Univ. of California and the state colleges.

And State Senator Stephen Teale is trying again. A Teale-authored bill, which would have created the kind of department Post wants, passed the state Senate last year, but died in the Assembly when it adjourned in mid-August. A new Teale bill calling for the same thing was expected to have passed out of the Senate Finance Committee onto the Senate floor by mid-June.

The Senate Finance Committee has had its say, too. In mid-May the committee lopped \$125K from a proposed \$500K 1971-72 budget of the Office of Management Services which has primary responsibility for "control and service" of all state edp functions. The cut was accompanied by implications of impatience with OMS for not moving fast enough toward edp consolidation. Most vocal in his impatience was the committee's vice-chairman, Senator Teale.

Over in the state's Assembly, where a bill similar to Senator Teale's has been introduced, a committee which heretofore has not taken an interest in edp operations is studying them closely. The Assembly bill, authored by Assemblyman Mike MacDonald, is being studied by that body's Committee on Efficiency and

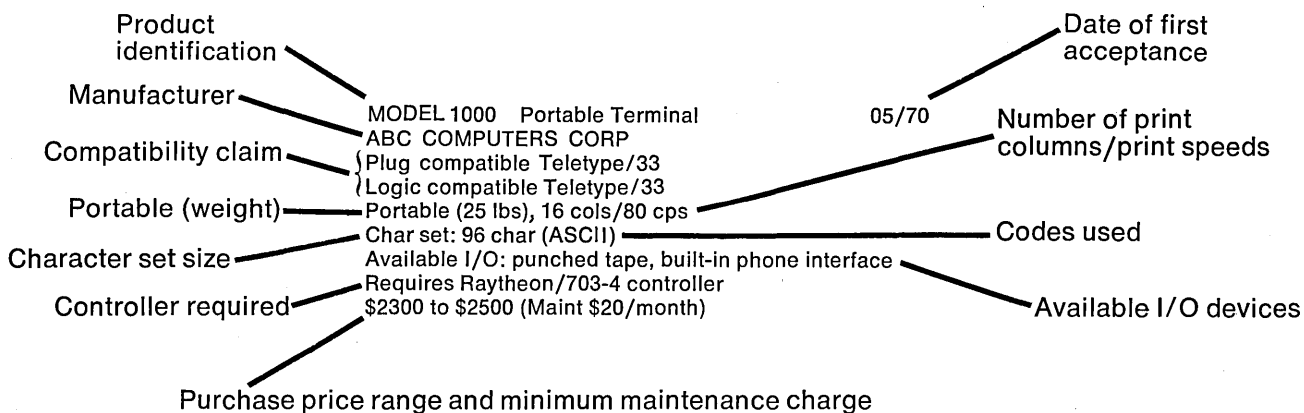
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## NEWS SCENE

### Cost Control.

Both the Teale and MacDonald bills, as well as the legislative analyst's recommendations, would transfer the duties and responsibilities of the Office of Management Services to a proposed Dept. of Data Processing Services. OMS feels this step is unnecessary; that it can accomplish what consolidation is needed through a five-year plan, now one year old.

This plan, which creates seven consolidation groups, each including a number of state agencies and each assigned the responsibility of studying the edp requirements and operations of member departments and suggesting a better way of doing things on a joint basis, has been called "the tea party approach" by Post, who says his department "is not aware of any significant accomplishments of the stated goals by any group."

Another source called the five-year plan a "plan to plan with all planning ending in a standoff." He added that "most . . . agencies agree on the value of consolidation but each wants to be the one to provide the service."

The Senate Finance Committee's cut of the OMS budget is not the final word. Full Senate approval of the committee's recommendation was assumed, but the Assembly will have its say and the final decision will be made by a conference committee before July 1 when the new budget will go into effect. The committee's move was seen as a lever to get OMS to come up with a program to speed up its consolidation efforts and, at this writing, OMS was working on such a program.

Post has recommended that no funding be approved for OMS until some decision is made by the legislature on his data processing department proposal. Proponents of the department argue that consolidation cannot be accomplished without direct control over data processing because of politics involved between departments. The proposed data processing services department would have such direct control under the law. OMS does not.

The state's edp budget for 52 agencies in the year ending June 30 totaled \$81,340,301. Budget requests for the same agencies for fiscal 71-72 total \$87,751,171. That's a lot of taxpayers' money.

June 15, 1971

## NEWS BRIEFS

### New RCA Line Escapes Hike

RCA Computer Systems is raising the price of second-generation computers 3% and those of the Spectra series 5% as of August 1. There is no change in pricing for the new RCA series, but all Spectra peripherals used with it will have higher price tags. The day following the pricing announcement, Robert Sarnoff, RCA chairman, said the company is making the largest investment in its history to establish a strong position in the computer industry. "We made important progress in 1970," he said. "We continue to expect to achieve profitability in the early 70s." The company blamed increasing labor and materials costs for the price boost, but an observer noted that the new schedule should make the price transition to RCA's new series a little easier.

### Key-Disc All the Way

Sales of non-punched-card data entry equipment will reach \$250 million a year by 1975, with key-to-disc systems accounting for \$135 million and key-to-tape \$115 million. These figures, says Creative Strategies, Inc., the Los Altos, Calif., research firm, compare with \$22 million for key-to-disc systems and \$100 million for key-to-tape this year. The study thus shows a leveling off during the next four years in key-to-tape marketing and a strong growth in the other. But the figures are conservative compared with those of Consolidated Computer International, the Canadian data entry firm which says key-to-disc system sales will reach \$200 million a year by 1973 (see Feb. 15, p. 61). Creative Strategies says that mark won't be reached even by 1975. Its more conservative estimate may be due to a "major shakeout" it anticipates in the key-to-disc market because "there are presently more new, financially weak companies than the market can support."

### Batch Terminal Boom

Remote batch terminals will account for a quarter of terminal sales in 1975 and for a third of such sales in 1980, says the New York research firm, Frost & Sullivan. Its study covers six types of terminals — teletypewriters,

