# DATAMATION 70®

October 1

u$ed computer$

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At Varian, we consider the 620 series as a kind of computer molecule, bonded by the same standard software: FORTRAN IV, MOS, BASIC, RPG, and others. This 620 family also offers the largest line of peripherals available in the industry.

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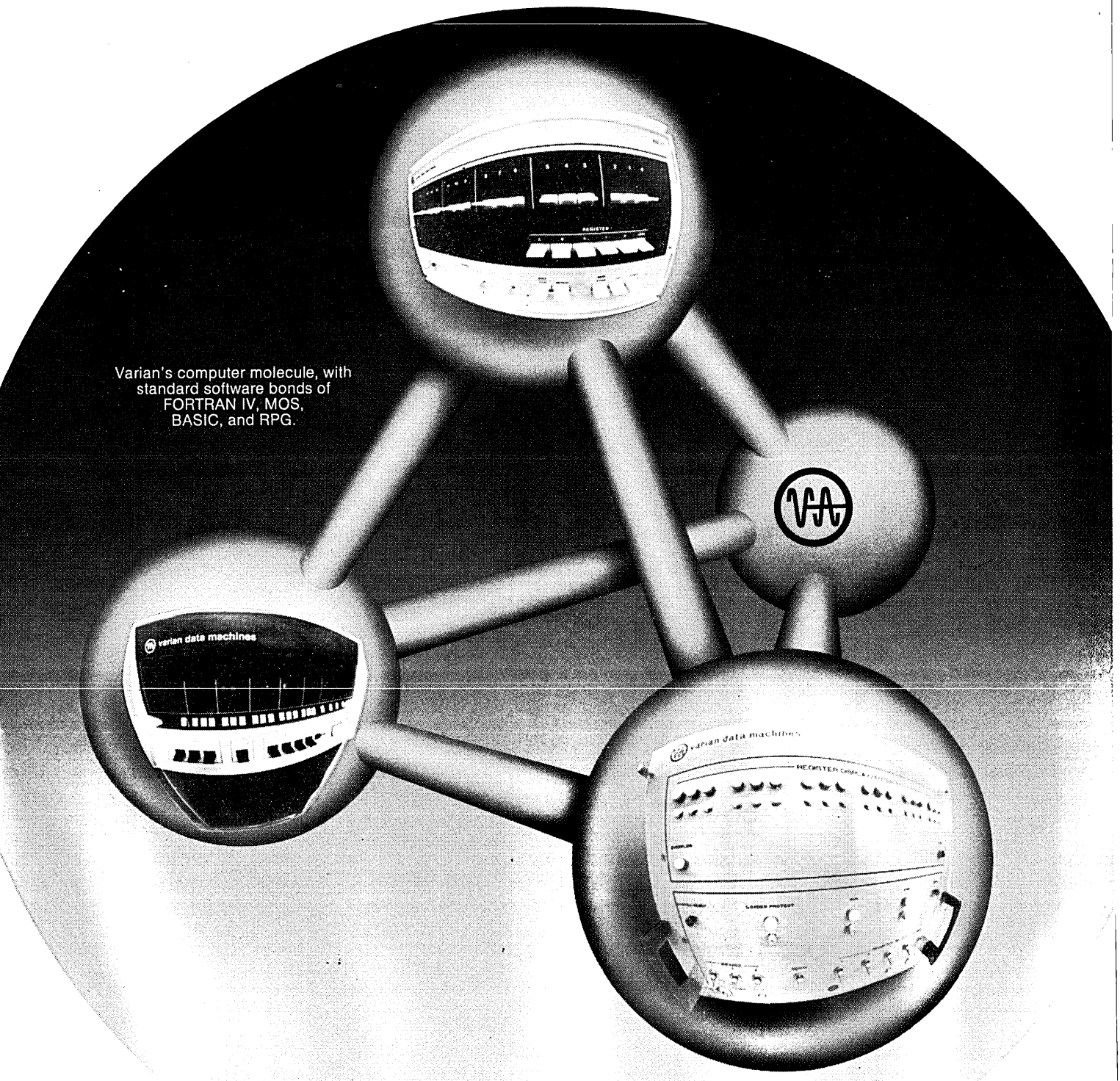
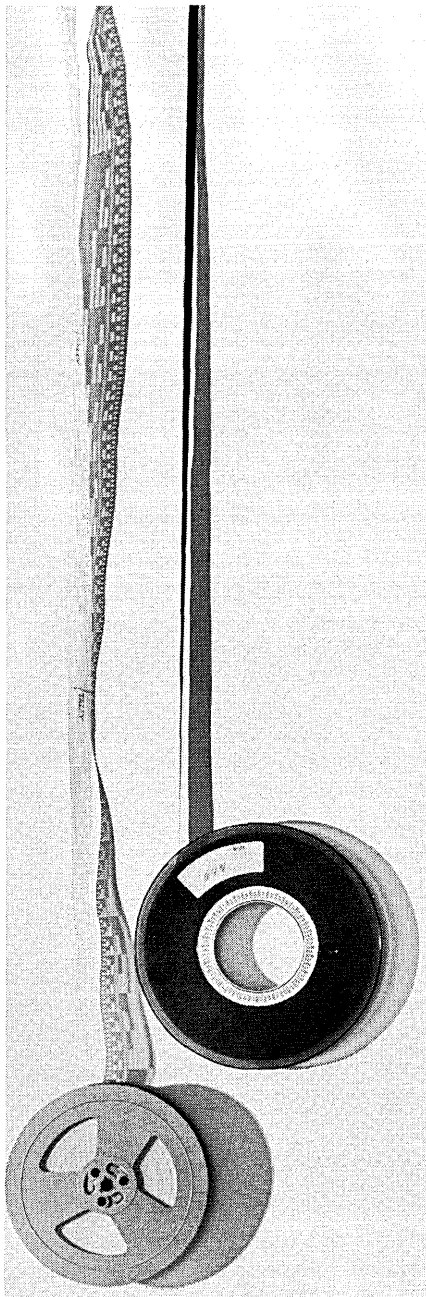
**The Big Company in Small Computers**

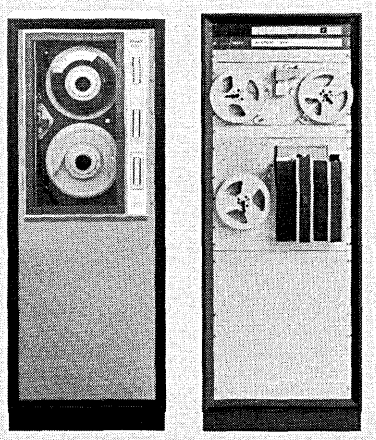
CIRCLE 1 ON READER CARD




Varian's computer molecule, with standard software bonds of FORTRAN IV, MOS, BASIC, and RPG.



# Computer compatibility, a hang-up we understand



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CIRCLE 50 ON READER CARD

# DATAMATION 70®

**OCTOBER 1, 1970**

volume 16 number 12



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**About the Cover**

A pot of gold may well rest at the foot of the rainbow over the used computer merchant's house as tight money and cost cutting bring him new status. Construction by David Graves, photography by Andy Cominos.

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# DATAMATION®

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| MetaCOBOL | COBOL |
|---|---|
| `PRINT BODY BY 2.` | `WRITE BODY AFTER ADVANCING 2 LINES.`<br>`MOVE SPACES TO BODY.`<br>`ADD 2 TO LINE-COUNT.`<br>`IF LINE-COUNT IS GREATER THAN 56`<br>`  PERFORM PAGE-HEADING-ROUTINE`<br>`  MOVE ZEROS TO LINE-COUNT.` |
| `CLEAR WORK-RECORD.` | `MOVE SPACES TO WORK-RECORD.`<br>`MOVE ZEROS TO AMOUNT OF WORK-RECORD.`<br>`MOVE ZEROS TO HOURS OF WORK-RECORD.`<br>`MOVE ZEROS TO RATE OF WORK-RECORD.` |
| `CANJOB THREE.` | `ENTER LINKAGE.`<br>`CALL 'CANJOB' USING THREE.`<br>`ENTER COBOL.`<br>`STOP RUN.` |
| `INPUT-FROM CARDS-IN`<br>`  INTO CARD-IN.` | `OPEN INPUT CARDS-IN.`<br>`PERFORM ZZ-INIT-ZZ.`<br>`GO TO ZZ-OPEN-ZZ.`<br>`ZZ-READ-ZZ.`<br>`IF ZZ-LR-ZZ = 'N' CLOSE CARDS-IN STOP RUN.`<br>`READ CARDS-IN AT END MOVE 'N' TO ZZ-LR-ZZ.`<br>`GO TO ZZ-BREAK-ON-ZZ.` |
| `LISEZ LA-CARTE,`<br>`  A LA FIN ALLEZ A SORTIE.`<br>`MULTIPLIEZ LES-HEURES PAR LE-TAUX`<br>`  POUR DONNER LE-SALAIRE.`<br>`DEPLACEZ PIERRE A COLETTE.` | `READ LA-CARTE,`<br>`  AT END GO TO SORTIE.`<br>`MULTIPLY LES-HEURES BY LE-TAUX`<br>`  GIVING LE-SALAIRE.`<br>`MOVE PIERRE TO COLETTE.` |
| `01  TRAN-SORT-KEY.  02 SEQ-KEY.`<br>`03  ACCT.  04 ACCT-KEY.`<br>`05  ACCT-NO P=X(10).` | `01  TRAN-SORT-KEY.`<br>`02  SEQ-KEY.`<br>`03  ACCT.`<br>`04  ACCT-KEY.`<br>`05  ACCT-NO  PICTURE IS X(10).` |

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The limitations of COBOL are well-known to anyone who works extensively with it. Rigid syntax; the frequent need for an excessive number of statements and for repetition of information common to many COBOL statements; and the general inflexibility which too often consumes valuable time for unproductive purposes, are just some of the undesirable characteristics that have been unavoidable till now.

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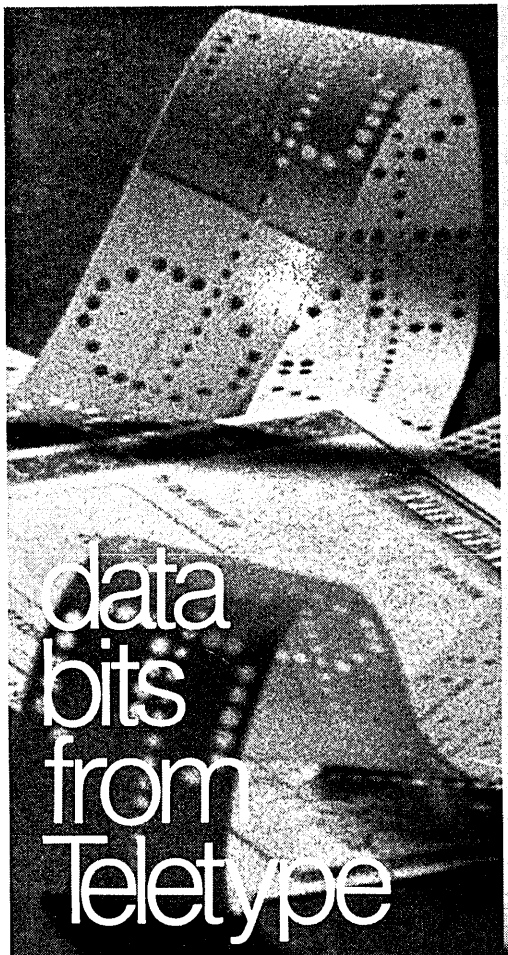


# data bits from Teletype

## payout time cut from week to 24 hours

A large insurance company with over twenty benefit paying offices across the country has slashed payment authorization time from seven days to 24 hours or less using Teletype® equipment and a computer.

Local offices put benefit application data on punched paper tape. The tape is placed in a Teletype terminal's tape reader at the end of each day. Then the home office computer automatically polls each unattended terminal during the night. The entire data collection process runs about 1½ hours.

The computer sorts incoming data by policy number and produces all of the significant facts required to make accurate payment decisions. This data is transmitted to the local offices where it is reproduced in easy-to-use page copy form by Teletype automatic send-receive sets. Helping the insurance company provide the type of payment service policyholders really appreciate.

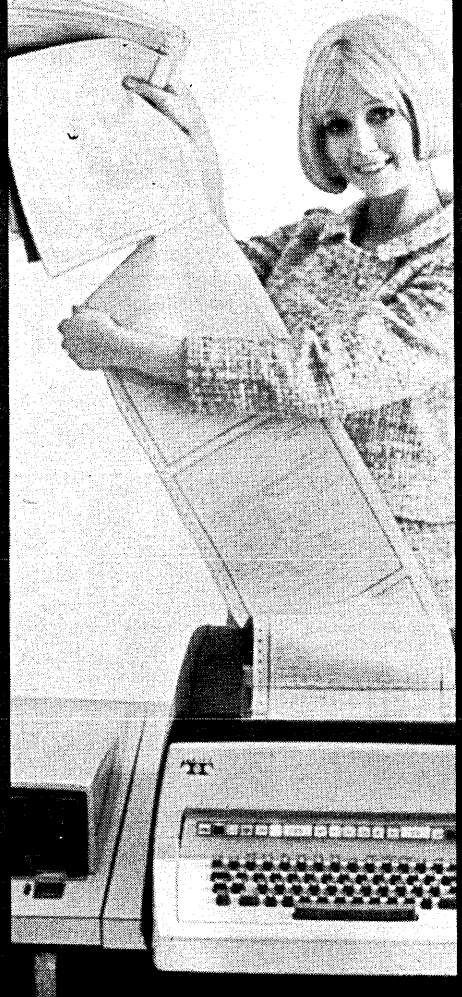
## finicky forms filled on-line

The model 37 has a large number of interesting data communication capabilities. One that means business to many people is its ability to produce multiple copy business forms on-line.

This heavy-duty terminal has: horizontal and vertical tab stops that can be set on-line by operator or any remote terminal using ASCII code. Full and half-line space (forward or reverse). Optional pin feed platen and form feed out control. Types in upper and lower case. Sends and receives data at 150 wpm. It really makes form filling operations fly fast.

With the model 37 it is even possible to add up to 32 special characters to the normal compliment of letters, numerals, symbols and punctuation marks found in its typebox.

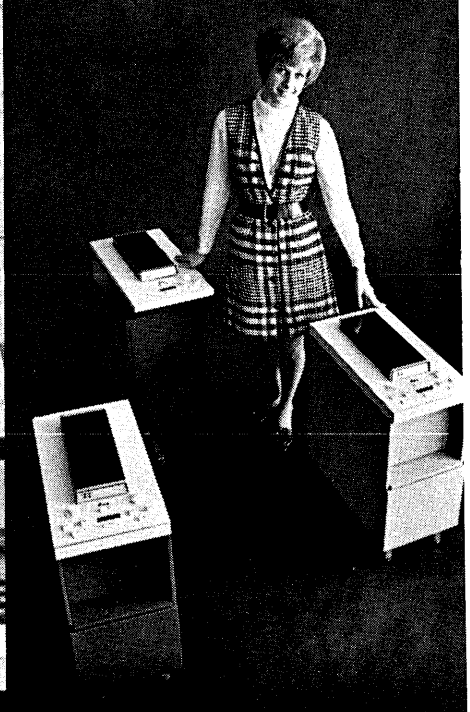
It's a great time-sharing tool, too. The first terminal that enables you to take full advantage of ASCII capabilities.



## new magnetic tape data terminals

Visualize 150,000 characters of information tucked neatly into a compact 3″ by 3″ by 1″ tape cartridge. Making data easier to use, move, handle and store. A reusable tape that brings new economy to communication system operations. Teletype magnetic tape data terminals give you these important benefits, plus on-line speed capabilities of up to 2400 characters per minute.

These magnetic tape terminals are compatible with Teletype model 33, model 35, model 37 and Inktronic KSR equipment. Will send and receive data at both high and low speed. Tape recording, loading, message search, editing and other related functions are extremely simple.





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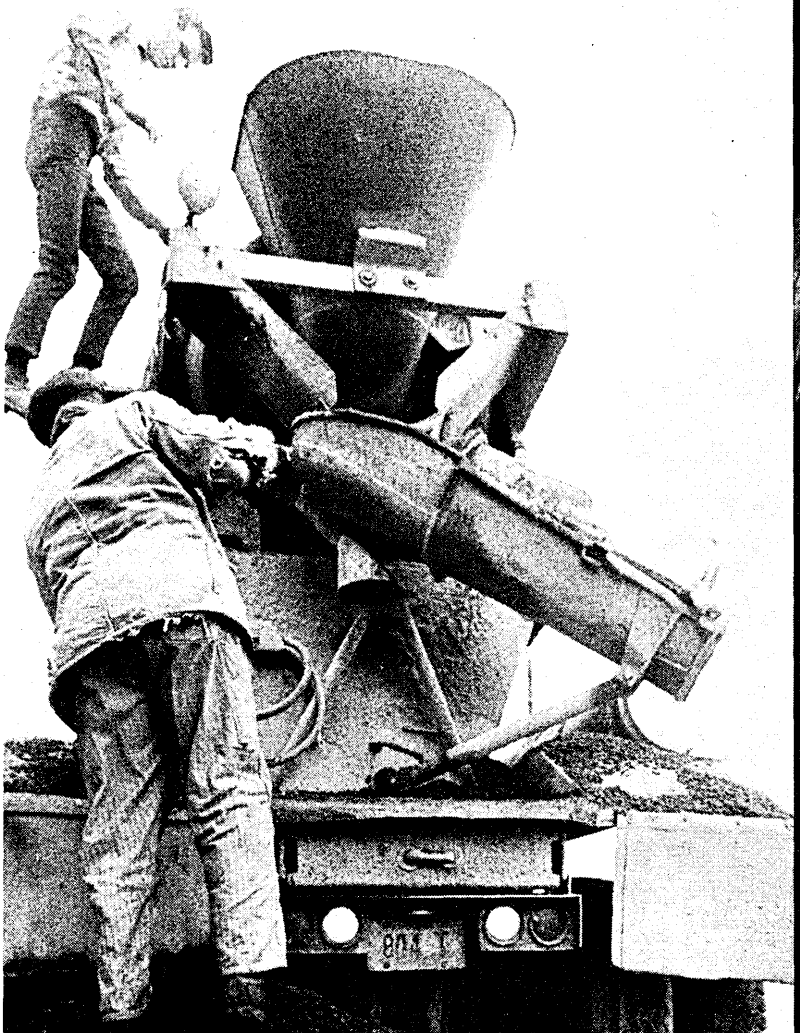

## fast data flow keeps cement on the go...

One of the nation's largest cement and building materials producers uses Teletype equipment and a computer to help keep its vast marketing complex under control.