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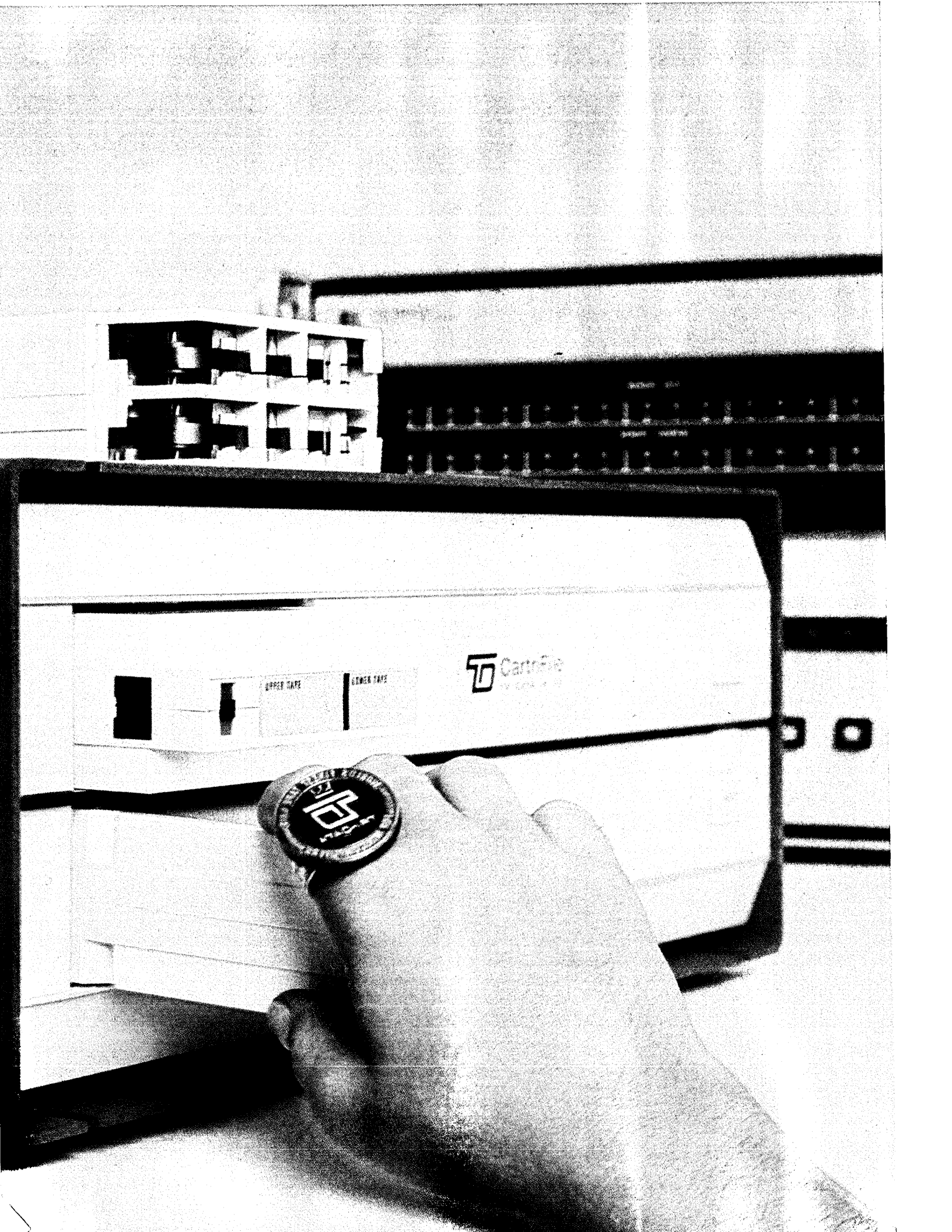
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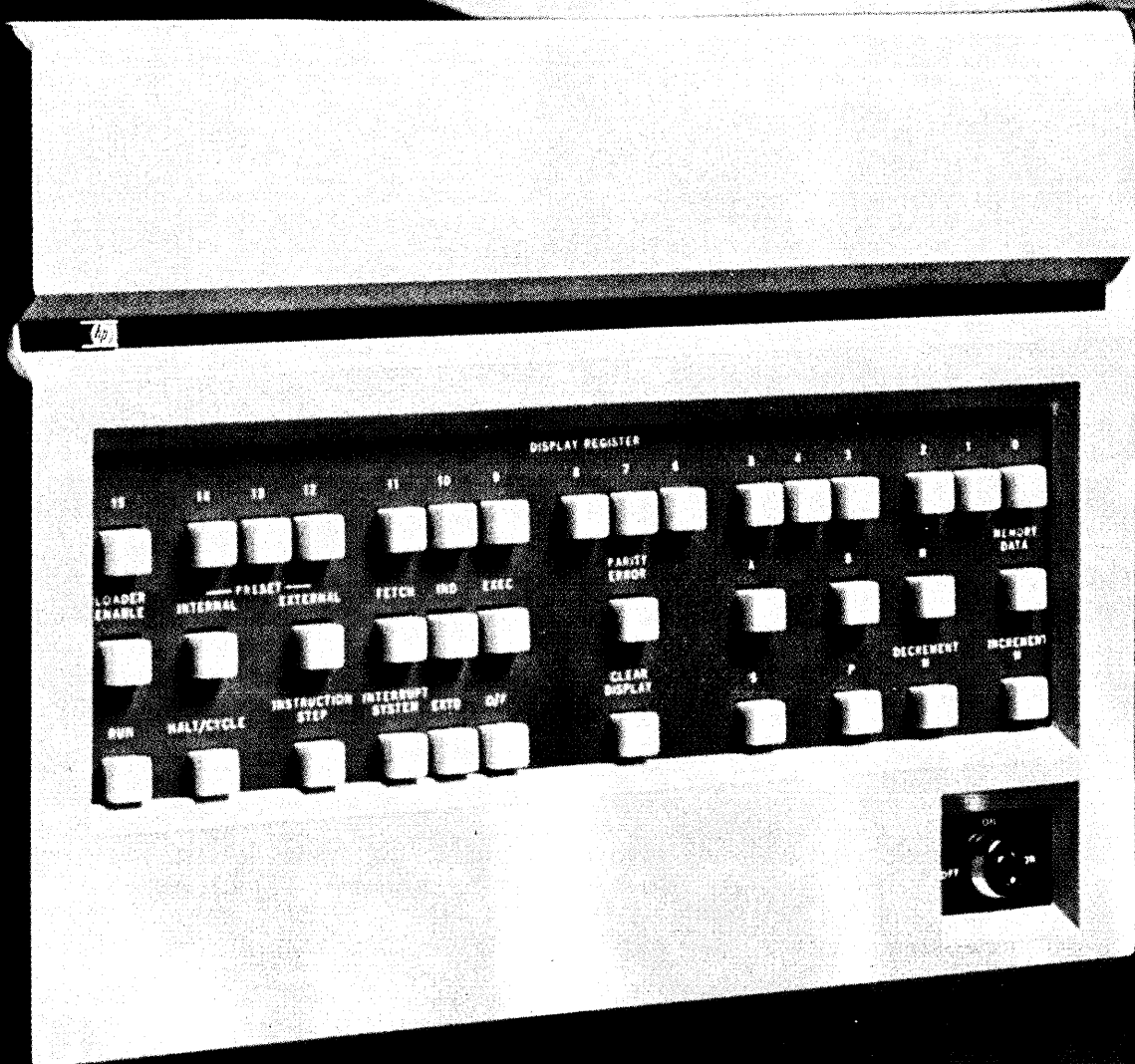
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CIRCLE 35 ON READER CARD



# Meet the thoroughly modern mini- our new HP 2100 computer.

It's much more than a pretty new face.

It's a big step forward in small computers.

The HP 2100 combines all three of our earlier minicomputers in one. And its sub-microsecond memory makes it almost twice as fast as any of them. It's also much smaller. And you can expand from 4K to 32K in the same convenient mainframe.

This mainframe, incidentally, houses a thoroughly modern design—including the latest in MSI/LSI technology. Plus control Read Only Memory (ROM). Standard features usually found only in bigger systems include parity checking and hardware multiplication and division. And they won't put a big crimp in your budget. In fact, the HP 2100 is the most attractively priced mini we've ever offered.

Peripheral vision. The way we see it, a mini-computer just isn't modern if it can't communicate simply and easily with the outside world. So we designed the 2100 to go to work with more than a dozen peripherals. As well as 47 instruments. All you do is plug them in. Apart from saving your time, this also saves you a great deal of money. Because you don't have to design special interfaces. After all, why

should a user have to do a computer designer's job?

All kinds of software. The 2100 uses FORTRAN, ALGOL, and BASIC. And we give you the widest choice of operating software packages available with any small computer. Time-share, real-time, and batch processing are the three main categories. And they're all compatible with our twenty-five hundred earlier systems.

Rugged testing. Our 2100 passes rigid environmental tests with flying colors. (Other small computers would simply fly apart at 3000 oscillations a minute, if they didn't freeze up at 32° F or melt at 131° F.) But our mini can really take it. It will hold its own in just about any situation—without missing a bit.

Add to these benefits our traditional worldwide support. Consider our reputation for quality. Evaluate our field engineering and analyst back-up. Check out our customer training programs. It all adds up to a thoroughly modern package.

That's why our new mini is much more than a pretty face. So how about getting better acquainted? Call your HP computer specialist. Or write Hewlett-Packard, Palo Alto, California 94304; Europe: 1217 Meyrin-Geneva, Switzerland.

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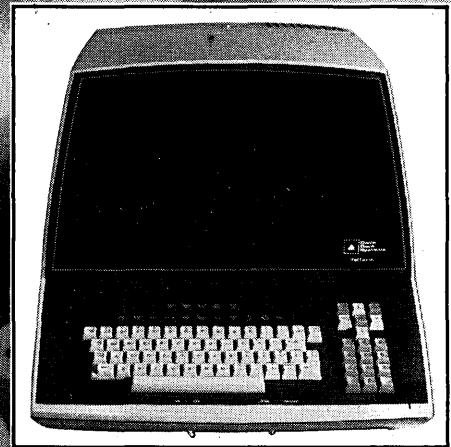
Of course, our other features match those offered by other video terminals, with one big difference: we've put the best of all into TelTerm. Like the most readable upper/lower case character set you can buy. And addressable cursor, blinking, underlining, formatting and line drawing capabilities. With more too. There's also a long list of useful accessories, such as a light pen, built-in acoustic coupler, hard copy printers, cassette recorders and multiplexers.

End the disappearing data act now. Ask for more information, demonstration, or applications assistance. Or ask about our Delta 1 color display. DELTA DATA SYSTEMS Corporation, Woodhaven Industrial Park, Cornwells Heights, Pa. 19020; telephone (215) 639-9400.



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## NEWS SCENE

alphanumeric data display, graphic data display, audio response, remote batch, and miscellaneous, including point-of-sale terminals. The study shows sales of all of these terminals will reach \$3 billion in 1980, compared with \$510 million last year and \$110 million in 1965. Remote batch terminals — both satellite computers and specialized batch terminals — will account for one-third of that amount, says the study. The second fastest growing segment will be audio response terminals. However, in total sales volume alphanumeric displays will be second behind remote batch devices.

### More Net for Tymnet

Five-year-old Tymshare, Inc., Palo Alto, one of the small handful of profitable time-sharing companies in the country, expanded its Tymnet network with acquisition last month of the time-sharing business of the Computer Systems Div. of Graphic Controls Corp., Buffalo. The acquisition boosts Tymnet's coverage to 35,000 miles. The company has offices in 30 cities

and local service in more than 40. The network is served by 22 computer systems — 19 XDS 940s, one Sigma 7, and two PDP-10s.

## SHORTLINES

General Electric's still in there in time-sharing. The company has added a capability to its time-sharing network providing for linking a company's in-house computer operations with GE's international teleprocessing network and has expanded that network from 42 to 250 cities . . . The Data Processing Management Assn. has abolished the academic requirements (two years of college credit) for its Certificate in Data Processing and has raised work experience requirements from three to five years . . . Raytheon Co. tentatively agreed to sell its memory and module product lines, produced at Raytheon Data Systems Co., Santa Ana, Calif., to Data Technology Corp., Palo Alto, Calif. The lines include analog instruments, analog and digital logic modules, and Biax

memories . . . Hewlett-Packard began offering a computer system purchase plan to educational institutions which provides for monthly payments as low as 2.29% of purchase price over 24 to 28 months . . . Black Forest Development Co. of Colorado purchased the majority stock of Systemation, Inc., Colorado Springs-based systems education firm . . . Control Data Corp. sold a metalcraft and printed circuit manufacturing subsidiary, Croname, Inc., Niles, Ill., to Ohio Decorative Products, Inc. . . . Boothe Computer Corp., San Francisco, tentatively agreed to purchase a unit of The Budd Co. which produces an airport terminal-to-aircraft vehicle called Plane-Mate . . . Berglund Associates, Inc., Cherry Hill, N.J., began offering a new Network Audit Service it describes as "a low-cost, fixed-fee professional review of the cost-effectiveness of communications systems" . . . A student-staffed company, College Craft, is using Computer Sciences Corp.'s Infonet time-sharing system to provide "instant cost estimates" for customers of its home painting services. ■

## HOW MANY MILLIONAIRES

ARE THERE IN THE UNITED STATES?

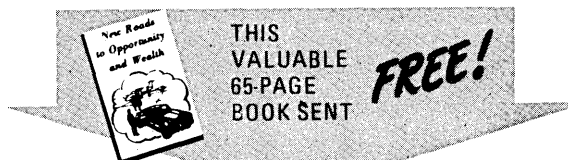


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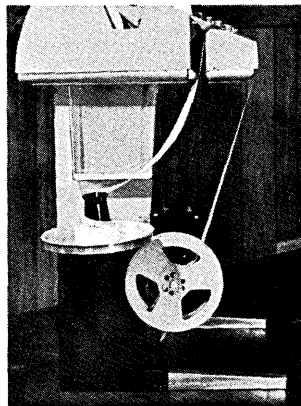
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CIRCLE 21 ON READER CARD



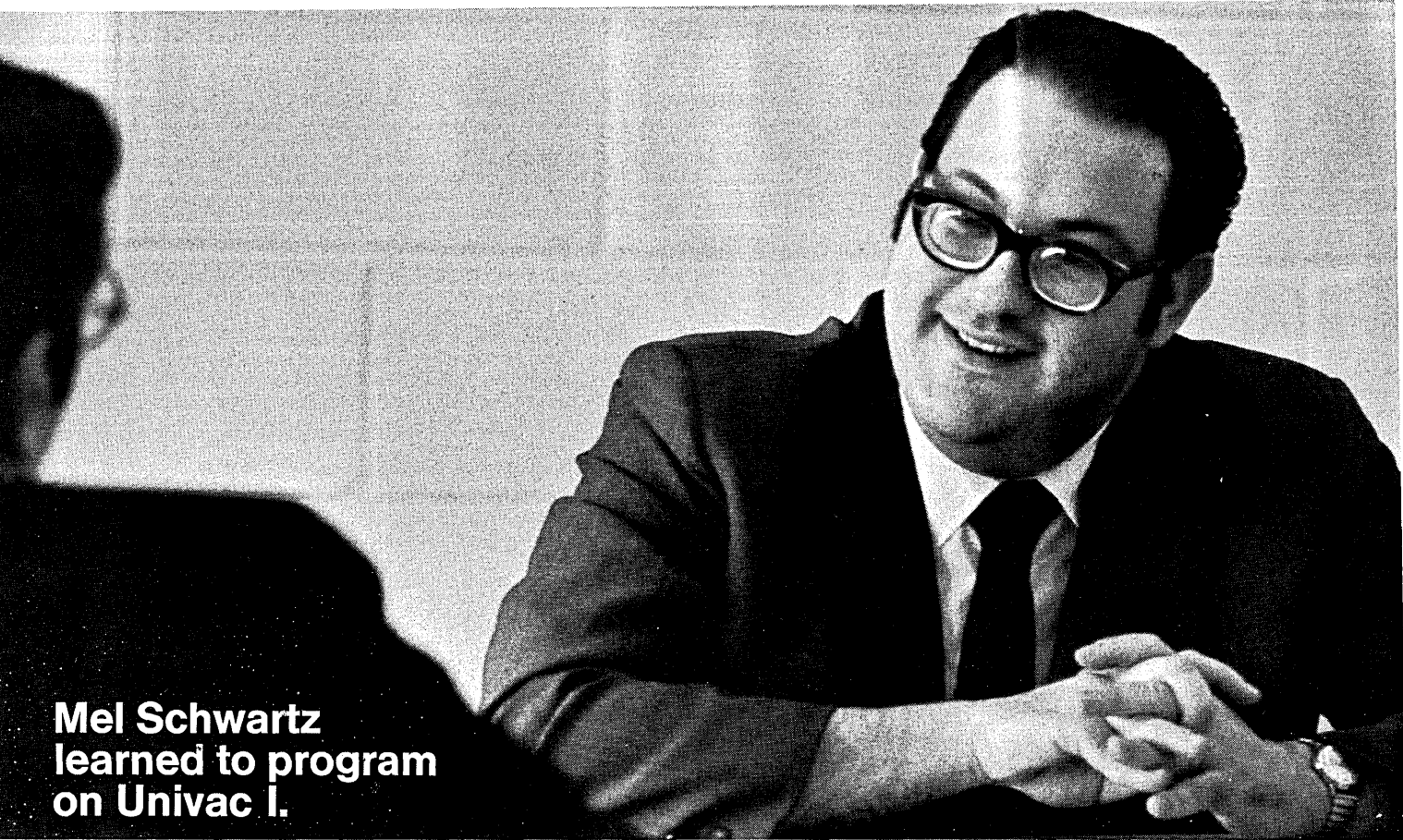
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CIRCLE 56 ON READER CARD