Company manufacturing facilities, warehouses and sales offices span from Hawaii to Florida. Teletype tape-to-tape terminals and automatic send-receive sets are used to move order, billing, and shipping data, as well as administrative information. Teletype terminals are also used as a management tool to generate financial, statistical and marketing data using a time-sharing computer.

Taped order information sent to manufacturing and distribution centers is received by Teletype equipment that produce it on multiple copy business forms. Making possible far faster customer service and improving operational efficiency.

TELETYPE

## recommended reading

Teletype has a number of brochures on equipment, applications, and case history data. A short description of what is available is contained in: "How to get answers to your questions about Teletype equipment." Write for your copy.

Teletype data communication equipment is available in send-receive capabilities of up to 2400 words per minute. Included are hard-copy, magnetic-tape and paper-tape terminals, error control devices, options and accessory equipment to fit most data communication system requirements. For information, write:

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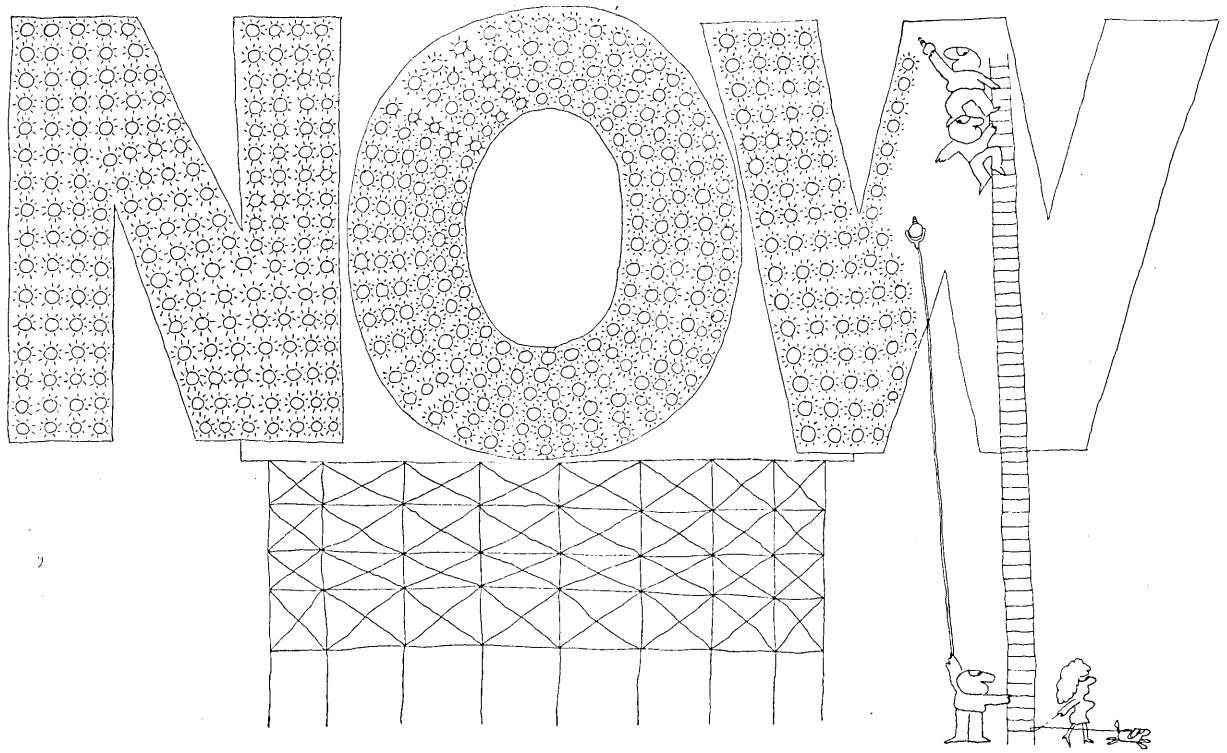


## Univac makes now mean now.

Now used to be a sometime thing.

Maddeningly approximate, disturbingly vague. Sometimes no more recent than a quarterly report or a monthly summary.

But things are different today, and better.

Univac has made now into something you can count on and build on.

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Today we can offer you the management technique of the future.

Call us in. Let us show you what now can mean to you.

UNIVAC SPERRY RAND
FIRST IN REAL-TIME INFORMATION SYSTEMS

# LETTERS

## Incompatible words

*Sir:*
The letter is informal (handwritten), but I didn't want to waste any time: check p. 17 of the Aug. 1 issue, "Look Ahead" section, two misspellings (according to my dictionary): "compat*a*bility" and "incompat*a*bility." However, on p. 19 (same section) I see "compat*i*ble"—that's not even being consistent! Which is it going to be?
SELMA L. SAWAYA
*Dept. Health, Education and Welfare*
*Washington, D.C.*

Ed. reply: We will consistantly try to be more consistent in the future.

## Sorting it out

*Sir:*
The article entitled "Fast Sorting" in your issue of Aug. 1, p. 47, in my opinion, simply does not deserve publication in a serious trade journal. It contributes nothing to existing knowledge of sorting techniques. The speedup of 375 by comparison to the bubble sort is extremely misleading since a comparable speedup can be achieved from using a treesort, whose time is proportional to $n$ log $n$, instead of a bubble sort, whose time is proportional to $n^2$ and which is one of the slowest sorting methods. The claim that use of the associative memory " . . . is transparent to the user" is true as far as it goes; however, its main advantage is that it provides a dedicated 2048-word area of fast storage which the caller of the sort routine does not have to know about. It would be far less expensive to provide equivalent storage in main core. It may be true that an LSI associative memory is only twice as expensive as a conventionally addressable LSI, but neither is within a large factor of current core prices.
L. PETER DEUTSCH
*Berkeley Computer Corporation*
*Berkeley, California*

*Sir:*
I feel that the phrase, "The combination of a CDC 1604 and a special associative memory has turned in the fastest sorting times yet," displayed above the recent article, "Fast Sorting," by Casper R. DeFiore, is, at best, a bit misleading.

The author states that the entire memory can be searched for a minimum or maximum value in "less than 160 microseconds," but there is no relation given between the time required to perform this search of a table within the memory, of size $n$, and the number $n$ itself. If this relation is represented by $f(n)$, then the total time taken to sort a table of length $n$ using the method discussed by DeFiore would be $n \cdot f(n)$. It is not at all clear that this is fastest. In particular, there are sorting methods which take $n \log_2 n$ steps, for a table of length $n$, and others which take $nk$ steps, where $k$ is the length of the key. (See, for example, my book, "Programming," Holden-Day, 1968, chapter 5.)

Particularly misleading is the comparison, later in the paper, with the bubble sort. A sort which is 375 times faster than a bubble sort is not at all difficult to manage with conventional techniques, using no associative memory, provided that the table size is large enough. It is true that for a table of 2,000 48-bit words a standard classification sort, for example, would be at most 50 times faster than a bubble sort, but for a table of 20,000 words it might very easily be 400 times faster. This is not to say that DeFiore's sort is definitely not the fastest available, but simply to point out that a graph relating sort speed to table size, for several methods of sorting, would have been appropriate for a paper of this type.
W. D. MAURER
*Berkeley, California*

Mr. DeFiore replies: In my investigation I reported on what was available to me; i.e., the associative memories, 1604, bubble sort, etc. However, if Messrs. Maurer and Deutsch want to make comparisons, there are much better sorting methods than the one that takes n log n-stepped that they mention. I recommend they read Lewin's paper (Lewin, M. H.: "Retrieval of Ordered Lists from a Content Associative Memory," **RCA Review**, June, 1962), since his algorithm, which uses an associative memory, requires only 2n-1 cycles to retrieve n words in order. It is evident from the comments that Maurer and Deutsch do not understand associative memories. For example, Maurer's statement that **n • f(n)** is the time taken to sort a table of size **n** is incorrect. The time is at most **n • f(m)** where **m** is the number of bits. A lack of understanding about associative memories causes one to draw this erroneous conclusion.

A short explanation of associative memories may enlighten them. Associative memories are distinguished from random access memories by (1) word parallel access of the entire memory; (2) word parallel performance of its operations in the entire memory; and (3) the inclusion among its basic operations of that of comparing. Conventional memories possess none of these features. This means that such tasks as sorting, comparing, searching, grouping, etc., are much more natural for associative memories. It is recommended that Maurer and Deutsch investigate sorting methods further, including Lewin's technique, and that they learn about associative memories instead of making comments on subjects in which they have little or no knowledge.

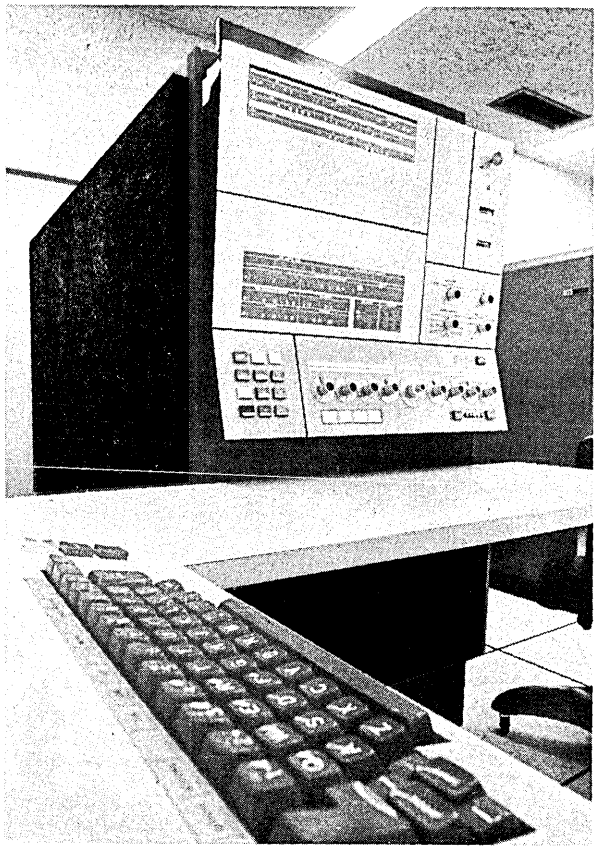
## System knowitalls?

*Sir:*
Placing Mr. Parr's and Mr. Maegerlein's articles back-to-back in your Aug. 1 issue presented nine pages of delightful reading. "A Different Breed" clearly states the enormous conceit of the systems profession, while "Curing Discontent" points out some of the results of that conceit.

Mr. Maegerlein's last sentence states his viewpoint quite clearly: "They (the systems group) know all the answers . . . " Nonsense! A systems group should serve the goals and needs of the company in which they are employed. If "all the answers" are known by anyone (and I doubt that "anyone" would so brag), it is by the line managers of the company, who are responsible to their stockholders and to the general public for the company's "success" (even the abstract goal "success" varies greatly from company to company, and even in one company, from time to time).

If GB's (Green Berets) are needed, perhaps they should be isolated into a computing subsidiary or an isolated r&d group (as Mr. Parr suggests), where projects can be ends unto themselves and the people can have more orientation toward their profession than their company.

The people in such a group will naturally abhor "professional obso-



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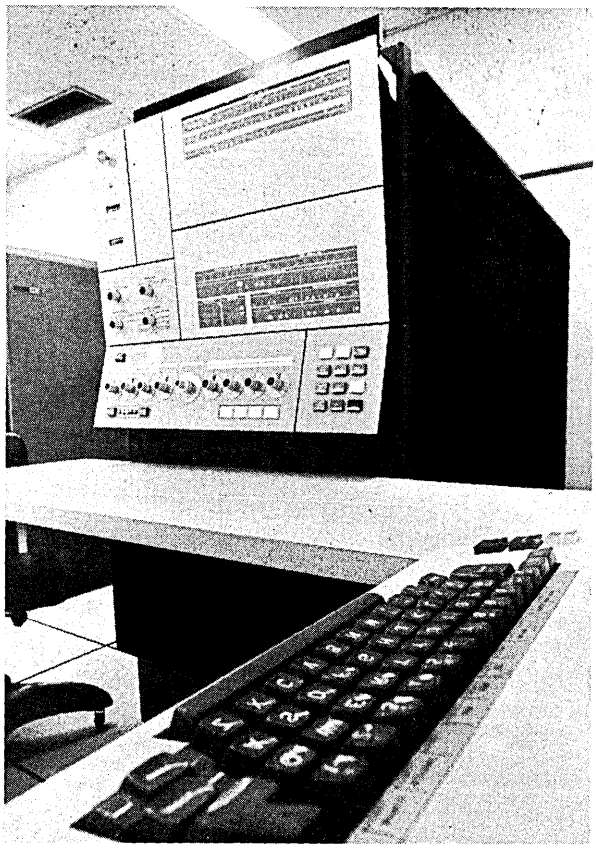

**$9,288 per month**

# These are mirror images

## *--with one big difference--*

The illustration shows the central processors of two identical 360-30 systems. Yet one system costs $2,322 per month less than the other.

**Why should one computer cost 20% less* than its identical twin?**

Because the $9,288 per month system is available on a lease from Computer Leasing Company. Its cost has been partially amortized, and its new user will benefit because the cost is being spread over its full useful life. As with any computer leased by CLC, this 360-30 has been under continuous maintenance contract with the manufacturer. It will be reconfigured to meet your exact needs and refurbished to look and perform like new. The "package" will be the same as that offered by the manufacturer to the first user, i.e.: We will pay maintenance, insurance and taxes. The only difference is in the cost and the fact that you get unlimited usage without additional rental.

**Computer Leasing Company has more than $150 million in computer equipment on lease** . . . including UNIVAC 1108s, HONEYWELL 200s, CDC 6000s, and IBM 360s. For details on upcoming computer availabilities, contact any of the offices below.

*20% is the savings on a 5-year lease. Shorter leases are available at somewhat reduced savings.

This system includes:

**IBM 360-30 (64K)** **CLC System No. 87**

2030-F with 3237, 4427, 4456, 4463, 4466, 4468, 4760, 5856, 6960, 6961, 7520, 7915.
1051-N1 with 3130, 4410, 4411.
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The system will be reconfigured to meet your specifications.

**Computer Leasing Company**

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San Francisco, Calif. 94104
(415) 391-2898

*A Subsidiary of University Computing Co.*

lescence" and will want to be able to say that they worked on the latest generation of computers on applications that are "industry firsts" (or even seconds). They want this experience not to benefit the company they are currently with, but to justify their 10% increase as they move on to their next job. Often they analyze an assignment not with the question: "Is it best for my company?" but with the thought: "Will it look good on my resume?" How exciting it would be to see one resume with the truly relevant comment: "I did on a model 20 what everyone else needed a model 40 to do . . ."

I feel that the role of systems and data processing is much larger than that envisioned by Mr. Maegerlein. Their influence should be continuous, not necessarily toward revolutionary projects, but toward evolutionary (and maybe even revolutionary) companies. Their goals and their companies' goals *must* be the same. The systems group should always press for change and does so by its very existence, but the change should be guided by the corporate management.

There are at least two ways of accomplishing this guided evolution. Mr. Parr points out the first when he suggests that a company move a top computing man into areas beyond computing. In such a position he will not only be expanding his own career but will also be exposing the company to systems thinking in areas not directly related to computers and data processing.

A second approach is to ask a manager who has a growing career in the company to serve for several years as director of MIS. He must, of course, be backed up with a competent technical staff, but his company orientation will tend to lead the systems group into those applications which best serve the company.

Sometimes, top management edp committees are asked to orient systems effort toward company goals, but they usually meet too infrequently to influence the attitude of the day-to-day systems development.

Companies vary in type. Their systems groups should vary accordingly. Ansoff and Stewart, in an article in *Harvard Business Review,* November/December, 1967, suggested four types of technology-based companies:

1. First to market (highly innovative)
2. Follow-the-leader (copy the innovators)
3. Applications engineering (modify the product to suit special markets)
4. Me-too (follow the crowd)

GB's are probably neither necessary nor desirable for companies 3 or 4, and are needed only on occasion in company 2. In company 1, GB's are probably useful in an r&d capacity.

"Army-type" systems people, closely tuned to the companies' needs and goals, will serve much better. If specialized skills are needed for particular problems or projects, those skills can be bought from a software company working under the direction of a company-oriented manager.

The great first century teacher, Hillel, said: "If you are not for yourself, who will be for you? But if you are for yourself alone, what are you? And if not now, when?" He could well have been referring to us 20th century systems analysts.

JOSEPH L. PODOLSKY
*American Information Development*
*San Francisco, California*

## Watts the difference

*Sir:*

Congratulations on your "new look" and the thoroughly professional report on military cpu's by Cecil Frost (July 15, p. 87).

However, lest our friends and competitors think Honeywell Aerospace is marketing a maxi version of a mini, I'd like to correct what the digital type gremlins did to your listing of our HDC-201 computer.

The 201, the "baby" of our five-computer family, weighs 6.0 pounds and uses 26.5 watts—not *60* pounds and *265* watts as listed.

LARRY R. LUBENOW
*Honeywell, Inc.*
*St. Petersburg, Florida*

## Foil that algorithm

*Sir:*

Hoffman and Miller's algorithm is not so easily foiled as Chris Shaw intimates (Letters, Aug. 1). To get past such a safeguard as Shaw proposes, all one need do is "or" in some mutually exclusive set of criteria with a known count above the minimum required for exact counts.

The invincible lock is, I suspect, impossible. However, all that is really required is to make such unintended extractions of information sufficiently difficult, costly, and dangerous. This might be approached by randomly adding a small number (e.g., between −5 and 5), reporting only ranges (e.g., 0-10, 10-20, . . . ), keeping central algorithms secret, and establishing criminal or civil sanctions against attempting such extraction.

RICHARD H. KARPINSKI
*UC Medical Center*
*San Francisco, California*

## Twonique, maybe

*Sir:*

Your Aug. 1 Software item, "$199.95 COBOL Documentor" (p. 75), caught my eye since I have for many years been deeply committed to COBOL and its documentation.

Pioneer Data Sciences claim that their second listing is "unique," and with this I must disagree. Somewhat more than two years ago, I installed such a documentation system which I wrote at an installation in Oakland, Calif. The documentation aids program, known as COBXREF, has been available free of charge since that time to users of the Burroughs B5500.

CHRIS J. CODDINGTON
*Burroughs Corporation*
*Pasadena, California*

## On your marks

*Sir:*

As a user of the Mark II time-sharing service, we have in the past very frequently engaged in the wishful thinking that it would be of great benefit to us if we were able to share the experiences of other users in coping with Mark II.

For this reason, I would like to explore the feasibility of forming a Mark II User's Group. The objective of this group should be to maintain communication between users relating to Mark II problems and opportunities. There is, of course, no point in forming such a group if the demand is nonexistent. The purpose of my addressing this letter to you is to determine if such a need exists.

I would appreciate your publishing this letter and inviting interested readers to express their desire for participating in this undertaking by writing to:

HEINZ DINTER
*Computer Management Corporation*
*1105 West University Avenue*
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# How a little extra thought revolutionized the terminal.

Our revolutionary slogan

We thought about all the people who could be using remote batch terminals. How they deal in records and files.

And we thought how nice it would be if they could have a character-oriented terminal instead of a number cruncher.

We thought they would appreciate a terminal with a little intelligence. One that can be programmed to handle their kind of work. That's smart enough to take care of error detection, full overlap and automatic code conversion.

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So we built the Hetra T/2 remote programmable terminal and made it plug compatible with most other terminals. Like the 2780. That makes it easy to install.

Finally, we thought about how little it cost us to make it. And we decided to pass the saving on by charging a much lower price. About 25% lower than the competition.

Wasn't that thoughtful?

The revolutionary Hetra T/2 terminal.

**We thought about performance.**

And built a smart terminal. With one-microsecond core. As much as 65K if you need it. And a processor that's completely programmable.

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A terminal should be quick. Our's handles 4,800 BPS on voice grade lines.

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Our card reader is rated at 400 CPM. And we added a printer that runs at 600 LPM.

**We thought about price.**

And got it down to $33,950 with 8K of core and peripherals.

**We thought about delivery.**

And decided we could get you one in 90 days.

**We thought you'd be interested.**

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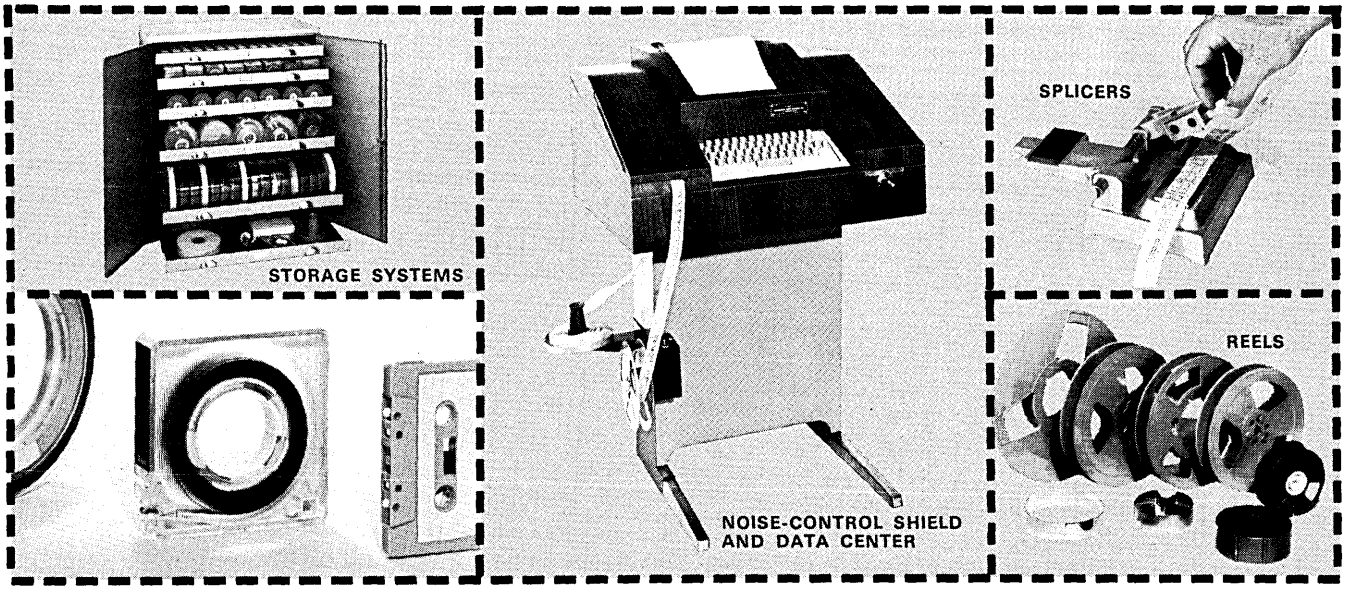


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- 10, 15 or 30 characters per second
- 26 to 132 columns per line
- Fully incremental
- EIA standard RS-232B interface
- USASCII code
- Full right-hand numeric keyboard
- Compatible with Teletype at 10 and 15 cps with EIA Standard RS-232B interface

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The companion Magnetic Tape Reader/Recorder is an accessory to the basic Gulton 10/30 terminal. It saves on-line time for greater economy and is fully incremental. Plug-in cassette permits faster start cycle and easy tape storage.

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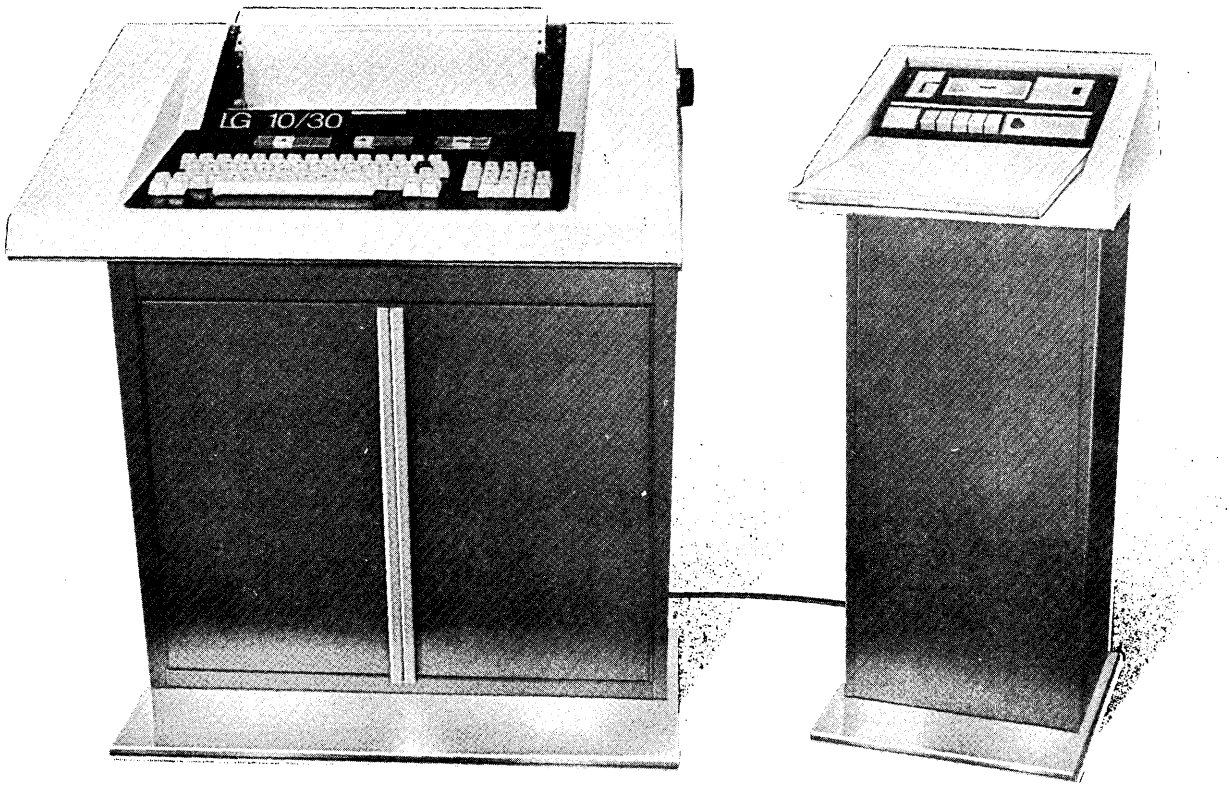


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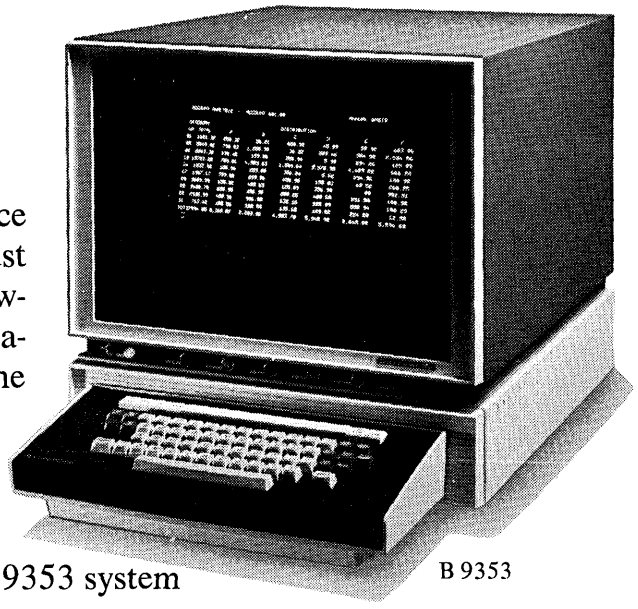
CIRCLE 37 ON READER CARD

B 9352

# Here are two new reasons for you to choose Burroughs input and display equipment:

# the B 9352 Terminal and the B 9353 System.



B 9353

Burroughs simplifies your choice of input and display equipment. Just decide whether you need a few low-cost, featured terminals at each location (in which case you'd select the B 9352) . . .

or whether you want big-screen viewing area, greater shareable capacity and data comm flexibility (which would make the B 9353 system right for you).

Both are outstanding performers, easy to install and use. Both are products of a *total systems* supplier offering nationwide support and service. Both are ready for delivery now.

Call Burroughs for all the information you need to make the logical choice.

Burroughs

# LOOK AHEAD

**BIRD IN HAND VS. BILLION IN BUSH**

Now that ADR and DPF&G have abandoned their antitrust trailblazing in favor of cash transfusions from tormentor-turned-mentor IBM, Control Data's antitrust suit can proceed with fewer problems. (Apparently the three suits, combined as a class action, were slowing progress.) Sources doubt that CDC will also settle out of court, saying that Big Chief Norris is "still there," the firm is "out for blood," and IBM really couldn't offer a trade—say, selling CDC's supercomputers or refinancing any debts. The 370 may fuel the fire at both CDC and the Justice Dept., since some think IBM's percentage of the market could climb steeply. Greyhound may also stick out its suit since the corporate daddy is not cash poor. The suit, on a state level, could be settled sooner, too, maybe within a year.

**THIN SILVER LINING SHOWS UP**

A few service firms report that their old customers are beginning to fire up projects that have been dormant for the last nine months. Too, while edp recruitment is still a shadow of its former self, headhunters report that users are beginning a cautious look for more people, although computer firms themselves are generally still cutting back or holding tight. IBM, for one, is "still tighter than a drum." So are some consulting shops.

**HAS ANYBODY HERE SEEN KELLY?**

As Great Southwest Corp. last month attempted to unload its 50.9% interest in Scientific Control Corp., Dallas, a leading contender was a man whose bankroll may not match Howard Hughes's but whose elusiveness does. No one seemed to know any more about Richard Kelly than his name, except his attorney and he wasn't telling.

Kelly and the Penn Central affiliate agreed in principle in late August to the mystery man's purchase of the SCC interests for some $250K in cash and oil properties, $1 million less than GSC paid for the ailing Texas firm last January. And some of the cash could be said to be coming home. Kelly bid against GSC for the SCC interest and reportedly received an out-of-court settlement from the land development firm of $25K plus SCC stock when he charged GSC with "lifting" his plan of arrangement. The sale to Kelly, however, was yet to be consummated at this writing, and there was some feeling in Dallas financial circles that the proposal was shaky and could blow up.

**STANDARD TO EXTEND LINE, ADD 360 ALLURE**

Watch for an early–'71 announcement of a top of the line computer from Standard Computer Corp., Santa Ana, Calif. To be called the IC 7000 Model II, the system will incorporate an Arithmetic and Language Processor several times faster than in Mod I. First copy could go to Stanford U. Also in the shop is a multiplexer channel that will enable a Standard computer to emulate the 360 at the 50 level. The multiplexer and processor may both go into yet another machine (IC 9000?), due in mid-'71.

*(Continued on Page 18)*

**CUT AND FILL AT VIATRON**

More cutbacks in employment and the filling of orders continue at Viatron. Latest slash of 135 employees reduced the payroll to some 365 at last count, down from more than 1K in May. On the plus side, the firm is still landing contracts. New England Telephone is reported to have purchased some 50 System 21s for about $250K. Another large order is said to have been placed by Motorola.

Meanwhile, the men who brought us Viatron, Drs. Bennett and Spiegel, are embarking undaunted on another venture. The business, headquartered in Lexington, Mass., will be the importing of components--not MOS--from Japan and exporting of same to Europe. Spiegel is vp, friend Jerry Wasserman president, and Bennett—still a $50K/yr consultant to Viatron—will initially play an inactive role.

**TO CATCH A THIEF**

Computer Science's New York City off-track betting system had the benefit of an outside expert: an ex-bookie who helped make the design both better and employee secure. Seemed necessary with billions of bucks being handled. Why CSC's interest? It's a $500 million yearly market, for which NYC can be a foot in the door, and, besides, Fletcher Jones is said to have his own horse to enter.

**CONTRACT BRIDGE**

CSC's five-year, 500-man facilities management contract with NASA in Huntsville, Ala., will be over at the end of the year. CSC will rebid the contract but there's lots of competition. Boeing, we hear, is among the bidders.

**RUMORS AND RAW RANDOM DATA**

One observer can't understand why RCA announced machines competitive with IBM's 370/135 and 145 before IBM debuted them. "That's telegraphing punches, a bigger gamble than RCA should take"... Probably a world record for the software biz has been set by System Development Corp. There are now four ex-SDCers for each person remaining with the firm. Since it was formed in '56, SDC has hired 12,500, of whom only 2,300 remain...Independent maintenance companies planning to raid IBM for top-level people are in for a shock. One headhunter reports IBM services execs get as much as $100-125K per year...On the selling block: the publicly-held CAI service bureau subsidiary, EBS Data Processing Inc., whose profitable business last year was partly attributable to the now-defunct Speedata, another publicly-held CAI subsidiary... Sign of the times: a veteran of the software biz, now among the unemployed, is shying away from job offers by software companies, leaning instead to user firms...Some members of the GUIDE users group are upset by that organization's defeatist stance in outlawing joint projects with SHARE. They may ask a full membership vote on it...Notable quote: one IBM time-sharing man said to another, "The telephone company screwed up just in time to save our necks."

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And there's more. All because of a revolutionary writing device and MAC. MAC, with 1-microsecond cycle time, an 8K core that works splendidly with FORTRAN IV, and a surprisingly low price.

"Hard to believe!" some doubters may exclaim. They, and you, can get the full story by circling our number. That's the way Xynetics got started.

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Data Products Division
A Division of Lockheed Aircraft Corporation

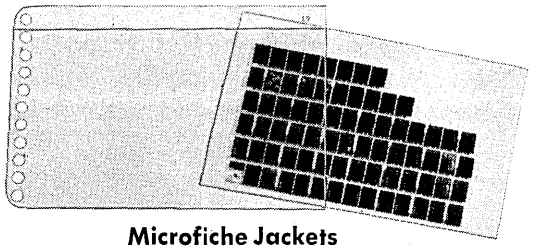
CIRCLE 49 ON READER CARD

# Microform Filing a Megaproblem?

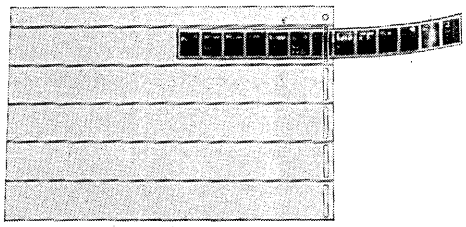
## Wilson Jones announces the solution...

### Microfiche and Microfilm Transparent Jackets

- Special coated right-reading index area
- Punched for filing in visible ring binders, or unpunched for filing in trays

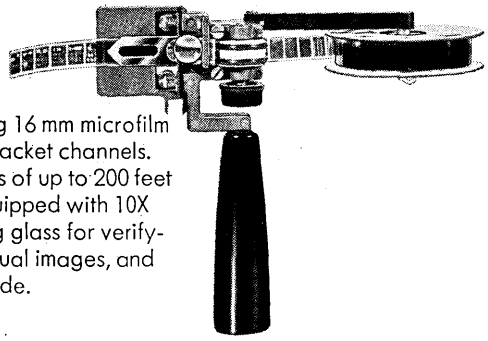


**Microfiche Jackets**
For single 4" x 6" sheets of micro-images



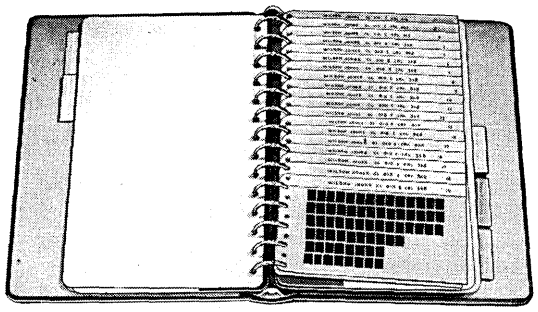
**Microfilm Jackets**
Hold five 16 mm strips in ultrasonic-sealed "Mylar" channels.

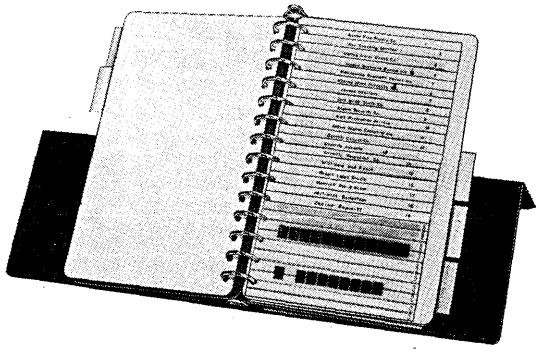
### Microfilm Inserter



For loading 16 mm microfilm strips into jacket channels. Holds reels of up to 200 feet of film. Equipped with 10X magnifying glass for verifying individual images, and cutting blade.