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learned to program  
on Univac I.**

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who designed it.**

Mel Schwartz manages software development and teaches computer science at Northwestern University. He's an active ACM member and Technical Program Chairman of ACM'71, our annual conference to be held August 3-5 in Chicago.

Reading about computers is almost a hobby to Mel. "Even before I joined ACM, I borrowed and read every copy of *Communications* I could lay my hands on," he says. "I think I've read most of the classic articles on

computing. Now I'll get a chance to meet most of the authors—at ACM'71.

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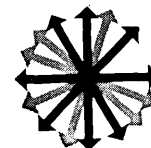
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## Everyman's Terminal

If you have an electric typewriter and a telephone handy, you already have two-thirds of a remote terminal. KALLTYPE, then, is the missing communications link, allowing IBM Selec-

## PRODUCT SPOTLIGHT

tric's (or any other electric typewriter) to become a computer terminal.

The hardware consists of a keyboard that drops over the standard typewriter keyboard, an acoustic coupler, cassette storage, and an unattended answering receiver. The keyboard also contains solenoids which depress the typewriter keys, and is constructed to feel as much like a regular keyboard as possible—even down to duplicating the slant angle of the typewriter. The coupler,



cassette drive, and control buttons are mounted in a separate case, with casters for portability. The casters and stand are readily removed for carrying the KALLTYPE unit to another

destination.

In use, the KALLTYPE can be used off-line to prepare documents onto the cassette, with character editing features provided. When the text is ready to be transmitted, the operator switches over to on-line mode, inserts the telephone into the coupler, and transmission over voice-grade lines at 110 or 300 baud commences. The cassette is the standard Philips type, with information stored on two tracks at 1000 bpi.

Initially the manufacturer will concentrate on the California market so that any bugs that occur can be cured. National and international marketing is expected late this year for the KALLTYPE system, which is priced at approximately \$2800. The equipment comes with a full one-year guarantee. KALLMAN RESEARCH CORP., Los Angeles, Calif. For information:

CIRCLE 530 ON READER CARD

## Bank Hardware

Honeywell's market research indicates that the value of computers and related hardware currently in banking applications exceeds \$1.8 billion and that 78% of the computers represented by that dollar figure will be upgraded by 1975. With figures like that it isn't hard to see the motives behind the introduction of numerous hardware and software products for the banking industry. Included in this banking bundle are two versions of the model 236 high-speed reader/sorter (one for 200 series computers, and the other for the 600 and 6000 series machines), the Document Entry Controller (DEC-6000)

for controlling up to six document handlers such as the 236, and the DRD203-1 remote MICR reader/sorter.

The 236 is expandable from 16-32 pockets in increments of four pockets. It can operate either on-line for MICR entry, proof, and transit at the rate of 1625 documents per minute, or off-line for fine sorting of all types of MICR documents for demand deposit, installment loan, savings, and mortgage loan accounting. Numerous options are available, with the basic 16-pocket unit renting for approximately \$1920/month.

For large banking houses, the DEC-6000 can simultaneously control any mix of up to six MRS200, DRD200, or DRD236 document handlers. The con-

troller is a 32K 18-bit computer, operating at 1 usec, and accommodating 6-, 9-, 18-, and 36-bit data words. The DEC-6000 rents for \$694/month on a five-year contract.

The DRD203-1 permits MICR document transmission from remotely located bank branches at a rate of 350 documents/minute, depending on line conditions, to centrally located series 200 or series 16 computers. Off-line the 203-1 can be used for fine sorting at 830 documents/minute. It rents for something under \$1K/month. HONEYWELL INFORMATION SYSTEMS, Wellesley Hills, Mass. For information:

CIRCLE 526 ON READER CARD

## Medical System

The AHS-11 is based on the Digital Equipment Corp. PDP-11 together with a software system, MUMPS, developed at the Massachusetts General Hospital and Harvard Medical School. The turnkey system provides everything from hospital admissions and bed census, patient history, and clinical laboratory information processing to hospital scheduling and billing, medical record keeping, multiphasic screening, and pharmacy inventory control.

MUMPS, contrary to its name, is said to be an easy-to-live-with medical language written for medical people by medical people. Question

lists are presented to the user, with the answers given determining the subsequent line of questioning for the interactive system. Pricing for the system is difficult at best, with each hospital's demands and budgets differing so markedly, but the basic system—MUMPS, the PDP-11, and the DOS system—is priced at about \$60K. Options include CRT's, mark sense equipment, readers, printers, and interfacing to special equipment such as robot chemists, etc. The AHS-11 is available 120 days ARO. AUTOMATED HEALTH SYSTEMS, INC., Burlingame, Calif. For information:

CIRCLE 527 ON READER CARD

## Card Reader

Three models make up the CT series of 80-column card readers. The CTA provides 10-, 15-, and 30-cps capability for 128 ASCII characters and attaches to such 30-cps terminals as the Terminus 300. The CTB and CTC read at 15 and 20 cps, respectively, and are set up for EBCDIC code units of the 2741 type. Purchase prices for 30-cps units are \$4175, or they may be rented for \$135-148/month. Delivery is approximately 60 days ARO. WESTERN TELEMATIC INC., Arcadia, Calif. For information:

CIRCLE 524 ON READER CARD

(Continued on page 70)

## Oem Keyboards

This family of electronic keyboards uses cross-bar single contact switches with precious metal alloys and self-wiping action, all of which means, the vendor claims, that the keyboards are reliable and inexpensive. The exotic feature is the keyboards' flexible encoding techniques, which permit modification of complete code changeover on short notification. Without charge, too.

The MK-29/2011 is aimed at the familiar 029 keypunch array market. The model is designed for key-to-tape applications. There are 51 keys, 48 encoded; six-bit ASCII code with parity, and alpha and numeric codes. There is two-key rollover, and the function keys are multicode, number and letter. These are priced at approximately \$70/unit in oem quantities.

The model MK-33 has the familiar model 33 tty configuration and func-

tions and is designed for a wide variety of uses, including crt, source data collection, printing and computer I/O terminals. It has 53 keys with two-key rollover and ASCII code. Prices again are approximately \$70 per unit, depending on quantities and options. DATA ELECTRONICS CORP., Burlington, Mass. For information:

CIRCLE 522 ON READER CARD

## Scientific Computer

Several pieces of special equipment have been announced by this manufacturer in the last few months and are now packaged standard with the PDP-15/50, the sixth model of this line of 18-bit computers. For example, a floating point processor is a system component, enabling floating point arithmetic to be done some 10 times faster than with software routines. And there is an extended arithmetic element for integer arithmetic and logical shifts. Also standard is

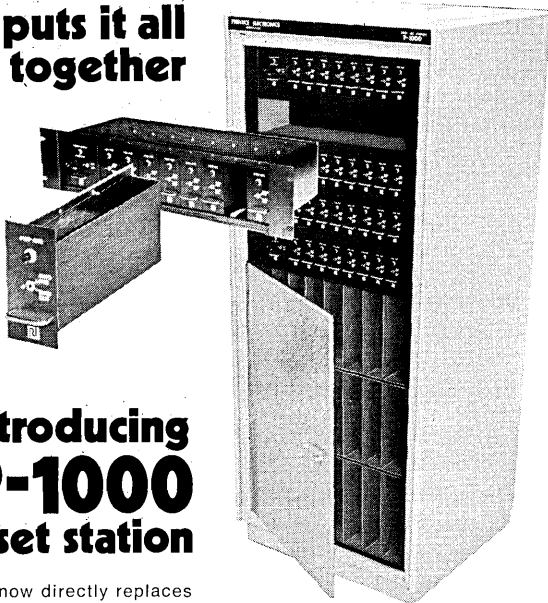
16K of 800-nsec memory, a teleprinter, an IBM-compatible tape drive and controller, a disc pack controller and accompanying drive unit for storing 10 million words, a paper tape reader/punch, and real-time clock, all for a starting price of \$114,900, or \$3K/month. Options include expansion of the memory up to 128K, several line printers ranging in capability from 275-1000 lpm, and either a 200- or 1000-cpm reader. The newest sibling can also support up to eight 2314-type disc packs.

Markets are expected to be college

computation centers and government or industrial R&D projects, but the maker also can build a case for the 15/50s replacing most machines in the 360/40 class. Scientific batch processing is accommodated, as are real-time applications. Languages supported include FORTRAN IV, ALGOL, and the MACRO machine assembler. Deliveries begin this summer. DIGITAL EQUIPMENT CORP., Maynard, Mass. For information:

CIRCLE 517 ON READER CARD

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CIRCLE 26 ON READER CARD



**Mini Paper Tape Reader**

The latest model of the DRB-500 paper tape reader operates with Nova and Supernova computers and sells

for \$1450. It includes the 500-cps reader with stop-on-character capability and an interface card. Other readers are available for PDP-8 series at \$1155 and Hewlett-Packard at

\$1365. Delivery time is two weeks. DATASCAN, INC., Clifton, N.J. For information:

CIRCLE 528 ON READER CARD

**Display Terminal**

Originally developed for Bell Laboratories, the vsr-3700 crt terminal has an upper and lower case ASCII keyboard layout similar to a model 37 tty. The display can range from 1,296-7,776 characters, with the minimum format being 18 lines of 72 characters. Standard rs232-c or tty interfaces can be used for switch-selectable transmission at 110, 150, 300, 600, or 1200 baud, and a 2000-baud parallel interface is available as an option. The purchase price ranges from \$2795-4995, depending on model selected. The terminal can also be leased, with rental ranging from \$105-\$189 per month. Delivery is 30 days ARO. VIDEO SYSTEMS CORP., Pennsauken, N.J. For information:

CIRCLE 518 ON READER CARD

**Disc Pack Cleaner**

The builder of the model 21 disc pack cleaner will tell you that packs should be cleaned every time they are mounted—which is a lot more often than is currently done. Either 6- or 11-high packs are cleaned in something less than five minutes, with the model 21 automatically determining which type of pack was mounted for cleaning. The cleaning pads are washed after cleaning in a special solution which is then passed through a 3-micron filter. Control lights indicate low fluid levels or that the pads should be changed. The model 21 is sold to oem's for \$3770 (single unit) or leased to end users for \$195/month. WABASH COMPUTER CORP., Phoenix, Ariz. For information:

CIRCLE 529 ON READER CARD

**Real-Time I/O**

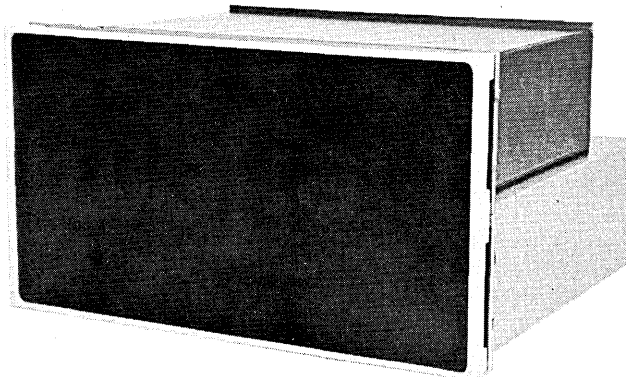
The Mini-Linkage 1000 is a data conversion system that provides real-time communications for use in applications such as process control, simulation, and monitoring. It is an outgrowth of in-house systems used by the vendor. The system accommodates from 128 to 512 channels of digital input and from 32 to 512 channels of digital output, while handling from 16 to 32 channels of A/D conversion and 16 to 80 channels of D/A conversion. Interfaces are available for full-scale cpu's as well as minicomputers. It is TTL compatible. Prices start at \$23,000 for the basic unit with minimum number of channels, and delivery requires 90 days ARO. SINGER-LINK DIV., Binghamton, N.Y. For information:

CIRCLE 525 ON READER CARD

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INTERCOMM has been selected as the communications monitor for over 20 on-line installations. Our customers include American Can, AT&T, Manufacturers Hanover Trust, CBS, DuPont, Pacific Mutual Insurance, and the State of California to name a few. And just as important as the companies we keep, is the company we're a part of - GTE Information Systems. PMI isn't just another hot new company. We're a stable, solvent member of one of the world's largest corporate families.

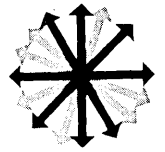
And now that you've asked yourself all these important questions, let us ask one of you. Can you afford to go on line without looking into INTERCOMM first?