### Visible Ring Binders and Easel Binders with Indexes and Jackets





Both one-inch binders hold 10 banks of 19 microfiche or microfilm punched jackets—over 19,000 24X micro-images (or more at greater reductions). Easel model is easily set up to stand at convenient angle for filing or retrieving jacketed microforms. Binders available separately or with indexes and jackets as complete outfits.

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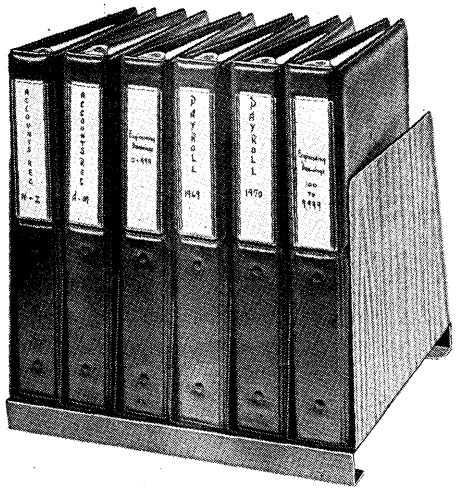
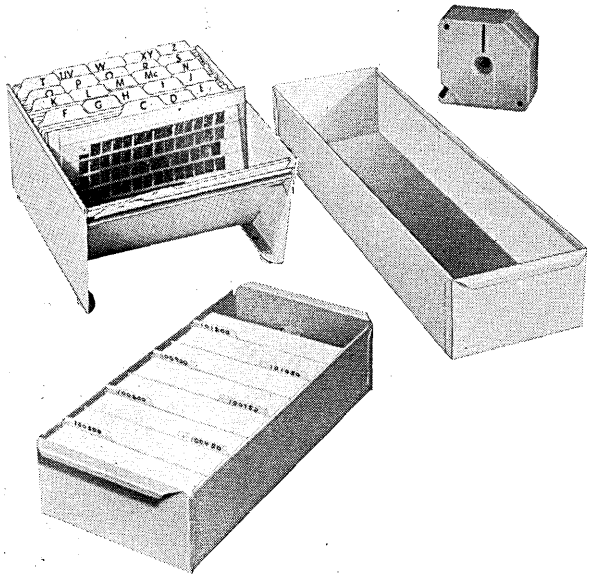


Holds approximately 120,000, 24X micro images in six one inch binders for organizing a convenient, efficient microfiche/16 mm microfilm reference system.
Black satin finish dividers and base, with wood grain ends. Four rubber feet prevent marring desk or table top.

## Steel Trays to hold your Microforms



**Files for Unpunched Jackets** Available separately or with indexes and jackets as complete outfits.
**Cartridge/Roll Film Tray** Each holds up to 3,000 feet of 16 mm microfilm in 15 cartridges or 1,600 feet of 35 mm microfilm in 8 cartridges.
**Aperture Card Tray** Holds up to 1,900 standard size cards.
**Trays that Fit in EDP Printout Retention Equipment** Up to 5 or more Aperture Card Trays or up to 9 or more Cartridge Trays can be suspended in Wilson Jones "Data-Racks," "Data-Stations," and "Data-Centers."

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**Tight money and long-lasting hardware have combined to expand the second-user market**

# Used Computers

by George Heilborn

The last five years have seen a substantial growth of the used computer market. Ten years ago, when most equipment installed was still vacuum tube, corporations thought in terms of purchasing equipment, running it till it wore out, and scrapping it. However, as more modern equipment was developed, the economic life of individual computer systems extended beyond the life of the individual application for which it was used. As a result, a continual flux of equipment developed as corporations upgraded complete systems or portions of systems. A continuous series of judgments had to be made by data processing managers as to whether equipment should be rented, leased from a third party or purchased. They wished to minimize cost, on the one hand, and on the other, maintain the maximum amount of flexibility in changing equipment. To understand the used computer market, it is first necessary to briefly explore the relative advantages of these approaches.

## Rent, lease, or purchase

In considering the question of whether to rent, lease, or purchase equipment, one of the key factors is the anticipated residual value. If it is assumed that purchased equipment has a low residual value, it becomes increasingly attractive to rent or lease. However, if the residual value is high, it will pay to purchase. The general tendency in the industry, particularly on IBM equipment, has been to underestimate the residual value of equipment. Often equipment should be purchased even if it is anticipated the installation will be upgraded in three or four years, if the purchased equipment will still have a substantial residual value. At the time of this writing, a system such as a complete 360/40, which may be three years old, is still selling for 75% to 80% of the original IBM cost. While this particular situation may be a little unusual, it has obviously paid a company now upgrading such equipment to have purchased. Needless to say, however, new equipment introductions would affect these prices substantially within one to two years.

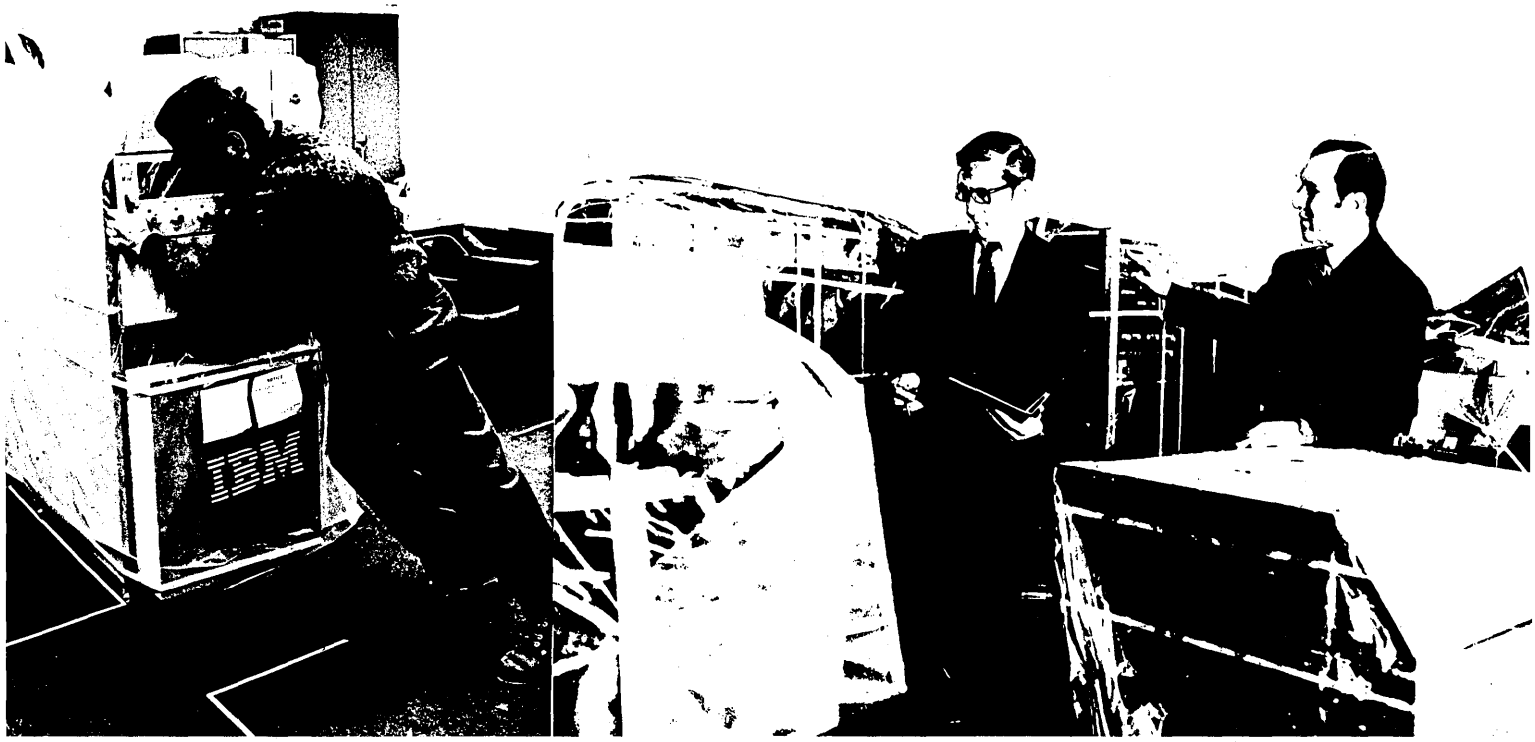
If equipment is used for a substantial length of time, it is probably clear that the most economic route is to purchase it. However, to summarize, this assumes that:

1. There will not be a significant amount of change in the purchased configuration over the short term, and
2. That the total *effective* cost of a unit or system can be minimized because it retains a high residual value after a given period of time.

Assuming the tax bill presently under consideration by the Congress is passed, the tax investment credit will no longer apply to purchased equipment. This will also have some influence on decisions to purchase vs. rental or leasing. However, in that it effectively makes the purchasing (and possibly the leasing) of equipment more expensive, it will also tend to stabilize used equipment prices. One of the effects will be that prices of used equipment—which then must be compared to the full list price, rather than list price minus investment tax credit—will appear more reasonable. Used equipment prices therefore will not drop as rapidly as they might have had the investment tax credit not been repealed.

## The used computer market

As a result of the upgrading of systems and components by owners, and the desire of other users to cut data processing costs, the used equipment market




has developed. The primary function of the used market is to supply equipment in the following categories:

1. To add capacity by adding individual components such as tape drives.
2. To add capacity by replacing or upgrading similar equipment, such as the replacement of a 7070 system by a 7074, or a 360/30 by a 360/40.
3. To cut costs by the purchase of used equipment to replace identical equipment rented from IBM or leased from a third party, where a life for the purchased equipment is anticipated to be long enough to cut the per year costs of depreciation below the lease or rental rate.
4. To add capacity by the addition of identical systems. For example, obtaining a second 1401 rather than replacing a single 1401 with a 360 system.

A number of factors influence prices on the used market. The most significant of these are:

1. Whether the equipment is still in production, or has been made obsolete by newer equipment in production.
2. Whether the system is an "end-of-the-line" system, such as a 7080, or whether it can be upgraded later without major reprogramming costs, such as in the case of a 360/30.
3. Manufacturers' sales prices for equivalent or newer equipment of the same capacity.
4. Availability and cost of maintenance.
5. Equipment configuration; for example, whether the system is a standard configuration or an unusual one which can be utilized only by a small number of users.

In addition, the general application of the system is a factor. Scientific machines tend to depreciate in value much more rapidly than machines used for commercial applications.

The volume of the market is now running at the rate of $20 million to $30 million per year, as far as can be estimated. This does not include the volume of equipment which is coming back from lease to major leasing companies, which represents a significant additional amount of equipment.

One consideration that should be kept in mind on the residual values of used equipment is that complete systems, central processors, and peripheral units tend to decrease in price at different rates. The reason for this is that during all three generations of computer equipment (650, 1401, and 360 generations), more users have tended to buy central processors than peripheral units. The reasons most often given for this are the relatively high maintenance cost for peripherals as opposed to cpu's, and anticipated increases in peripheral unit capacity (which often seem not to happen). As a result, during the first few years of the system's life, cpu's, complete systems, and peripheral units tend to sell for about the same percentage of new cost. However, as the life cycle moves on, cpu's decrease in value more rapidly, complete systems are next, and peripheral units hold their values best of all. The reason, actually, is that there is a tremendous demand for peripheral units to complete cpu's made available by people who have purchased only processors. In addition, there is a continual demand for additional peripheral units from companies wishing to upgrade their already installed purchased systems. At this time, using second generation equipment as an example, companies which bought 1401 cpu's have only a worthless box on their hands. Complete 1401 systems can still bring 20% to 30% of their original prices. But those who own peripherals such as card readers, printers, tape units, and disc drives, can obtain from 30% to 50% of the original prices for them, even when these units are seven or eight years old.

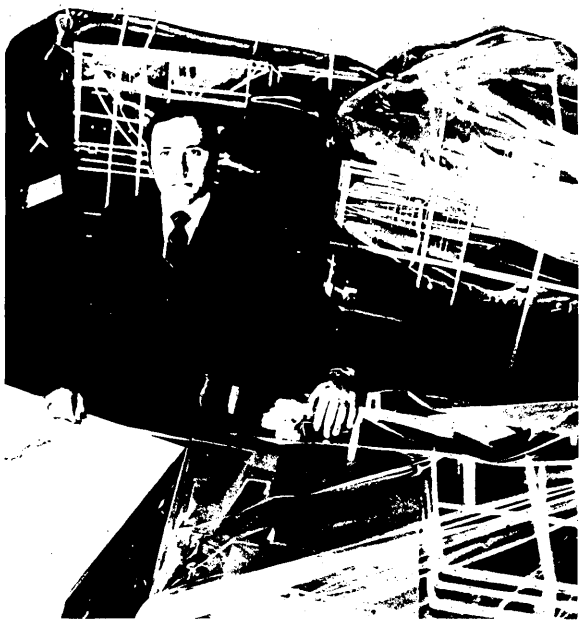
One interesting development over the past couple of years has been the number of companies which are "retrogressing" in their choice of computer equipment. In a typical example, a West Coast company canceled an IBM 360/30, which was being used mainly as a printer for large-scale equipment, and installed a used 1401. As the tape and printer speeds of the 1401 are not substantially different from 360 I/O speeds, equivalent throughput is possible at a small fraction of the 360 cost. The surprising number of programs still being run in emulation on third generation equipment can often be run for a fraction of that cost on purchased second generation machines.

The development of the used computer market is a mixed blessing for manufacturers. On the one hand,

used equipment dealers will often compete with them on particular transactions. On the other hand, the availability of intermediaries to dispose of purchased equipment in a fluid market also opens new opportunities for the manufacturers' salesmen to upgrade customers or to switch them from one manufacturer to another.

Adding to the competitiveness of the used computer market is the position of the leasing companies, who own about $2 billion in 360 equipment. Gradually, equipment is starting to come back from first-user lease and becoming available for re-lease. The majority of this equipment is at the bottom end of the IBM 360 line, as users are generally terminating leases on smaller equipment in order to upgrade. As the leasing companies have a high book value for this equipment, because they depreciate it over a long time scale, they cannot sell it at the open market price without showing a book loss on that equipment. They must therefore re-lease it at competitive rates. Users, of course, will consider these second-user systems as well as those offered for outright sale. However, because of the volume of equipment owned by leasing companies, this field can also be anticipated to become very competitive. Already, the market is weakening slightly on 360/30 central processors, and this can be expected to creep up the 360 line, especially now that the 370 machines have been announced.

It is interesting to look at the future of the used computer market from the point of view of new announcements by IBM and the significant volume of



equipment which is being rented by leasing companies. The effect of the System/3 on the used computer market will be negligible because of the restricted capacity of the new equipment compared to even such older systems as the 1401. However, it is anticipated that System/3 will have a significant impact on the eam market over the next three to four years.

On the other hand, new announcements in the 360/370 line could have a significant effect, both short term and long term, on the used computer market. Since the 370 machines recently announced have significantly higher performance for an equivalent price, this will naturally affect the prices for which used 360 systems will sell. Based on the experience in the market at the time the 360 was announced in 1964, there will probably be, for several months, a slowing-up in the rate at which owners of equipment would sell or purchase used equipment. These owners will be attempting to evaluate their present configurations in light of the new equipment announcements. There will probably be no significant price decrease for used equipment because of the *announcement.* However, when *deliveries* actually begin, the flow of equipment on to the used market may resume at its original level or beyond, and prices gradually start to decrease. It is doubtful that there will be a sudden price break, as supply and demand seem to stay in approximate balance during these stages. The long-term effect will be significantly larger used equipment market as more and more 360 equipment is offered by present owners, and purchased by those who consider it a better value, at a reduced price, than the newly announced equipment

## Effect of "unbundling"

A new and significant factor in the recent "unbundling" announcement by IBM is the decision by IBM to rent software. Thus, in the future, not only will purchasers of used equipment have to compare the prices of *equipment,* new and used, of similar performance, but they also must take into consideration the prices to be paid (or not paid, in the case of older equipment) for the control and application programs required. This will mean analyzing not only the hardware, but also the software; but not only the manufacturers' software for comparable systems, but also that of independent software companies and software brokers. This will substantially complicate the task of data processing management in making a decision of this nature. At the same time, it should also give a significant advantage to those who can most effectively and judicially make this comparison.

It is generally agreed that the IBM announcement and similar ones by other manufacturers will increase total data processing costs significantly because the decrease in equipment purchase and rental prices is probably small for most installatoins compared to the additional prices which must now be paid to lease programs. Most data processing managers will not be able to go to their management and ask for significant budget increases merely because of the IBM announcements. There will, therefore, be pressure on data processing managers to cut data processing costs through third-party leases and the purchase of used equipment to replace equipment rented from IBM. In addition, as users will have to pay for programs whether they are first users or second users, the advantage of the previously "free" IBM services of education, systems engineering, installation, planning, etc., will have disappeared. There would be, then, little or no point in paying extra for these in the form of paying IBM list prices rather than purchasing used equipment. Thus, the "unbundling" will on the one hand help leasing companies because of the increased demand for used equipment, and on the

other hand increase substantially the competitiveness of the used equipment market.

The primary function of a dealer or broker in computer equipment is, of course, to match buyers and sellers in equipment configuration and availability. However, many times this is difficult, because a buyer wants a configuration slightly different from what is available. A dealer may thus inventory equipment in order to be able to reconfigure systems to the particular needs of a buyer. Where necessary, equipment can be reconditioned. In addition, a dealer or broker can also arrange for transportation of equipment, insurance, and installation. Since dealers work on a regular basis with computer manufacturers, it is often easier for them to straighten out technical problems on transferring equipment than it is for many users.

## A package deal

Many dealers will also guarantee that equipment is acceptable for maintenance contract. Some dealers will offer "package" prices, wherein all the above details, which are usually the responsibility of the buyer, will be handled for him. Thus, the user receives much the same service, and in some cases a bit more, than he might if buying similar equipment directly from the manufacturer. Dealers are also much more likely to be able to find buyers for specific items of equipment than can an individual user. At the same time, where a company wishes to sell purchased equipment in order to upgrade, a dealer is often able to give an on-the-spot quote for the purchase of the presently installed equipment.

On the other hand, few dealers or brokers will assist with applications, generally assuming that the buyer is sophisticated enough not to require this assistance.

Many customers ask brokers or dealers to find equipment for them. This is often an effective way of obtaining additional capacity. However, the prospective buyer should, before going out to find equipment, have the appropriate management approval substantially completed. Since a broker or dealer can usually supply the approximate price to be paid for equipment, this should not be so difficult to do. If it is not done, both buyer and broker sometimes find themselves in embarrassing situations because the equipment, having been found, is not approved by top management. Even worse, if the decision-making process takes several weeks, the equipment is often sold to someone else in the meantime. Thus, a firm asking a broker to find equipment should be prepared to complete the transaction quickly if the broker is successful.

Many large companies continually have equipment on order from the manufacturer. Often identical equipment is available from leasing companies or dealers as a used system. Thus, companies which keep their broker or dealer advised of changing requirements can often be told about other equipment which is immediately available at a much lower cost. Sometimes it is also possible to work out leasing arrangements with the present owner of equipment who may wish, for tax reasons, to lease rather than sell outright.

Companies anticipating selling equipment should also consider timing of the sale as being of vital importance. On the one hand, companies anticipating installing new equipment should not offer their installed equipment for sale before they have a firm delivery date for the new equipment and have allowed adequate time for conversion. Buyers are rarely interested in discussing systems for which a firm delivery date has not been established, or for systems for delivery more than six months in advance. On the other hand, sellers should not wait until the last 30 days before delivery, as a forced sale will rarely be to their financial advantage. Thus, it is generally desirable to have between three to six months before the delivery date to consummate a satisfactory sale.

Many users, particularly those who may be on long-term contracts with manufacturers or leasing companies, ask brokers to resell equipment they do not own. Generally, this is very difficult as the purchase prices for such equipment from the manufacturers are quite high. It is not easy to find another user who is willing to take over the remaining portion of the lease at the same price the first user was paying. As a result, companies who are under long-term leases which they wish to get out of must usually reconcile themselves to some type of financial loss.

In the 1970s more and more companies, who have seen their data processing costs grow astronomically in the past decade, will become more cost conscious. As a result, more pressure will be put on data processing managers to eliminate unnecessary facilities, consolidate data processing centers, decrease rental costs, and cut day-to-day operating costs. Since a significant portion of any data processing center's budget is the rental or amortization of equipment, significant gains in cutting costs can be made by obtaining second-user systems from leasing companies or independent brokers. In times of economic stagnation or recession, the used market will prove still more attractive to companies who wish to expand their data processing facilities, but who are unable to keep up with the continuing higher costs.

In the last analysis, the used computer market represents a significant development in the economics of the computer field. Many major corporations have taken advantage of the services of brokers and dealers to realize residual values or save substantial amounts in equipment acquisitions and many more will doubtless do so in the decade ahead. ■

Mr. Heilborn is president of Information Processing Systems, Inc., Englewood Cliffs, N.J., brokers and dealers in edp systems. He was formerly with Ramo-Wooldridge Corp. and Philco Computer Division. He holds a BA in physics from Northwestern University and an MA in physics from Harvard.

**They've worked hard for it, but rapid expansion could soil the image of respectability of the used computer industry**

# Used but Useful?

by F. Barry Nelson, Eastern Editor

While the computer industry has worried about IBM, unbundling, the proliferation of software houses, the time-sharing mess, etc., the used computer industry has quietly grown from an uncertain beginning five to ten years ago. Used computer firms have sprouted up with little publicity, some being one-man organizations, others having nationwide offices, and most of them actually serving user needs while gleaning profits for themselves. Certainly not typical of the computer industry as a whole.

Indeed, the only thing the used computer segment seems to have in common with the rest of the computer industry is that there are many small entrepreneurs, as in the software area. As the president of one used computer firm remarked, the used computer business is free American capitalism carried to an extreme: no trade association, no fixed prices, no licenses, no authorized dealers—just a free market with lots of bargaining. And the "typical" broker is probably "a guy standing in a phone booth with lots of dimes." This reporter found that many presidents answer their own phones.

The used computer industry is subdivided into two segments: brokers and dealers. The brokers act as finders, bringing buyers and sellers together, and possibly tossing in a few peripherals or buying some for stock in order to match requirements, while dealers actually buy equipment for later sale. There are more brokers, probably because it is so much easier to become a broker. Dealers tend to be larger—there are probably no one-man dealerships, though some are small.

## Large and sophisticated

The customers, however, tend to be large, sophisticated users. Most are financially oriented firms, like insurance companies and banks: organizations clever in the use of both computers and dollars. One major insurance company has a large IBM installation completely equipped with used hardware.

Until recently, the used computer industry got little publicity in the press, probably because the firms really didn't need any. The business is often conducted by direct mail, telephone, personal visits, and classified advertising. Prospects are apparently obtained from lists of users secreted away from mainframe firms. Brokers often operate much like the "third market" men who have been enabling large institutional traders to avoid high commissions in securities trading: a simple card file is used to match sellers with buyers. And the broker reaps the commission.

It's a bit more complicated with computers than stocks, of course, because configurations for sale and those wanted for purchase rarely match, forcing brokers to maintain some inventories of peripherals. But most brokers shun ownership of equipment as much as possible; after all, the going price of computers tends to constantly decline.

The dealers—who more often maintain inventories—argue that they are able to get better deals from sellers by actually buying equipment. And in an ideal situation the dealer locates a buyer for the hardware before it is even removed from the seller's installation. Even so, much capital is needed, as the seller must usually be paid before the equipment is removed, whereas the new buyer doesn't normally pay until the system is installed and operating in his facility. This leaves a 30 to 90 day float, requiring short-term financing from banks, finance companies, insurance companies, individuals, or even leasing companies. And that is expensive in today's tight-money economy.

It is difficult to measure the impact the recession has had on the used computer industry. While some investment advisory services tout used computers as being a "recession proof" industry, the used computer firms themselves generally admit to being impacted. But nearly half say the recession has *helped*, by making users more cost conscious and more interested in cheaper, used equipment. At the same time, others claim the recession has hurt business by causing less

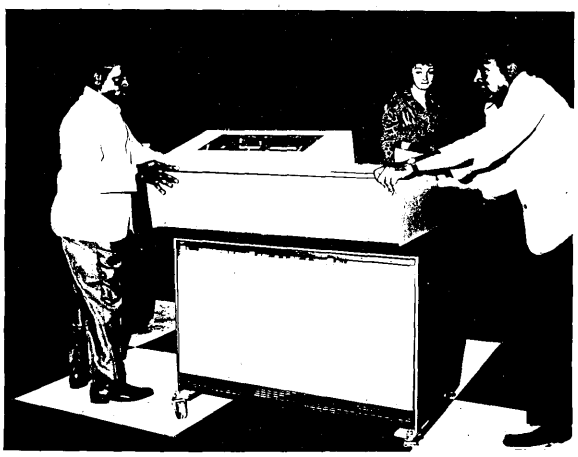
activity: users aren't buying anything, whether it's low-priced or not. The smallest number of used computer men say the recession really hasn't affected them.

The used computer business is almost entirely confined to IBM machines. Reasons for this range from the great percentage of IBM computers in user hands to charges that other mainframe manufacturers deliberately depress the used computer market by discriminating against subsequent users. An IBM consent decree requires the firm to support the used equipment market. And, of course, the many former IBM employees now selling used hardware naturally feel at home with IBM equipment.

One thing most brokers and dealers agree upon is that unbundling has helped. Now all users are on an equal basis as far as costs are concerned, and they are also aware of what their separate hardware costs are. It's easier for the used computer salesmen to present comparisons. The impact of new product announcements on used computer sales is minimal, however; it isn't felt until the equipment is actually being delivered. Nevertheless, The Computer Exchange, Inc., New York, is now advertising for users to "Place Your Order Now for a Used IBM 370." Delivery won't be for two years, however, and no discount has been established.

Discounts on used machines vary widely according to demand. Summit Computer Corp., Summit, N.J., estimates that an IBM 7074 which sold for $950K new is worth about $75K at today's retail market. System/360 Model 30s go for about 45-50% discount, and 360/65s sell for nearly 80% of new price. The manufacturer's *current* price, of course, is more relevant than the original price paid for the equipment. This is significant for those selling used minicomputers, whose prices have lately been reduced substantially in several cases. Still, it's generally a seller's market, with perhaps four potential buyers for each machine available for sale.

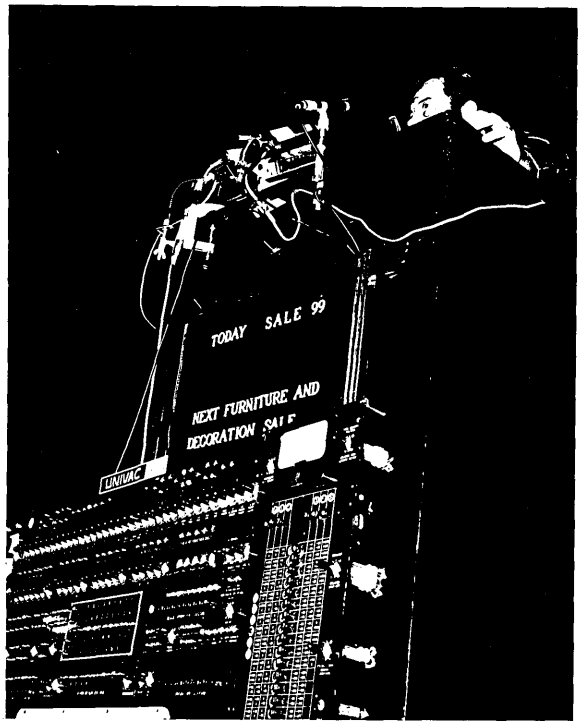
And it's always easy to undersell IBM, since their



equipment is always "new"—even if it is actually refurbished hardware returned from rental or for trade-in—and, hence, the prices never decline. But used computer firms have to be careful that they also undersell low-priced compatible peripherals.

Bargains are such in second generation equipment that many buyers are sold on the basis of "de-emulation." Say a user has a 360/65 that runs some 7074 programs in emulation mode. That may have seemed cost-effective when he got the /65, but now he may save by buying a dirt cheap 7074, de-emulating the old programs, and freeing some additional work space on the /65. Although newer equipment is more efficient, the actual cost:performance ratio for used hardware improves as prices drop.

A first-time computer user almost never buys a used computer, mostly because it's too difficult for used




computer firms to handle such unsophisticated buyers. Dallas-headquartered Business Computers Inc. did once sell to a first-time user—the Dallas Stock Exchange—but that was a few years ago, and president Jim Gehling says the used computer market is good enough today so that they wouldn't want to spend that much time again. Easier sales are readily available.

## How to relate to customers

But even when dealing with computer sophisticates, a big problem in the used computer business is how to relate to potential customers. Users just aren't familiar with buying or selling used computers. Most are conditioned to the idea of renting equipment, or at least buying it with the expectation of later trading it in to the manufacturer for little more than scrap value. And the used computer firms may appear a bit shady—many are new on the scene, and often operate in shabby quarters or even out of private homes.

Conscious of their doubtful image, some used computer people objected to the promotional tactic of the American Used Computer Corp., Boston, at the SJCC: the firm's president, Adolf F. ("Sonny") Monosson, paraded along the boardwalk with a sandwich board promoting his wares (see July 15, pp. 73, 75). He did get a lot of publicity, however. Monosson himself objected to the recent computer auction, sponsored by Time Brokers, Inc., New York, on the

grounds that the auction—the first of its kind and generally conceded to be a failure—tended to degrade the used computer business. And he said that *before* the auction. Again, it got plentiful publicity, with coverage by everything from the computer press to national television.

Strangely, hardly anyone but Time Brokers and the Parke-Bernet Galleries seemed to think the auction would work, and few were surprised by its failure. Sales of about a million dollars were expected, but only $269K was attained—and that included equipment bid back by the house because it did not reach the seller's minimum price in the legitimate bidding.

The bidders were mostly dealers, and no large systems were sold. The highest sale was a 360/20 from I.O.A. Data Corp., once valued at $117,165, which went for $52K. But this turned out to be a house bid, made under a "reserve price" arrangement whereby the seller refuses to sell below a specified minimum even though bids may open below that price. A house bidder bids against legitimate bidders

in an effort to reach the reserve level. In this case, it was apparently impossible. The highest legitimate bid was $50K, which left I.O.A. with a $1,250 bill to Parke-Bernet: the gallery collects 2½% commission on the highest legitimate bid below the reserve price.

Immediately following the Time Brokers auction, Standard Prudential Corp. announced that its New York Auction Co. subsidiary, which has engaged in fur auctions since 1916, would convert to computer auctions on a full-time basis! Auctions will probably begin in the fall. Standard Prudential argues that the Time Brokers auction failed because of the odd-ball equipment presented for sale—such as five Control Data LGP-30 systems—and the fact it was a one-shot affair, with no assurance additional auctions would be held. Notably, Standard Prudential will emphasize peripherals, which should lend themselves more to auction sale. The firm will also publish used hardware price statistics, in hopes of creating a counterpart of the auto industry's "blue book" of used car prices.

A Parke-Bernet spokesman blamed the failure on the lack of auction sophistication on the part of bidders. Used computer people blamed it on such factors as the difficulty of selling computers to end users without reconfiguring the systems, and the futility of dealers trying to sell to other dealers and brokers. Most bidders probably could have settled matters on the telephone with a lot less trouble.

Some of the most spirited bidding was for 026 keypunches, which went for about $800-1000. A Univac I control panel, offered at $50, went for $110, while a giant Univac Solid State 80 system sold at $325. A large-scale Univac 1107 offered at $50K drew no bids, nor did an IBM 7094 offered at $15K—the latter once valued at $2,309,405!

## A rosy future beckons

For the future, used computer firms look to vast growth as users become more sophisticated and more aware of edp costs. Many also eye the overseas market. EBM Electronic Business Machines, Staten Island, N.Y., has dealt with European brokers to export American hardware, for example, and Business Computers Inc. has shipped computers to dealers in Southeast Asia. Others have exported to South America.

The export business should be a natural for American used computers in that the rest of the world tends to lag a few years behind American technology. And Europeans, at least, tend to be more conservative and to hang on to equipment which works well, even when more efficient machines are available. Such is the case with the French national railway, which still has some of the American steam locomotives it purchased nearly new in the early fifties when our roads moved completely into the diesel generation. Those old engines aren't as efficient, but they still do the job.

But as the used computer business increases, the problem of credibility may be intensified by a proliferation of one-man shops whose dependability and longevity are subject to doubt. Business Computers Inc. makes a point of maintaining a "professional" stance by having fine offices in downtown areas and salesmen who dress to IBM standards. Indeed, BCI has a lot of former IBM personnel, which must help. Throughout the used computer industry, most persons are former computer salesmen. One company president, a former Univac marketing man, won't handle anything but IBM equipment because he feels IBM is so much better at supporting the used equipment market.

IBM may have done much to sanctify the used computer industry by its recent opening of Purchased Equipment Service Centers (Aug. 15, p. 83) for the refurbishing of used machines. Previously, a used computer firm could only turn to an independent maintenance firm for major overhauls outside user locations. The most any used computer company does itself is "cosmetic" repairs, such as new paint.

As yet there are not too many used computer firms, and there seem to be profits for the sellers and advantages for the users. But brokerages could multiply quickly and irresponsibly—all you need is a phone. So far, this is the sort of business the computer industry can be proud of; hopefully, it will continue this way. ■

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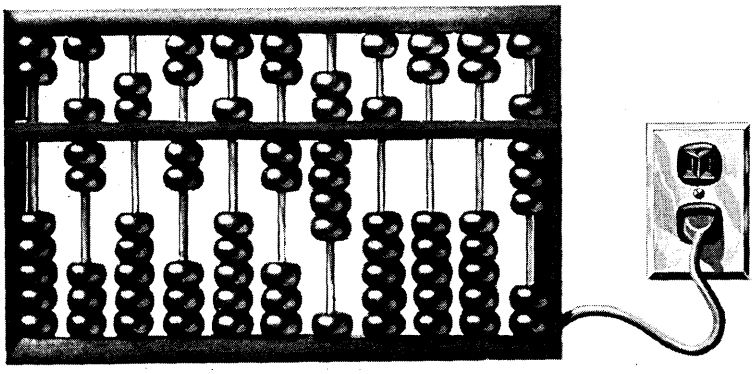

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# PERSPECTIVE

## an interpretive review of significant developments

## RCA's New Line: Just Enough to Check Migration To 370?

RCA is racing down IBM's road again, trying to intercept the System/360 users migrating to the 370.

Just days ago, RCA announced four models in its new line, simply designated the RCA 2, 3, 6, and 7, and aimed at memory-bound users of the 360/30, 40, and 50. While RCA claims a banner year for Spectra systems (three to four times the new accounts in '69, two times the shipments, 30% above sales quota), it says it really has been competitive only with 40% of IBM's installed revenue base. The new line attacks 55% of that base. Further, RCA dreamily eyes 17,000 System/360, Spectra and other user prospects.

Designers are just as disappointed with RCA's new efforts as they are with the 370. They had hoped for what the internal reports promised over a year ago — stack architecture, a new addressing scheme, a superset of a current instruction set, etc.

Hopefuls think both firms may have the "Utopian" system under wraps, to come out in evolutionary bits and pieces. For now, RCA is directly responding to IBM and is happy that its big brother announced relatively minimal innovations (except for the 3330 disc drive), compatibility, and no communications gear. RCA can, like IBM, stress reliability, unexcitably better price/performance, proven technology — but then one-up them with a new marketing strategy.

### Braving the elements

These are among the major elements of that Sept. 15 debut:

1. Again RCA emulates the 360, and, effectively, the current 370 software. It has the same instruction set, but not the new instructions added in the 370. (It also emulates second-generation RCA and IBM equipment.) But this time RCA is offering 360 users, for a price, a guarantee of conversion on one of two levels: by a specified date or by a date and at an agreed-upon performance.

2. Besides the guarantee, RCA, as on its 45, 60, and 61, offers full bundling or unbundling of systems engineering services at 3% off rental. A six-year contract is also available at 12-15% off rental, and ownership at contract end. Educational discounts are at 33%.

3. The model 2 is aimed in price and power between 360/30s to medium-sized 40s at the low end, and the 370/145, not yet announced at this writing. It may be directly competitive with the upcoming 135. The 3 is a virtual memory version aimed at the same market, but higher priced. The 6 and its virtual memory counterpart, the 7, fall between big 40s and 50s on one side, and the 370/155. In other words, the line offers alternatives to the 370, while it wipes out the Spectra 70/35 and 45.