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### Table Searching

HASHER is a FORTRAN subroutine for searching tables and either locating the address of a particular element or verifying that it is not present in the table. If the table is less than 95% complete, HASHER is said to outperform binary search techniques and get progressively faster than binary searching as the table gets more sparsely occupied. HASHER can also be used with PL/I and COBOL programs, requiring only about 100 bytes of memory. It is priced at \$100, including source deck and documentation, and comes with an unconditional 30-day guarantee. COMPUTING AND INFORMATION SCIENCES CORP., Tulsa, Okla. For information:

CIRCLE 515 ON READER CARD

### Letter Writing

Multiple copies of up to 255 different letters can be produced using LWS/2. Each letter may contain five different inserts, in addition to name and address, any number of times. The system can print one- or two-up letters and envelopes, and one- to four-up labels. Letter text width may be varied from the console at production time from 10-75 characters: LWS/2 is written in BAL and requires 24K bytes on 360 model 25s and up. The program can be purchased for \$3500, with each additional installation \$600, or it can be rented for approximately \$175/month. CBIS INFORMATION SYSTEMS, Woodland Hills, Calif. For information:

CIRCLE 513 ON READER CARD

### Cross-Assembler

Generation of programs for the Varian 620/i, /f, /l, and 622 minicomputers using CDC 6600 or Univac 1108 computers is accomplished using VAR66. It is written in FORTRAN IV and requires typically 100K of memory or more. Features of the program include automatic overlay processing with a common symbol table, automatic generation of cross-reference listings, use of a random file technique in generation of the operation code and symbol tables, and accommodation of the new 620/f instruction set. The price of the system is in the neighborhood of \$4K, or VAR66 can also be leased. Installation and support are provided. DUBNER COMPUTER SYSTEMS, INC., New York, N.Y. For information:

CIRCLE 510 ON READER CARD

### Accounts Payable

Up to 999 companies, each with its own organization coding, separate accounting controls and reporting requirements, can be processed by this A/P system. Organization, vendor, and accounting codes are matched against master files for validation, with errors automatically transferred to a suspense account for analysis and reclassification. The system maintains 1099 accounting records and provides for automatic interface into general ledger, inventory, and check reconciliation systems, as well as accommodating the Dun and Bradstreet numbering system for vendors.

The package is written in COBOL, requiring 32K bytes of memory and some auxiliary storage. Some 20 reports are produced by the program, which is currently operational for DOS and OS 360s, RCA Spectra 70 TDOS, and the Honeywell 200 series. The accounts payable package is priced at \$10K. ANCOM SYSTEMS, Los Angeles, Calif. For information:

CIRCLE 516 ON READER CARD

### Banking Software

Designed for large commercial or Federal Reserve Banks, the CPCs (Check Processing Control System) controls all phases of MICR document handling activity, including entry, distribution, proof, adjustment, and control. It builds a data base for processing, balancing, and kill listing all documents entering the system, and also provides a base for development of statistics on throughput, peaks, correspondent performance, and end-point analysis. CPCs operates on 360/40s and above (requiring OS/360 and 256K bytes of memory) and also on 370 equipment. The program will be available in October of next year, and will rent for \$1100/month. IBM CORP., White Plains, N.Y. For information:

CIRCLE 519 ON READER CARD

### Accounts Receivable

In this ANSI COBOL accounts receivable system, balance forward, open item, installment, and deferred or

postdated receivable obligations in any combination and quantity are processed for each account. The batch system produces a single statement and maintains a data base of customer information. The data base is a single master file and could be accessed on-line; however, in its current form the system will generate reports for various levels of control within an organization in a single reading, sort, and printout.

The product of a two-year-old company, the system is one of five packages currently being marketed. It will operate on a 360 model 30 with 44K, or larger 360 configurations. The seller provides installation assistance (a system analyst for five days) and warrants the system operation for one year. After that there is a \$150 annual fee for maintenance and warrantee. The Accounts Receivable/Customer Information System is priced at \$10K for a perpetual lease. There are also one- and two-year purchase/lease agreements. FORTEX DATA CORP., Chicago, Ill. For information:

CIRCLE 511 ON READER CARD

### Fortran Measurement

FORMAX (FORTRAN MAXimizer) is the first software package offered by a firm that specialized in hardware measurement equipment in the past. By inserting CALL statements into the FORTRAN programs and employing sampling techniques, any or all of five reports can be obtained by the

user to show frequency summary, time summary, program activity summary, subroutine summary, and statement type summary. On the basis of this information, a user then might look into those areas of the FORTRAN program that take the most time and possibly rewrite them for better performance. FORMAX requires a maximum of 110K bytes of 360

memory and runs under OS/360. Including object code and documentation, the program is priced at \$7500 and is available for a two-week evaluation period. COMPUTER SYNECTICS, INC., Santa Clara, Calif. For information:

CIRCLE 512 ON READER CARD

## Computer Composition

The American Society for Information Science (ASIS) has published proceedings of its Workshop on Computer Composition held last December in Washington, D.C. It contains papers and panel discussion transcripts on computer-controlled typesetting and photographic composition. Copies are available at \$5 to members of ASIS and other AFIPS organizations and at \$8 to others. ASIS, 1140 Connecticut Ave., N.W., Suite 804, Washington, D.C. 20036.

## DP Bibliography

"Quarterly Bibliography of Computers and Data Processing" is designed, says the publisher, "specifically for the practicing computer and data processing professional." It is organized into more than 200 subject categories and includes both books and periodicals. Annual subscriptions are \$29.50. Single copies are \$10. APPLIED COMPUTER RESEARCH, 8900 N. Central Ave., Suite 208, Phoenix, Ariz. 85020.

## Point-of-Sale Report

"Point-of-Sale, Part I" is described by its publisher as "a comprehensive manual describing the systems design of all point-of-sale configurations." The 95-page report covers the scope of point-of-sale communication systems and includes schematic drawings of sample configurations. Price of a single copy is \$45; two copies cost \$70; and three copies, \$75. GAMBIT MANAGEMENT STRATEGIES, INC., 1440 Broadway, New York, N.Y. 10018.

## Used Computers

Study of the used computer market, "All About Used Computers," reportedly documents the presence of some \$10 billion of computer equipment owned by leasing companies and users including the government. It covers all aspects of the used computer, treating it as a capital goods item it says "now represents the largest single class of capital equipment in the world." It notes that the cur-

rent market price of IBM 360 equipment is "substantially below the book values of equipment in the hands of third-party leasing companies, thereby exerting pressure on their lease rates." Copies of the study are priced at \$275. THE BOSTON COMPUTER GROUP, INC., 15 School St., Boston, Mass. 02108.

## User Information

The Computers 70 series' 1971 Census of Computers 70 of Northern California contains more than 330 pages of statistics on more than 1400 computer installations. It includes a section on minicomputers and covers installations from the Fresno marketing area to the Oregon border. Retail price is \$30. KLH ASSOCIATES, 578 Folsom St., San Francisco, Calif. 94105.