4. Recognizing that half of all third-generation machines are memory-bound, the 2 and 3 have real memory of up to 512K bytes vs. the 30's 65K and the 40's 128K. The 6 and 7 climb to two megabytes vs. the 50's 512K. Word has it the 145 will go only to 512K, too, discouraging 50 users from that short step to the 145 but not from "controlled migration" to the 155.

5. The 3 is the first virtual machine (up to two megabytes) in the $20K price range for a typical configuration; the 7 offers eight megabytes of virtual memory, and the typical price is $36-37K. IBM has not, but is expected, to announce virtual machines in the 370 line.

6. Standard and manually switchable memory modules are used so that any processors, say the 6 and 2, can share use of several modules.

7. Feeling competitors are left in the dust without the 3330 disc drive, RCA is supporting this drive, and has placed a big order for them with IBM. 360s under the 85 do not support it.

8. RCA is particularly after the cpu portion of IBM communications-based installations and is offering a front-end processor, the 8660, which is based on the installed RCA 1600 and interfaces to several IBM communications processors like the 2701/2703, and terminals like the 2780, plus the Burroughs TC500 terminal.

9. The peripherals include a 1600-lpm printer, 160-320 KB tape drive, and video consoles for the whole line.

10. Deliveries begin in the third quarter of '71, and RCA says the new line will account for most of its shipments in 1971.

### Selling them

The marketing strategy is the most important feature and will have "longer range implications than the line itself," says L. E. Donegan, vp and general manager of the Computer Systems Div. (Ex-IBMer Donegan, by the way, is the man Robert Sarnoff is heavily relying on to jack up RCA's position in this industry.) RCA is putting itself on the line by offering a fixed-price guarantee and hoping it will be the frosting on its bundled creation. The intent is to battle the psychological resistance to non-IBM equipment among decision-making top management. In plainer terms, managers often fear loss of job or face if non-IBM gear collapses, but not when the "dependable" IBM falters.

Essentially, the guarantee says the user pays no rental until conversion is complete, and penalty clauses can be negotiated. This hits at IBM's separate pricing, particularly since it will be more heavily reflected in the evolutionary move to and through the 370. IBM's standard contracts provide no date or performance commitments, and once a program or systems engineer is working, the fees are in effect. RCA says its 360-to-Spectra 70 conversions have helped it specify requirements. Some big questions must be raised on emulating program products like IBM's PL/I, the linear programming MPS, etc. RCA says it has ANSI COBOL and its own versions of products like GPSS.

How does RCA mesh with its target prospects? While exact pricing of the RCA line was not available at writing, the following charts will provide some idea of how the IBM and RCA systems compare. Note that all "power" figures are based on a typical IBM mix of instructions and job execution tests and use the Model 50

as a base of 1.0. The 135 and 145 figures are reported by outside sources, not IBM. If a 256K-byte Mod 50 user wants to upgrade, these are his options:

| | Model | Power | Price/Mo. (in K's) |
|---|---|---|---|
| 256K | 360/50 | 1.0 | $14.1 |
| 512K | 360/50 | 1.0 | 19.3 |
| 512K | 370/155 | 3.5 | 21.5 |
| 512K | RCA 6 | 2.1 | 16.4 |
| 512K | RCA 7 | 1.9 | 17.6 |
| 512K | 370/145 | 1.4-1.9 | 18.0 |

A 360/30 user at the 65K maximum has the following options:

| | Model | Power | Price/Mo. |
|---|---|---|---|
| 65K | 360/30 | .26 | $4000 |
| 131K | 360/40 | .45 | 6500 |
| 131K | 370/135 | .70 | 5200 |
| 131K | 370/145 | 1.90 | 7900 |
| 131K | RCA 2 | .69 | 5900 |
| 131K | RCA 3 | .55 | 9400 |

### Fond memories

The virtual machines are the most interesting feature to the computer professional. RCA has learned many lessons on the Spectra 46 and 61 systems, not originally heralded as elegant accomplishments, although RCA is now happy with their sales. The TSOS operating system has been a near flop in the past, but RCA says that version 6, released Aug. 15 six months late, is the "finest virtual memory software available today." It is operating within 5-7% of original specifications, and reports say it will handle 30 terminals with six concurrent background jobs at a response time of under five seconds. TSOS will be superseded for the new line by the Virtual Memory Operating System, whose delivery will be concurrent with the third quarter '71 delivery of the first machines. Regular memory machines will, of course, be using Spectra's OS-70, which will also operate under VMOS.

In summary, RCA offers virtual machines at a low price and a promised on-time semi-proven VMOS, 3330 support, emulation, and of course, the guarantee. And it plays the old "price and configure the machine in between" trick.

Among questions the user probably will ask are: When I reach the top of the RCA line, will there be somewhere to go? Is conversion worth saving a few thousand a month, plus receiving free support services through system life? Will it be impossible to go back to the big 370s later, especially since IBM will be making constant changes in its software? Does the promise of virtual machines from IBM deflate the RCA impact? What if the 512K 145 also has several virtual megabytes? Will RCA match, surpass, or continue to buy and support IBM peripherals?

RCA's iceberg is about as big and deep as IBM's, relatively speaking, so the industry will analyze and wait again. But credit RCA with trying. It says it'll have the second largest sales/support force (2,000) by year end, and it continues to beef up software operations up there in Marlborough, Mass., rumored to become the new headquarters of the computer division. Unemployed take note.

**—Angeline Pantages**

## Proxmire Says Electronic Battlefield is Big Boondoggle, Imperils Privacy

A big fight has erupted in the Senate over the "electronic battlefield," a computerized system for detecting, evaluating, and zapping enemy forces.

Sen. William Proxmire says the electronic battlefield won't work, will be fantastically expensive, poses a threat to civilian privacy, and exemplifies — in flagrant form — the military's ability to spend vast sums without first asking Congress.

Bunker-Ramo, CDC, Litton Industries, RCA, and IBM are immersed in developing computer hardware/software for the "Integrated Battlefield Control System (IBCS)," the military designation for what Proxmire refers to as the "electronic battlefield." Essentially, there are three IBCS computer configurations. One, known as TOS (Tactical Operations System), will be installed in IBCS command centers. The other two are TACFIRE (Tactical Fire Control System) and $CS_3$ (Combat Service Support System); they'll provide specialized support to TOS. The overall IBCS plan also calls for linking TOS to Navy, Marine, and Air Force command centers, and to the National Military Command Center in the Pentagon.

Several dp system firms are researching and/or building highly sophisticated crt displays, communication links, and sensors for use in the IBCS system. These sensors, which are meant to operate on land, sea, and in the air, as well as underground, will provide some of the input to TOS; the rest will come from relatively conventional devices — typically, handheld, key-actuated terminals linked to the command center by radio or wire, and operated by forward patrols.

The sensors — unattended, automatic, and capable of being polled from remote locations — are the target of a vast r&d effort. Some utilize lasers, others infrared energy, heat, sound, and the vastly amplified reflection of starlight or moonlight from targets. The basic idea, according to Leonard Sullivan, Deputy Director of Defense Research & Engineering for Southeast Asia, is to "locate and track anything that perspires, breathes, broadcasts, makes a noise, shakes the ground, runs an engine, shoots a weapon, or is hotter or colder than its surroundings."

### Sensors censured

Sensors have already been used to a limited extent in Vietnam. Proxmire has letters from two Army officers recently connected with that activity who say the devices are ineffective. One officer suggests that their shortcomings have been covered up on purpose.

Present computer technology is also inadequate, according to Brig. Gen. Wilson R. Reed, head of the Army's Computer Systems Command; his organization is technical manager for TOS, TACFIRE, and $CS_3$. In a recent speech to an industry group, which hasn't been generally released, Reed said that Army tactical operations centers now use only about 30% of the information they receive. Calling this "a sorry situation when the fate of the nation may be in-

volved," Reed said the tactical operation center's performance must improve greatly before it can run the electronic battlefield. "We must develop the direct sensor/computer interface so that all information can be assimilated rapidly, and a computer-developed course of action can be proposed and displayed for command decision. (Also) we must come to accept the validity of our electronic sensor outputs and act upon them as readily as we accept and act upon those of our human senses."

Reed suggested the size of the technological gap that must be bridged when he talked about communication requirements of the electronic battlefield and compared them to present characteristics of Army tactical systems. Bit rates, for example, which presently range up to 2400 bps in Army tactical communications systems, will have to be increased to 38.4K bps, possibly higher, said Reed. Todays diverse transmission codes will have to be superseded by ASCII; analog manual switching will have to be replaced by digital automatic, frequency division multiplexing by time division multiplexing, analog transmission by digital, and today's largely non-existent error controls by a "stringent inherent forward error control system" delivering accuracies of 1 x $10^5$ or 1 x $10^6$.

### 10 years away

Reed and other top military officers who talk about IBCS envision it as a 10-year development effort, so maybe DOD has allowed enough time for these technological advances to break through. But the computers that will be running the show apparently are going to be based largely or completely on obsolescent technology.

A prototype of TOS — the IBCS command center computer system — was nearly ready to be shipped by Litton Industries, from its plant in Van Nuys, Calif., as we went to press. This system, composed of components that will also support TACFIRE, was headed for Ft. Hood, Texas, where it will be integrated into Project MASSTER, the test bed for the sensor portion of the electronic battlefield project. A prototype CS3 configuration (a 360/40) is already installed at Ft. Hood.

Proxmire, quoting a "hard DOD estimate," says $1.7 billion has been spent on the sensor surveillance program so far. But this amount probably doesn't include expenditures for TOS, TACFIRE, and $CS_3$, and the other IBCS-related computer systems, because they're separately funded.

Ultimate cost of the electronic battlefield will be $20 billion, adds Proxmire, quoting trade sources. Presumably, this includes computers. He points out that $20 billion is twice the currently estimated price tag for the ABM system.

### Army regroups

Possibly as a result of Proxmire's attack, the Army — which has the largest piece of IBCS — is reportedly thinking of reorganizing management of the project. Right now, there is an office at the Chief of Staff level for the sensor portion; it's called STANO (Surveillance, Target Acquisition, and Night Observation). The computer elements are managed at the Army Chief of Staff level through a Directorate for Management Information Systems. "One alternative," we were told, "is to replace the STANO management with a new organization that would have responsibility for all elements of IBCS."

Largely because of Proxmire's nagging on the Senate floor, John Stennis, chairman of the Senate Armed Services Committee, has agreed to hold hearings on IBCS, probably next month. Stennis' concern is limited to the "worthiness" of the system. Proxmire is worried about much more — particularly the project's cost effectiveness, the future need for a system apparently designed solely for the peculiarities of combat in Asian jungles, and the threat to civilian liberties. He'll have to work on the committee indirectly, since he isn't a member. Sen. Stuart Symington, who shares Proxmire's concern, *is* a member, but the vast majority of the committee sides with Stennis.

Proxmire has also announced that he will ask GAO to make a comprehensive study of IBCS.

He believes the system poses a privacy threat because DOD plans to make the technology available for "civilian or other military purposes," and the Justice Dept. has already announced that it intends to exploit sensor technology.

"Clearly, there is an immediate need for some minimal restrictions on the use and distribution of these sensors," Proxmire said on the Senate floor recently. "We cannot allow the Defense Department to provide these devices to domestic police forces without any controls whatsoever. The potential for abuse is too great."

Support for IBCS, even within the Services, is apparently far from monolithic. While a few officers question its cost effectiveness, at least one other — Col. Mark M. Boatner III — implies IBCS requires too many nursemaids, despite its aura of automation and efficiency.

Boatner recently retired as chief of the concepts and doctrine division in the office of the Assistant Chief of Staff for Force Development. Writing in the August issue of *Army Magazine,* he said " . . . field headquarters have become so fat with the people needed to man these new electronic wonders and so heavy with equipment that they are practically immobilized. Command and communications troops account for almost 20% of the total strength of the division. Additional capability of military communications systems becomes overloaded as fast as it is created."

**— Phil Hirsch**

## GE Announces, Commits, Philosophizes on New Network

General Electric is now "two years ahead" of competition in network services development. GE is not trying to fatten the time-sharing calf, just to sell it. "Our operation is the industry leader. There is no need to merge to become the leader, is there?" smiled Arthur Peltosalo, vp/gm of the Information Services Div.

These were among the major claims of the Network Service announcement made by GE last month.

It was the second stage of the master pronouncements on the ISD master plan. In June of '69, GE talked of consolidating its centers and of providing a network that would permit a customer to access his data base or file in GE's Cleveland center from anywhere in the country. Last month it was stated that consolidation of 15 local centers into three supercenters — Los Angeles, Teaneck, and Cleveland — would be complete by year end and that each big center would have numerous big GE-635 systems (Mark II-AX). And by first quarter of '71, these centers will be linked by high-speed lines to one another. The end result will mean access from over 200 cities to any system or service in the network through a local or short-distance call.

There are many facets and implications of such a system — and many questions yet to be answered. The most impressive factor is its imminence, especially in a period of financial torment and broken promises in the time-sharing industry.

GE ought to be ahead, in view of its five-year, first-one-there history and a corporate investment of a guesstimated $200-plus million in equipment and manpower.

### Soak it to 'em

GE has taken a financial bath in the last few years, in part because of competitive pressures and markets that didn't meet expectations. But also it was investing in its answers to the "buzz" rules for big company survival in time-sharing, like uniqueness, broad range of services, specialization, and "get there first."

The Cleveland site now has five GE-635s, each with disc and drum files totaling 150 million characters. Each is front-ended by a GE-4020 linked to eight remote concentrators in Cleveland, six other U.S. cities, and London. The concentrators are linked directly to users in those cities and to 35 more cities via Diginet 152 multiplexors. The other centers will have "similar" configurations.

With the network in place, ISD says it will have the kind of stability that will accommodate any changes of equipment in the centers without impact, and with very little upheaval if and when another supercenter is needed. In fact, GE's very anxious to obliterate awareness of the specific centers and boxes, claiming the network is a single system, or "omnipresent," as one spokesman called it. (It also leads to the thought ISD won't always be bound to Honeywell-GE systems.)

GE claims that the deployment and technological concepts of the net will provide the "most reliable, available service in the industry." Concentrators are emphasized for their store-and-forward ability, improving reliability, and cutting transmission time. Multiple processors in each center provide backup for cpu failures.

GE's top technical manager, George Feeney, characterizes the stages of the pressure toward the network concept as 1) improving user productivity, where the engineer, financial analyst, etc., uses the system for his problem solving; 2) improvement of information logistics — the rapid dissemination of data within a multilocation company; and 3) scale economics, meaning the cost of each work unit is cut by going to and possibly sharing a bigger system. GE and the rest of the industry have been in stage one for the last five years, and Feeney sees stage two as the next five years' major market.

The GE quadrumvirate — Peltosalo, Paul Sage (deputy manager), Feeney, and Paul Leadley (marketing and business development manager — claim success with stage two in the past year based on tests with 100 selected customers who used the Cleveland network service. Of course no figures were given, so success can't be substantiated, but the following are applications: order entry, inventory control, tour reservations booking, central program storage, financial modeling, and personnel search. A plotter company used the service to do on-line sales demonstrations of its system. A heat transfer equipment firm used it to do in-the-field equipment and price configuring. In some instances, the partnership concept was practiced. The user would transmit his files tape-to-tape in the morning to GE, which provided remote access, and in the evening the file was retransmitted to the customer's batch system for report generation and other tasks.

This partnership, says Feeney, is the interim step toward "scale economics," when users will begin to eliminate their in-house systems in favor of sharing the large networks. That idea is a long way off, he says, in part because of the politics involved.

### Software factor

It has a lot to do with the software involved as well. As Feeney was quick to admit, GE cannot and does not intend to provide all industries with the same kinds of packages it has to its current four sectors. It requires a huge investment often put at $500,000 and up. And it will take a long time to provide more than file space and accessability to its "interprocessing" customers, since data base management is still very much in its infancy.

Thus, GE has made its announcement and its commitment. Comments from Peltosalo indicate that both he and General Electric corporate management are happy with the progress. "Sales are up," in a down market. No comment was made on when the next profitable year would be although sources say GE projects 1972.

As to current management in ISD, troubleshooter Peltosalo, who came from the International Information Systems Div. where he was credited with turning around a losing operation, notes that "if I wasn't happy with the people I would have brought others into the organization."

As for the GE overseas computer affiliates that have gone over to the newly forming Honeywell-GE company, Peltosalo cautiously pointed out that the international time-sharing centers are licensees of ISD and that the relationship has been a "successful one" in the past. Presumably, this will mean continued effort to link overseas systems into the network. GE has been testing satellite transmission from London for the past year.

Where does this leave competition for network services? Numerous firms are working on "supercenters," like Service Bureau Corp. and Tymshare, and on multiple regional centers, like Computer Sciences. GE is happy, in fact, that SBC has chosen to go the same route, a blessing on the GE approach, but won't comment on the prospective power that IBM may put behind it or how long GE can stay "two years ahead." The key to it all, after all, is massive and sustained funding.

**— A. P.**

**The past, present, and future potential of optical mark reading are carefully described**

# Mark Reading

by J. Bauldreay

In many people's minds mark sensing and optical mark reading (OMR) are synonymous. However, the physical differences between the two do lead to considerable differences in ease, breadth, and effectiveness of application.

True mark sensing involves the use of electrical brushes spaced apart by the width of a mark. They sense the presence of a pencil mark provided it is as long as this spacing, and providing it is of low electrical resistance. This means that very soft pencils must be used and that the marks be carefully made. If these two conditions are met then there is little risk of missing a mark; i.e., errors of omission are avoided. By the same token, however, one has outlawed preprinted marks, credit card imprinted marks, computer output print marks, marks which are hurriedly made with soft pencils, or marks carefully made with harder pencils. Thus, there is very little overlap between mark sensing and today's computer world. Mark sensing belongs to the limited data handling concepts of the tabulators and sorters, and as such may be regarded as obsolescent.

Those of you who went through the tube-to-transistor phase will remember that it was a long while before transistors were fully exploited. For some considerable time they were just treated as smaller, cooler tubes, while their inherent characteristics were ignored. Transistor circuits were generally more reliable than their tube equivalents, but they had the same black box characteristics. The same situation arose when peripheral designers awoke to the solid-state photocell, which was more reliable than any early photosensing device. They then used it as a one for one replacement for brush contacts. Without considering the new degrees of freedom that might be open to them, they then came up with optical mark readers (and card readers) that had almost the same functional or user specification as the old brush sensing machines had. The old machines had had crude formats, were not very reliable, demanded strict application discipline; and so the new versions slavishly copied these aspects. Oddly enough, the customers did not complain. After all, "everybody knew that mark sensing (reading) was crude, always had been, always will be." Thus, both designers and users talked themselves into this acceptance of mediocrity. Mark sensing (reading) was good for meter reading (well better than other schemes), and with the disciplines of examination halls was good for educational testing —period!