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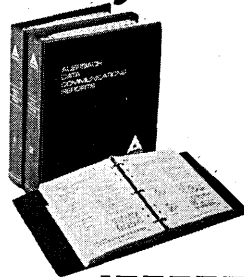
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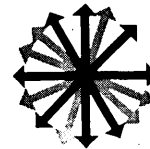
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**1970 Datamation Index**

Sixteen-page subject index to DATAMATION, Vol. 16, 1970, includes references to material in feature articles, conference reports and particulars, Editor's Readout, The Forum, Books, News Scene, Perspective, and System Spotlight. DATAMATION, Pasadena, Calif. For copy:

CIRCLE 501 ON READER CARD

**Manual Described**

Twelve-page pamphlet describes "Computer Characteristics Review," a pocket-sized manual billed as listing "the salient features of virtually all digital computers and related peripheral devices commercially available in the free world." KEYDATA CORP., Watertown, Mass. For copy:

CIRCLE 503 ON READER CARD

**Systems Publications**

Eight-page alphabetic and chronological index to all of this company's reference publications on "the art of better management through systems" gives pricing bases for single, assorted, and multiple copies. SYSTEMATION, INC., Colorado Springs, Colo. For copy:

CIRCLE 504 ON READER CARD

**TWX—What, How Much**

Having acquired the Teletypewriter Exchange Service from the Bell System and independent phone companies, Western Union has published a brochure telling what twx is and how much it costs. WESTERN UNION, New York, N.Y. For copy:

CIRCLE 502 ON READER CARD

**Computers Mapped**

Computer installation map of the United States, in two colors, shows monthly computer rentals per square mile divided into five categories throughout the U.S. It is available on letterhead request. COMPUTER INTELLIGENCE CORP., 525 B St., San Diego, Calif. 92101.

**Low-Cost Mini**

Eight-page brochure describes vendor's new 620/L (for low cost) mini-computer covering software and peripherals and including an instruction list and specifications. VARIAN DATA MACHINES, Irvine, Calif. For copy:

CIRCLE 507 ON READER CARD

**How to Write Optical**

"It's like learning the words to a new tune," says this self-study handbook, "Optical Handwriting—Private Study Course," which is a translation into

English from a Swedish edition. It teaches how to write reports for direct computer input via an optical reader much as a first grade student is taught to write the alphabet. Copies are available in quantities to 99 at

\$2.10 each, from 100-299 at \$1.75, from 300 to 999 at \$1.55, and from 1000 up at \$1.35. STUDENTLITTERATUR AB, Magistratsvagen 10, Fack, 221 01 Lund 1, Sweden.

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Computer managers who are facing increased workloads may think they're in an inevitable squeeze. Reducing program running time through conventional methods is a lengthy, costly process. It looks as though the manager is forced to escalate to more equipment.

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**Telecommunications**

"Telecommunications, dollar drain or profit builder?" is the title of a brochure describing a new consulting service offered by a Westinghouse Electric Corp. division. The service includes evaluation, selection, design, and analysis of telecommunications equipment and facilities. WESTINGHOUSE TELE-COMPUTER SYSTEMS CORP., Pittsburgh, Pa. For copy:

CIRCLE 505 ON READER CARD

**"World of OCR"**

In a question-and-answer format, the workings of optical scanning are reviewed in "The World of Optical Character Recognition." A glossary of ocr terms is included. MOORE BUSINESS FORMS, INC., Niagara Falls, N.Y. For copy:

CIRCLE 560 ON READER CARD

**Auditors' Update**

Brochure describes a new monthly publication designed to keep auditors abreast of developments affecting auditing in a data processing environment. PROFESSIONAL UPDATE CO., Oakton, Va. For copy:

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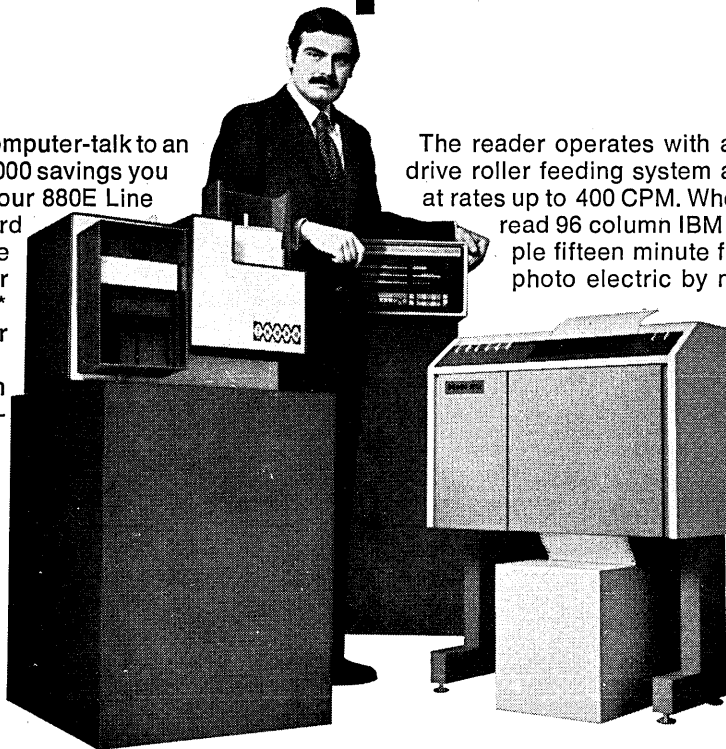
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## AGENCIES CLASH OVER PATENT PROPOSALS

Commerce and Justice Depts. clashed over controversial amendments 23 and 24 to the general patent revision bill (S.643). These would, respectively, guarantee states' rights in protecting trade secrets and know-how, and codify patent licensing practices, many of which are currently uncertain because of conflicting court decisions. The Commerce Dept. told Senate patent subcommittee hearings it generally supported these clarifying amendments since the situation was now confused. Justice opposed amendment 24 as weakening antitrust laws and said amendment 23 would undermine Supreme Court decisions and that the courts were best qualified to make such determinations. Committee sources say action is likely this summer.

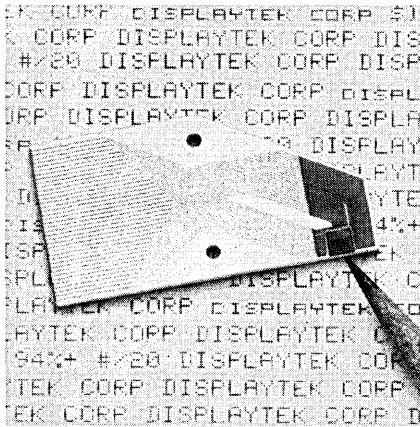
## THREE NEW PROJECTS UNDER WAY AT IRS

Three small but potentially significant development projects are under way at the Internal Revenue Service: a remittance-handling system that ultimately may be installed in 200-300 IRS field locations; a text-based, on-line legal information retrieval system; and a system for displaying microfilm images of tax returns. IRS has asked for \$500K in FY72 to finance "design and development" of the remittance-handling system. An RFP covering a prototype is due by next December. "We're willing to underwrite a little of the contractor's cost," says system development director L.W.Armstrong. The microfilm display system, acronymed STAR, is being benefit-valued in Kansas City and Covington, Ky. Final results should be available in six months.

## CAPITOL BRIEFS

The House Science & Astronautics Committee has approved a bill (HR 7960) boosting the National Science Foundation's computing activities budget by \$2.5 million (to \$17.5 million) in FY72...Business Information Systems, Inc., will serve as the Washington marketing office for Beloit Corp. and will develop advanced ATS/360 features for Beloit Computer Center ...Rep. Samuel Stratton (D-N.Y.) has introduced a bill to create a National Domestic Intelligence Advisory Board that would oversee and advise the President and Congress on all U.S. domestic intelligence and surveillance operations...GE has donated three t-s terminals to T.O.P. Inc., a Washington nonprofit group providing free programmer training to qualified local residents...The federal Cobol standard is likely to be published this month. It contains four levels, requires compiler developers to flag nonstandard and higher level features...Bill Andrus, recently appointed computer standards chief at NBS, now oversees all of the bureau's engineering and information processing standards activity. A key part of his new job will be to help engineer U.S. participation in the Tripartite, Multipartite, and related European standardization-certification programs.

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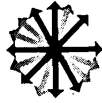
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## PEOPLE

You're a well-established company in the computer memory business, have the resources of a well-heeled parent firm, and are tired of being just a \$10 million-a-year firm. Which way do you turn for growth? That's the problem facing **Donald M. Decker**, the new vp and general manager of Bryant Computer Products, Walled Lake, Mich. Decker joined Bryant this spring from Control Data Corp. where he most recently headed CDC's peripherals manufacturing facility in Omaha. He now is formulating a 10-year plan for the 280-employee subsidiary of Ex-Cell-O Corp., the big machine tool manufacturer. It could involve a revival of the firm's drum memory development, or maybe take it into more exotic memory fields as lasers and bubble memories. Whatever the direction, Bryant has been careful in selecting the right person to lead it. Decker's new post has been vacant more than a year, since **Bob Wilson** left to join Ferroxcube.

**Lawrence H. Berul**, information storage and retrieval systems expert, has been appointed senior vp and general manager of Aspen Systems Corp., Pittsburgh. He had been director of marketing and product development for Auerbach Info. Aspen specializes in full text computer storage and retrieval of information, including the statutes of the 50 states and related federal codes . . . **Albert A. Hazan**, one of the founders of Courier Terminal Systems, Phoenix-based manufacturer of IBM-compatible crt display terminals and terminal printers, has been named to the new post of assistant to the president of the company. He had been serving as director of marketing . . . **URS Systems Corp.**, San Mateo, Calif., has appointed **Joseph C. Vierra** president of its URS Data Sciences Co. division. Vierra comes from Lybrand, Ross Bros. & Montgomery, where he was manager of federal government consulting services. URS Data Sciences is planning to move its headquarters to the Washington area. Assisting Vierra will be **William Ross**, former senior vp/gm of URS' Matrix Research Div. He'll be executive vice president of Data Sciences . . . **William N. Mozena**, one of the founders of Data Products Corp., has resigned, immediate business plans unknown, as se-

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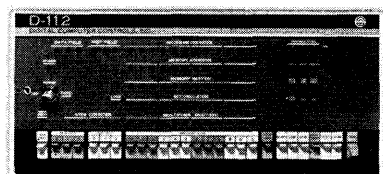
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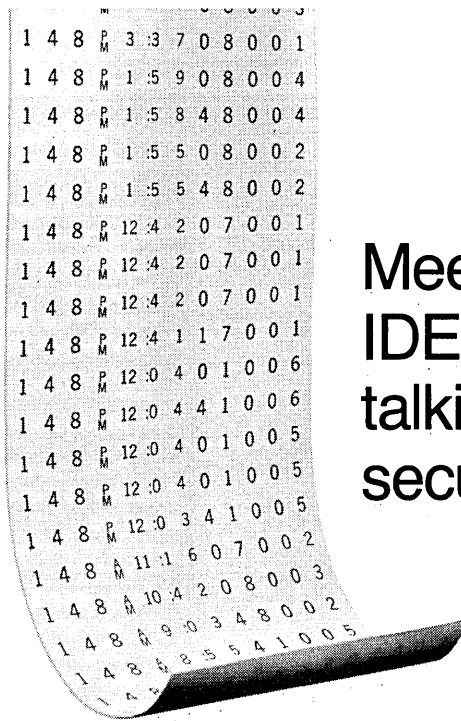


nior vp of finance and administration, treasurer, and director of the company. He is succeeded by **Frank J. McQuaid**, who has been vp/gm of Data Products' Telecommunications Div. in Stamford, Conn. . . . San Diego-based Digital Development Corp., with plans to expand its peripheral sales into the foreign marketplace, has named **Milan R. Mraz** director of international operations. Under his direction DDC will announce the opening of foreign sales and service offices in the near future.

**Jim Foord**, formerly head of Rolls-Royce's computer operations, has joined the DP Div. of Honeywell Information Systems Ltd., where he will direct marketing support in the U.K., South Africa, and Australia . . . The Computer Co., Richmond, Va., data services firm that says it has expanded four-fold in the last year, has elected **Andrew Smith, II**, to the new position of vice-president, operations . . . **Walter Burke**, a director of Fairchild Camera & Instrument for the past 14 years, has been elected chairman of the board, succeeding the late **Sherman M. Fairchild** . . . **William H. Reuter** has been promoted to the new post of director-telecommunications of American Express Co. and American Express International Banking Corp. He will be responsible for the design, development, and operation of a corporate-wide voice and data communication network . . . **Dr. Carlos Cuadra** has been appointed manager of the newly combined Education and Library Systems Dept. of System Development Corp., Santa Monica. He replaces **Dr. Harry Silberman**, who resigned to accept a post with the U.S. Office of Education . . . TRW Data Systems, manufacturer of electronic check and credit authorization equipment, has named **Charles J. V. Fries** its manager of market development. He is the former marketing vp for Credit Systems, Inc.

Two founders of Microdata Corp., Santa Ana, Calif.-based minicomputer manufacturer, have resigned "for personal reasons." **Kenneth D. Allen**, president, and **Fred B. Cox, Jr.**, vp, will continue on as directors of the company. Chairman of the board **Donald W. Fuller** has assumed the duties of president. ■

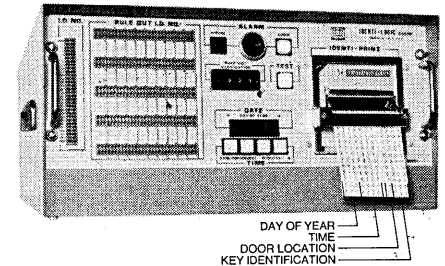
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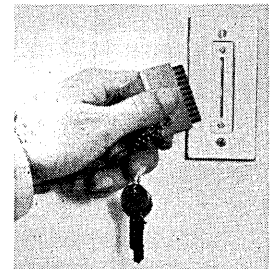
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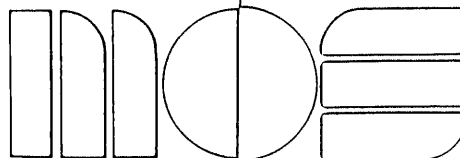
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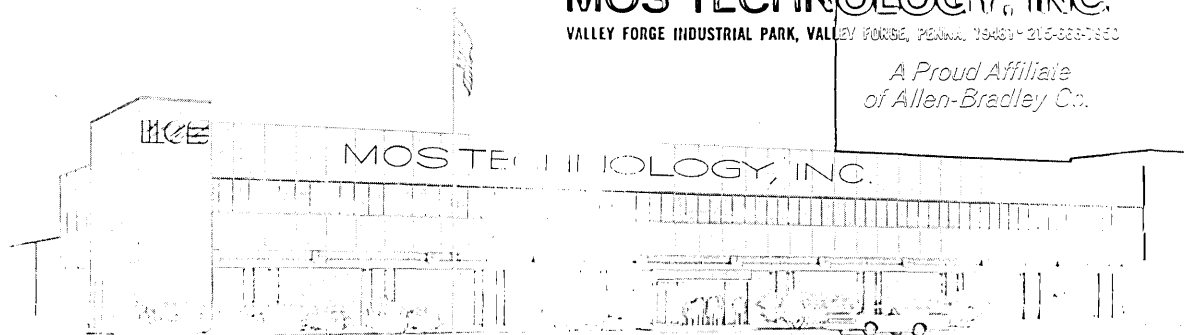
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