Now while it was excusable for the early solid-state photocell machines to copy their forerunners, there is little excuse for this to be perpetuated—and yet this

has happened and continues to happen. For instance, the reliability and performance of optical reading machines are directly influenced by the photocells, the lens (or light guides), and the light source(s). Thus, it is of doubtful virtue to have third-generation engineering in the photocell area but poor first-generation engineering for the light source area, especially since lamps are notoriously the source of so much trouble in all peripheral equipments. Again, since the old mark sensing machines were upset by creases or folds in the card, too many OMR designers have assumed that creases must be outlawed. However, by using two photocells at 90° and by summing their output, creases cause no bother, and any marks crossing a crease line are totally unaffected in their signals.

Armed with these first-generation solid-state OMR devices, a few adventurous people did try to push the application boundaries of this new tool, but not unnaturally found that their rigidity and their unreliability were prohibitive — back to the meter reading and the educational testing! Unfortunately, in too many people's eyes that is the OMR scene today, and the blame for this must largely rest with these crude design practices. Yet OMR is now beginning to show that it is *not* synonymous with rigidity of format, tight organization and methods (O&M) disciplines, unreliability, etc. It stands alongside OCR, particularly HNR (handwritten numeral recognition), being sometimes competitive with it, sometimes complementary.

## The first of the new readers

The reasons for this changed OMR picture arise from hardware users or potential users taking a hand in machine specifications. The first such user was the Lyons Co. of London, who set up a group to make computers and peripherals for the Lyons Co.'s own usage in its chain of teashops, bakeries, etc., with all the consequent ordering, production, and distribution problems. This group was more than usually user orientated, and came up with what we would now call a mark page reader. Luckily they had no preconceived notions of unreliability, and few of format; for one thing they felt that the reader should be compatible with output printers, since it would be used in a turnaround role. The Lyons Co. had no meters to read and was not intending to check on its waitresses' educational level.

The machine that they evolved was called Lector, about 50 of which were sold in the United Kingdom.

The second user influence was exerted by Dr. Bijleveld of the Dutch Giro in his 77-page booklet "The Automatic Reading of Digits."[1] Effectively he spelled out all the snags of mark reading, constrained handprinting, mark sensing, portapunching cards, etc., and laid down a set of ideals. This report was read by a design team in International Computers Ltd., which had essentially been given the task of designing a better engineered, more powerful, and wider document range version of Lector. This they had done. Initially, the team only saw the Bijleveld findings as being statements of the obvious, or as idealistic; but on greater study they realized that mark reading was being held back by little more than their own unconscious logical inhibitions.

One of the novelties of Lector had been that, whereas the mark sensing machines operating in a binary mode (because their outputs were holes/no holes), Lector had a ternary operation. It acknowledged that some marks would be borderline, and so it set a no man's land between good marks and no marks. If a signal was picked up in this no man's land then the document was rejected for the operator's inspection. Depending upon the application the data could then be corrected by erasure, by better pencilling, or by total rejection to keypunching. By this means, errors of omission (marks missed) and errors of addition (doodles or paper blemishes picked up as marks) were avoided. The ICL design team had adopted this ternary concept as being a good fail safe procedure. However, as with Lector, they had decided to output data in binary; but while Lector outputted to paper tape, the ICL machine was on-line to what is now known as the ICL 1900 series.

## Color me red

The conceptual breakthrough following the reading of Bijleveld's book was that one only had to realize that third-generation computers were quite able to handle ternary data, and that borderline (no man's land) marks could just as readily be examined in context by program as by an operator—but without lowering throughput or losing sequence. This meant further that one need no longer be obsessed by perfectly made sharp pencil marks, etc. Possibly more importantly, however, it meant that one could *deliberately* make borderline marks, provided that the computer program knew where they were. Thus, if dark blue printing was going to lessen the chances of a form being misunderstood and incorrectly filled in by untrained personnel, then the form designer should be able to have dark blue printing where he wanted it. He should not have to change the dark blue to a pastel blue or pastel red, just because a simple-minded reading machine would be confused. By changing to a ternary interface the 1900 computer would receive a complete image of the document, and its program would be perfectly capable of editing out the interfering background matter whether it gave good or borderline signals. The interface is binary, but is made pseudo-ternary by the use of a pair of binary signals.

Bijleveld's ideals could be essentially narrowed down to the following (obvious?) truths:

1. A flexible format will allow documents to be designed to be less ambiguous to the person(s) marking a document, and to those later reading it or checking it. Thus, marks will more often be in the right place.
2. A poor mark in the right place is infinitely better than a good mark in the wrong place.

Everybody who has ever run one of the old mark sensing machines, or the transitional concept OMR device, will tell you that human errors are the biggest over-all system error factor; yet, very largely this human error has been induced by poor machine design leading to poor document designs. Unfortunately, too much emphasis has been, and continues to be, focussed on sharp pencils, high precision form printing, paper cleanliness, etc., even though these are

1. Published by the Netherlands Automatic Information Processing Research Centre, 6 Stadhouderskade, Amsterdam, Holland.

usually secondary in their error contribution.

Incidentally, the design team also found that by studying forms industry printing procedures, they could take much of the terror out of form printing. Complementary to this, instead of imposing tight tolerances on the millions of documents that a machine might read, they imposed those tolerances on the reading machine. Tolerances of 0.002″ are virtually unobtainable on documents, but relatively easy for a competent engineering company.

All of the above improvements—marks being examined in context (i.e., data being checked and corrected by a program rather than by a consortium of plugboards, machine operators, "best out of five" hardware, etc.), format as flexible as a program would allow, printing tolerances achievable by ordinary printing houses, and many others—all led to the emergence of the ICL 8301 mark reader.

However, the 8301 has further application strong points due to the document transport that it is mounted on. This was unfortunately christened the Universal Document Transport (UDT), which led the ever hopeful brigade to believe that it would be a kind of edp man's garbage handler. This it is not; but it is nevertheless one of the most application flexible transports in existence. This means that with few exceptions the application power of the 8301 is not constrained by its document handler. This in turn is no accident since the reader and its transport were deliberately designed as a complementary pair, which was ensured by there being one over-all project group leader responsible for both design teams.

## Applications of OMR

Having laid the foundations in the previous sections, it is now meaningful to discuss examples of applications that the 8301 can tackle that are (1) well beyond mark sensed cards, (2) comparable with HNR, or (3) just different from HNR.

1. Readers, like Lector, 8301, and the Scanak, are well beyond the data capture limits of mark sensed cards because of their ability to read marks made by letterpress, litho output printers, and plastic cards, as well as by hand. Thus one can capture a document type number (in letterpress or litho), a document serial number (in letterpress bars), a customer identity (by output printer), and, say, a stock item (by plastic bar-marked card—Addressograph Multigraph or Farrington). In all these instances, the bar-coded information can be duplicated by character printing if need be. The bars, hand made marks, etc., can be taken from, for example, the bottom copy of a two part set. At least one Lector is used commercially reading the worst of the above elements in the dirty environment of a tire distribution company. Turnaround systems using 1,350 lines per minute computer printer bars are also used commercially in 8301 and Lector installations. The tire forms are quite large, while the turnaround applications use documents in the 6″ x 4″ category. But since the 8301 operator can quickly change from one size to another, one does not need to shoehorn all applications into the one size—as with most of the transitional readers.

The system designer who wants to create a turnaround document using a computer output printer can decide to create marks in one of two ways. He can either print minus signs (−) or figure one's (1). Which of these he chooses depends upon a variety of factors; but since the 8301 expects its marks to look like minus signs when read, then, between printing and reading, a 90° document rotation must take place if one's printing has been chosen.

During ICL quality assurance tests, minus signs and one's were printed down to a much fainter level than would ever be normal, and the reader was picking up roughly 1 in 500 as borderline. The binary readers are so fearful of picking up extraneous marks that they set their thresholds high, and so miss faint pencil marks and most ballpoint marks. The 8301 does not work as well with some ballpoints as with pencils, but the performance is not so bad that ballpoints must be outlawed. Unless they are known to be reprographic, the situation is simply that they are not recommended. If they are reprographic, this can be checked by viewing their ability to reproduce on one of the heat-sensitive office copying machines. Thus, a system designer should stipulate pencils, but he can be prepared to turn a blind eye to those people who occasionally use a ballpoint. If an uncertain mark is the only mark within the ten boxes of a decade or the twelve boxes of months, then the program can upgrade it.

## Comparable with HNR

2. As stated previously OMR and HNR are often competitive. Certainly when a user is considering an HNR application he should check whether it could be done more cheaply or better with OMR. Undeniably OMR is inferior to HNR in such publicized cases as shoe stores where a handprinted sales slip becomes the reading document. The inferiority is in three areas: (1) the sales slip would need to be larger when several items are sold; (2) the OMR form would be slightly slower to enter by the sales clerk; (3) the appearance of the sales check would not be conventional. These three criteria are considered important by shoe store managements.

The penalties in the above type of system are that software data checking and correcting demands a medium-sized dedicated computer to be added to the already high cost of the reader, not forgetting the ever present O & M team. They are the ones who must be training new sales clerks, and retraining the old ones as they forget how to draw the correct shapes. Nevertheless, the stores do get fast sales analysis, and this is one field where 97% accurate, speedy analysis of all sales is better than a week-old 99.9% accurate analysis of a 2% sample.

Where the emphasis is not on sales analysis but on precise bookkeeping accuracy, then the computer software must check that selling prices have the correct upper and lower limits, that they (typically) end in 95 cents, that the sales tax(es) are the correct percentages, and that all figures correctly add to a total. One very large prospective user is reported as decidedly against HNR after the above software checks led to a document trials reject rate of 52%. An area which demonstrates the competitiveness of OMR over HNR is public utilities. Here, several companies have tried HNR machines in situations where accuracy is of high importance but where there is little cross-

checking that can be done by software. If a meter reader writes down a figure 4 which is read by the machine as a 6, then an error of 2, 20, or 200 units may be allowed through. Some companies have taken a "liberal" view on this, deciding that the errors will balance out in time. (This month's bill may be high but next month's will be low.) Other companies have taken the view that 5% or so of the characters read in error is too high and have reverted to OMR. The 8301 is being used by several public utility companies for mark reading, and the format power of this reader is readily shown in Fig. 1. Note that the human error factor is reduced by having the marking boxes in the same geometric layout as the meter dials. Note further that

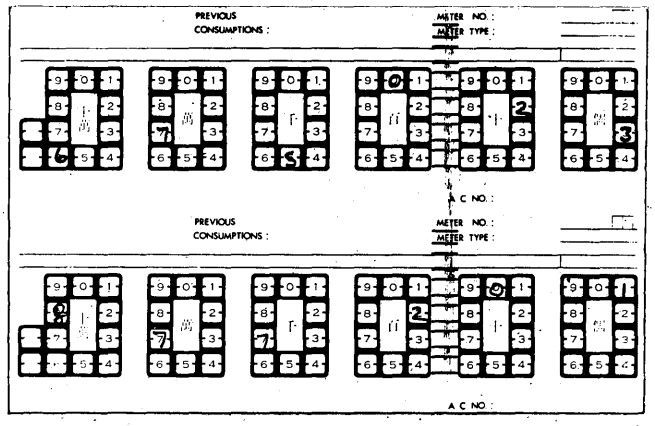


**Fig. 1. Meter reading form for ICL 8301.**

because of the ternary data transmission and program assistance the boxes may be "marked" by overprinting the numbers rather than striking through them. This gives better readback and again reduces human errors —another Bijleveld idea brought to fruition.

3. By definition, HNR reads only handwritten numerals, though a few control characters such as C, S, T, Z, and X may also be read under limited conditions. X may be read intermixed with 0 through 9, but C, S, T, and Z may only occupy the opening character position in a field. There are hopes that a few more alpha characters may be readable, but when one considers that the existing numeral readers readily misread 4's for 6, 2's for 7, 8's for 0, etc., one can appreciate that 5 versus S, 2 versus Z, 8 versus B, etc., will mean even more stringent handwriting training. As was expressed at the December, 1968, Miami Beach OCR conference, surely one-finger typing might be better. More recently, the shape disciplines have been tightened for the handprinted numerals.

In mark reading, however, a mark can be designed to have almost any meaning one desires. With the 8301 the program can receive up to 1,500 ternary digits of information relating to 1,500 X, Y coordinates on a form, and it is the program which assigns significance to these. The program may also merge coordinates if it wishes so that the presence of n marks in m coordinates may be treated as one information bit. For example, the presence of a signature, or an amendment clause on a delivery ticket, can be determined. The absence of the former, or the presence of the latter, might be cause for the program's directing back to the 8301 that the document should be outsorted for operator attention. With 3, 6, 9, or 12 output stackers available, the program can readily nominate a stacker for each category of document reject. Thus, stacker 1 might contain documents having empty fields, while stacker 2 could contain those having conflicting data—and so on.

In another case, a traffic survey, the form background was a roadmap of an industrial area, and the coordinates were then the road pattern. The forms were given to 5,500 drivers after they had reached work on Dec. 8, 1966, and in addition to the route they were asked to mark times of arrival, etc. Thus, histograms of traffic density at each of the critical road junctions were assessed from the 4,550 replies, without interfering with the traffic flow. Traffic censuses normally involve stopping vehicles and interfering with the flow; further, very few questions can be asked.

In another instance, a screening clinic used a 10-page booklet of OMR documents. Each page carried a bar code page number; but in addition each booklet had its own unique cyclically printed bar code number (see Fig. 2). This unique number was then allotted to each patient taking the tests. The 10 tear-

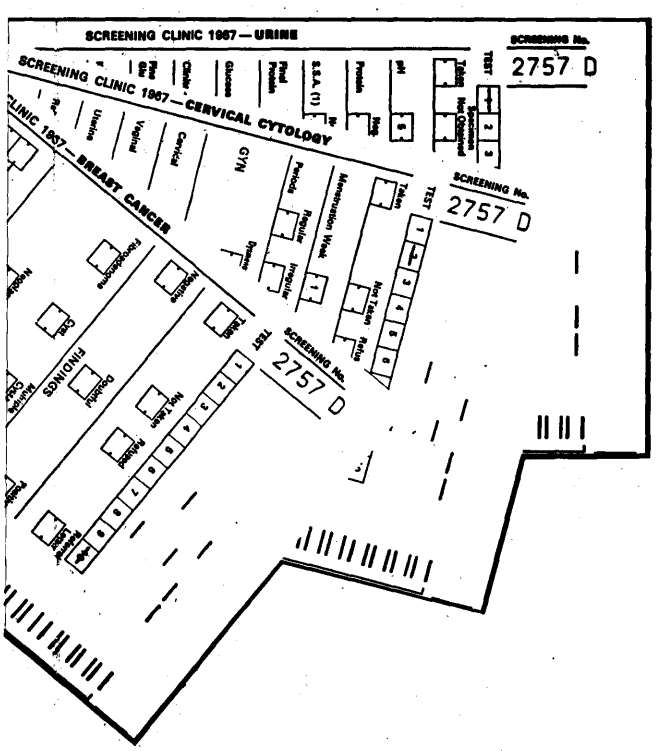


**Fig. 2. Examples from the 10-page health clinic booklet.**

out, 6½" x 4" documents covered measurements and observations made by doctors, nurses, and technicians with the 10 clinics, covering urine, cervical cytology, arteries and heart, blood, chest X-ray, vision, lung function, mental health, glaucoma, and breast cancer. Apart from very varied layout, tailored to each clinic, the value of just variable radix alone was evidenced by the fact that the following radices were used: 1, 2, 3, 4, 5, 6, 7, 10, 12, 16, 20, and 21. It would have been very difficult, if not impossible, to tackle the application, being limited to horizontal or vertical radices of 1, 10, or 12, as is the limitation in some transitional concept readers—or radices of 1 or 5, as in others. After reading the accumulated evidence from the 10 pages and correlating these with the punched basic data from the number-allocation page,

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a tentative diagnosis was made by the computer program and the patient's doctor was advised accordingly by selective printout.

## Program size

While potential users of the 8301 have been quite convinced of the superiority of the device itself, they have often misunderstood the data checking and correcting function in the ICL 1900 computer. They feel in their suspicious bones that OMR devices on-line must be like light pens on-line, which, as everybody knows, do bring large computers to their knees. However, while one can sympathize with their suspicions, there is no basis for them. The 1900 range uses a 24-bit structure and 8301's are used commercially on the smallest in the range, the single program 8K 1901. In one such case, the customer enters ordering data from 1,000 supermarkets in 15 minutes. The rest of the week is spent acting upon that data—the entry of which would otherwise have required 35 keypunchers and have delayed the information by at least 24 hours. The 8301's are also in use on 128K 1904E's, but here they input to the lowest priority of several concurrent programs. The 128K store is dictated by other considerations. The object program store size depends upon the job complexity, but is rarely more than 2 to 3K and is more generally 1 to 2K.

## What of the future?

One might be tempted to say that OMR has reached such a level of data collection power already that the future could take care of itself. However, nobody in OMR development is taking that line, and anybody in data collection or capture can look forward to greater simplicity on the one hand, and greater power on the other. As usual the simplification will either be usable to lower the costs or to facilitate the attacking of more complicated tasks. Form design cum programming will be made easier by technological advances as well as by the embracing of the newly emerging "baby" computers with their generator-type languages. These will most probably output to some magnetic medium. As costs should also fall, it will become even more the case that any data preparation or collection hardware evaluation should include a long look at OMR. ■

Mr. Bauldreay was with Farrington from 1959 to 1962. On returning to England he worked for two years on MICR, following which he was group leader for the joint ICL 8301/UDT development. After advanced OCR product planning work he has now joined Crosfied Business Machines. He holds a B.S. in engineering from London University.

## Some real numbers on the operating time of COM devices

# Throughput Myth?

by George H. Harmon

The characteristics of computer output microfilm (COM) devices are advertised in a manner confusing to prospective users. The most misrepresented characteristic is speed of operation. Any unit is many times faster than an impact printer or a plotter but quoted speeds are misleading. An analysis of all factors which influence the actual throughput of a COM device should help a prospective buyer make a choice. Such an analysis will also indicate to COM manufacturers where technological advancements are needed.

Not all COM units are the same nor intended for the same use. There are alphanumeric units and graphics units. There are versatile multipurpose units and others designed for a single use. The influences on throughput are different for each machine and also for each unit's intended use. Evaluation of all the various factors can help establish the worth of versatility.

Throughput means output over an extended period of time. In creating the table of values for the various factors an eight-hour day was assumed. All contingencies should be considered within this period. Therefore the Information International fr-80, a highly versatile unit capable of creating many varied recordings, was selected.

One must associate preparation time with throughput as well as actual recording time. Before an image can be exposed on the film, the camera must be provided with the proper unexposed film; the instructions must be given to the COM device for recording; and the input, such as the magnetic tape, must be properly connected to the unit.

The normal output from a COM unit is either 16mm, 35mm, or 105mm exposed but undeveloped film. Some units provide more than one size capability. With such units, time consideration is first given to placing the proper camera and lens in position. Next, one must consider the time to remove and replace the take-up magazine as well as replacing the supply magazine. In our example the following times are required:

| | |
|---|---|
| Time to change camera | 1 minute |
| No. of changes per day | 4 |
| Camera changing | 4 minutes |
| Time to load film | 1¾ minutes |
| No. of film loads per day | 9 |
| Film loading | 16 minutes |
| Preparing output | 20 minutes |

It should be noted that 20 minutes for preparing output is approximately 4% of available time on the

COM device. Savings could be realized by improving COM design, for a device with a single cassette would require less time to effect a film change.

The input signal for recording either comes directly from the computer (with on-line devices) or from the magnetic tape (with off-line units). The time to change tapes must include time for rewinding used tape prior to removal. In the example, an average of 1,200 feet for rewind is assumed.

| | |
|---|---|
| Time to rewind magnetic tape | 1¼ minutes |
| Time to change magnetic tape | ¾ minutes |
| No. of changes per day | 20 |
| Tape changing | 40 minutes |

Input instructions and methods are as varied as the number of different machines. Some units utilize stored programs while others may be entirely mechanical. Instructions for recording will be called the program. The instructions and times consumed for forms overlay or retrieval code marking will be separately considered.

| | |
|---|---|
| Time to insert program | ¼ minute |
| No. of times per day | 20 |
| Program insertion | 5 minutes |
| Time to load forms overlay program | 1/10 minute |
| No. of times to load per day | 40 |
| Forms overlay loading | 4 minutes |

The summation of these times is indicated as the input preparation time. The time shown is 49 minutes or about 10% of a COM day.

In one typical application of a highly versatile COM unit, 69 minutes of an 8-hour day can be used simply to prepare the machine for recording. Even recording times cannot be totally devoted to placing images on film. There are various plotting times and non-plotting times and, in some cases, factors which outweigh both.

Before considering plotting times it is necessary to check the transfer rate from the data source to the input of the system. If the transfer rate is below plotting rate it controls the time of plotting. The effective transfer rate should be determined. Tape speed and packing density indicate a maximum transfer rate. Packing density must be reduced by such items as interblock gaps. This will give an effective density and, when multiplied by tape speed, will give an effective transfer rate. Start and stop items usually reduce the speed and should also be considered in determining the tape speed. With on-line COM devices the transfer rate can be determined directly.

| | |
|---|---|
| Tape speed (inches/sec) | 45 |
| Tape density (bytes/inch) | 556 |
| Average record length (bytes) | 2,000 |
| Average record length (inches) | 3.6 |
| Interblock gap length (inches) | .75 |
| Effective record length (inches) | 4.3 |
| Effective density (BPI) | 465 |
| Effective transfer rate (BPS) | 21K |

Plotting time should be considered as that time which is left over when all other times are complete. The number of images which can be exposed is a function of the complexity of the images. All plotting times must be accounted for, including those for characters, points, horizontal, vertical and diagonal lines, overlays, and retrieval code markings. Some units without skip and tab capabilities must record all blanks as well as characters. Plotting time for the example is 288 minutes or 60% of total time. The plotting of forms overlay and retrieval codes is a part of regular plotting, making the special times not applicable.

| | |
|---|---|
| Average characters per frame | 2,000 |
| Character print rate (ch/sec) | 8K |
| Average frame rate (min/frame) | .004 minute |
| Average length of horizontal vectors | Full |
| Average no. of horizontal vectors | 20 |
| Vector print rate (vectors/sec) | 166 |
| Average frame rate (min/frame) | .002 minute |
| Average length of vertical vectors | Full |
| Average no. of vertical vectors | 20 |
| Vector print rate (vectors/sec) | 250 |
| Average frame rate (min/frame) | .001 minute |
| Average length of diagonal vectors | ¼ |
| Average no. of diagonal vectors | 20 |
| Vector print rate (vectors/sec) | 100 |
| Average frame rate (min/frame) | .001 minute |
| Average points per frame | 900 |
| Point plot rate (points/sec) | 90,000 |
| Average frame rate (min/frame) | .001 minute |
| Plotting characters, vectors & points (min/frame) | .009 |
| Plotting frames/day | 32,000 |
| Plotting minutes/day | 288 minutes |

Non-plotting times during image recording are caused by requirements for accommodating action commands. In the example, this was not applicable because of internal buffering.

In some instances, time is consumed between recordings to monitor the system, as well as to handle errors. Film advance between frames also uses time. In the example, unit monitoring is accomplished while recording. An error rate of 5% was used in computing times. (Some users of COM equipment are dealing with error rates in excess of 25%.) Two types of errors are considered, input and output. Tape or programming errors require voiding, rereading, and rerecording. Output errors with film processing or film handling require complete repetition of the operation.

| | |
|---|---|
| Rate of film advance (sec) | 0.1 |
| No. of frames per day | 32,000 |
| Film advanced time (min/day) | 54 minutes |
| Time to rewind tape for errors | 2 minutes |
| Time to rerecord for errors | 14.5 minutes |
| Time to record voids | 20 minutes |
| Time to rerecord for film errors | 25 minutes |

No operation works perfectly, and it is assumed that a 5% factor, or 3 minutes per hour, should be added for miscellaneous confusion.

## On-line processing and hard copy

Two other operations which might affect and indeed might completely control throughput are on-line processing and on-line hard copy generation. Both may take place simultaneously with plotting and film advance or perhaps all other operations. It is thus necessary to determine the time taken by on-line processing and/or on-line hard copy generation for

| | | | |
|---|---|---|---|
| Time to change camera | 1 | | |
| No. of changes per day | 4 | | |
| Camera changing | | 4 | |
| Time to load film | 1¾ | | |
| No. of film loads per day | 9 | | |
| Film loading | | 16 | |
| Preparing output | | | 20 |
| Time to rewind magnetic tape | 1¼ | | |
| Time to change magnetic tape | ¾ | | |
| No. of changes per day | 20 | | |
| Tape changing | | 40 | |
| Time to insert program by card | — | | |
| Time to insert program by paper tape | — | | |
| Time to insert program by magnetic tape | ¼ | | |
| Time to insert program by punch instr. | — | | |
| No. of insertions per day | 20 | | |
| Program insertion | | 5 | |
| Time to load forms overlay program | 1/10 | | |
| Time to load forms overlay | — | | |
| No. of times to load per day | 40 | | |
| Forms overlay loading | | 4 | |
| Time to load retrieval code program | 1/20 | | |
| Time to load retrieval code overlay | — | | |
| No. of times to load per day | 0 | | |
| Retrieval code loading | | 0 | |
| Preparing intput | | | 49 |
| Tape speed (inches/sec) | 45 | | |
| Tape density (bytes/inch) | 556 | | |
| Average record length (bytes) | 2,000 | | |
| Average record length (inches) | 3.6 | | |
| Interblock gap length (inches) | .75 | | |
| Effective record length (inches) | 4.3 | | |
| Effective density (bpi) | 465 | | |
| Effective transfer rate (bps) | 21K | | |
| Maximum characters per frame | 313,280 | | |
| Average characters per frame | 2,000 | | |
| Character print rate (CH/SEC) | 8K | | |
| Average frame frate (min/frame) | .004 | | |
| Average length of horizontal vectors | Full | | |
| Average no. of horizontal vectors | 20 | | |
| Vector print rate (vectors/sec) | 166 | | |
| Average frame rate (min/frame) | .002 | | |
| Average length of vertical vectors | Full | | |
| Average no. of vertical vectors | 20 | | |
| Vector print rate (vectors/sec) | 250 | | |
| Average frame rate (min/frame) | .001 | | |
| Average length of diagonal vectors | ¼ | | |
| Average no. of diagonal vectors | 20 | | |
| Vector print rate (vectors/sec) | 100 | | |
| Average frame rate (min/frame) | .001 | | |
| Average points per frame | 900 | | |
| Point plot rate (points/sec) | 90,000 | | |
| Average frame rate (min/frame) | .001 | | |
| Plotting characters, vectors & points (min/frame) | | .009 | |
| Plotting frames/day | | 32,000 | |
| Plotting minutes/day | | 288 | |
| Time to change forms overlay | | | |
| No. of changes per day | | | |
| Time to expose overlay | | | |
| No. of exposures per day | | | |
| Forms overlay recording | N/A | | |
| Time to handle action commands | | | |
| Average no. of commands | | | |
| Non-plotting time (min/day) | N/A | | |
| Time to monitor | | | |
| Number of times per day | | | |
| Monitoring times (min/day) | N/A | | |
| Time to rewind tape for errors | 2 | | |
| Time to reread for errors | — | | |
| Average no. of errors per day | — | | |
| Time to rerecord for errors (5%) | 14.5 | | |
| Time to record voids | 3.5 | | |
| Time to handle errors | | 20 | |
| Time to rerecord for film errors | | 25 | |
| Rate of film advance (sec) | 0.1 | | |
| No. of frames per day | 32,000 | | |
| Film advance time (min/day) | | 54 | |
| Miscellaneous confusion losses | | 24 | |
| Processing on-line (min/frame) | | | |
| Number of frames per day | | | |
| Processing time (min/day) | N/A | | |
| Hard copy production on-line (min/frame) | | | |
| Number of frames per day | | | |
| Hard copy production time (min/day) | N/A | | |
| Downtime of machine (min/day) | N/A | | |

comparison with the simultaneous processes. Whichever time is greater will control.

A factor should be included to allow for machine downtime. This average time should be determined as a percentage of the working day and output decreased by that same percentage. The unit shown in the table at left is on a preventive maintenance schedule to eliminate downtime. One half-hour before, and one half-hour after, an eight-hour operation are used for checking and fine-tuning the machine. This does not affect throughput until a three-shift operation is considered. Then two hours should be removed from the 24-hour day.

No specific mention has been made of the units which make microfiche directly using 105mm film. All assumptions have been for the perfect creation of microfilm. In roll film, an image can be voided, then repeated, and the bad image removed from the roll, after processing, but before delivery to the user. Fiche generation involves up to 200 images on one sheet. Any error would mean regenerating the entire 200 images. To have reasonable throughput of perfect film means working with error rates of less than one hundredth of one per cent. Therefore no attempt has been made to determine throughput for these units.

There are many factors which consume time in creating the desired output from a COM device. In our example, 20 minutes, or approximately 4%, of a 480-minute day is used for preparing the output of the unit, while 49 minutes (10%) are spent in preparing the input. Time for errors is 45 minutes and for general inefficiencies 24 minutes. This leaves 342 minutes (about 71%) of available time for plotting and film advance. Subtracting the 54 minutes film advance time leaves only 288 minutes (60%) of the COM day for recording. At a rate of .009 minutes per frame, 32,000 frames can be recorded. This shows 1.1 frames per second with an average of 2,000 characters, or a character rate of 2,200 per second. This is quite different from the 8KC print rate advertised, or the transfer rate of 36KC.

The unit described differs in throughput from advertised character rate less than any other unit checked. Although very few installations other than service companies now require increased throughput, it will soon be needed. Manufacturers of COM units should begin to increase the throughput of their devices to meet the requirements they now infer to their prospective customers. ■

Mr. Harmon is presently manager of information systems, Information International Inc., Cambridge, Mass., working on microfilm-computer interface. He was previously with Western Electric and Bell Telephone Laboratories. He is president of the National Microfilm Association. He has a BS in electrical engineering from Tufts University.

## Are private edp schools more than diploma mills?

# Golden Rule Days

by Edith D. Myers, Associate Editor

Mention private edp schools to people in the industry, especially long-timers, and generally noses go up and thumbs go down. Some are convinced they're all frauds. Others will admit some are honest enough, but just barely, and the training they provide isn't worth a darn. A very few will go so far as to admit some are doing a creditable job turning out people for trainee-level jobs. The trade and business press is full of stories of schools that have closed down without warning; of graduates walking the streets with their diplomas but no takers; of a need for a bigger push by the industry for rigid standards. Any prospective student having read all this would be naturally wary and well he should be.

But the average prospect isn't wary. He hasn't been exposed to these warning notes. What he has been exposed to are promises in the best soap opera tradition: can a laborer, a gas station attendent, a housewife, a high school dropout find happiness and, incidentally, wealth in the glamorous world of computers? Yes they can, say the salesmen for the schools—salesmen who generally are working entirely on commission.

To find out just what prospective students are told I assumed the role of a prospect and was interviewed by seven schools in California. I read the ads in the yellow pages, daily newspapers and Sunday supplements and the direct-mail pieces which some schools use exclusively and was informed:

"The computer industry will pay good money for your brain."

"If you had answered one of our ads a year ago, you'd now have a chance to double your present salary."

I was advised to picture myself "in a high-pay position in two months," and to take this "new, short-cut way to a richer, happier life in one of the fastest-growing, high-paying fields in the world."

One canned direct-mail piece, variations of which are used by a number of schools, contains a cleverly worded paragraph comparing computer industry salaries to those of electrical engineers. " . . . the approximate lifetime earnings of an electrical engineer are $372,000. The estimated average lifetime earnings of ANYONE in the computer field, including the keypunch operator, the data systems operator or the computer programmer are $378,000—$6,000 more." Skim that one and you could wind up thinking a keypunch operator can make $6,000 more in a lifetime than an electrical engineer!

Initially, I contacted 16 schools by mail. Thirteen filled my mailbox with their literature promising glamor, wealth, and excitement and making it all sound very easy. Three never replied and a follow-up by phone told me I was reaching disconnected numbers. The schools that did reply varied widely in course length, fees, curriculum, subject matter covered, admission requirements and physical facilities and probably in quality, too, though it should be emphasized that only the pre-enrollment presentations are considered here. And what should the prospect look out for in these? From my experience I'd put the "counselors" who insist on interviewing in the home at the head of the list. Next is a tendency to appeal to some of the baser emotions we all share, like greed and snobbishness.

### Mature and unskilled

The seven schools selected were picked for convenience and because they represented a cross-section of types: company-owned, one-branch, multi-branch, franchised, etc. My role for their benefit was that of a mature woman who attended college decades ago but had had no work experience whatsoever (20 years as a housewife) and no salable skill. The courses discussed were all programmer courses. Hours of instruction ranged from a low of 375 to a high of 800. Charges ranged from $1800 to $3000. Oddly enough the highest price tag went with the shortest course. Because they lend themselves to it, I've labeled the approaches encountered:

Are you old enough for Granny Goose?
Looking for the right color clay.
Beauty is only skin deep.
We've got a formula.
It's like baking a cake.
Telling it like it is.

The Granny Goose school is part of a national franchise organization with more than 100 schools. With their literature they sent a sample aptitude test with 58 relatively easy, multiple-choice questions, an answer sheet and a return envelope. I took the test and sent it back.

Their brochure does not: outline course content, list fees, describe their facilities and faculty, or tell in any specific way what some of their graduates are doing in edp. It does: talk about "40,000 BIG PEOPLE who stopped making excuses and started doing better

in their careers"; describe three happy graduates without telling what they're doing now; offer up "the future . . . today"; imply that age, ability in math and present employment have little to do with success in their courses; and issue a personal invitation from the franchise organization president not to stand by "and let opportunity pass."

This invitation-turned-challenge was effectively taken up by their representative who conducts an "in depth" interview in the home because of "the intense nature of the give-and-take," and the need to be completely free from interruptions (we had a few from demanding children, an overly affectionate dog and an inquisitive neighbor). The 2½ hour interview was more give than take as he did most of the talking. Somehow, like the brochure, he never did get into anything as concrete as course content. At his suggestion we sat at the dining room table. He leaned comfortably back in his chair and told me Granny Goose schools are the best in the field in the world and they have to be very selective in accepting students. He let me know he was an important man, skilled at spotting the qualities they were looking for—stability, organization, motivation, and (he hit hard on this one) the ability to make a decision. He told me they can only accept 10 people a month (I found out later that most of their current classes have fewer) from the 400 or so who apply.

## Play with the big boys

He authoritatively described the edp field (the provacative potato chip for grownups). He stressed salary, prestige, and opportunity. "The average programmer earns $17,000 per year and the range is from $12,000 to $40,000. It takes time. You can expect to start at from $700 to $900 per month but this goes up sharply after three weeks and an increase of $4,000 can be expected in the first two years—then it levels off. You hobnob with management, you're part of management. The fringe benefits are unbelievable . . . insurance, stock options, big bonuses."

I asked if the school had computers and he said they did, leased. "All computers are leased. No computer manufacturer ever sells a computer. That way they'd lose control."

Their programmer course is 425 hours long and costs $1850. Their enrollment procedure is in steps: first the home evaluation and, if this is favorable, a school interview, a second test, a tour and finally appraisal by an Admissions Committee which has the final word. "Tentative enrollment" and payment of a "registration" fee are completed at home.

He had graded my answer sheet and told me I had done "exceptionally well," which indicated "good potential." We were reaching the point at which I was to be given a chance to prove I could make a decision (are you old enough for Granny Goose?), but a story came first. He had interviewed a young man just a short time earlier who had impressed him as stable, well-motivated and all. "But, when it came time to make a decision, he wanted a few days to think it over. WELL, this was like a red flag to me. My attitude began to change fast."

My turn came. I admitted I wasn't ready to make a decision and waited for the change. None came. He sat there saying nothing. I said I would like to see the school before committing myself and was told this is "against our strictest policy." I held my ground and so did he—but only for awhile. "I'm going to do something I've never done before because I'm so impressed," he said. He was going to let me see the school without being tentatively enrolled but I had to promise I would pretend to be. I left it at that. I had found out I was "grown up enough," but then I feel sure almost everybody is.

## Home encounter

I only encountered two home interviewers. The second told me he was "looking for the right color clay." I approached the Right Color Clay school through a full page ad in a Sunday supplement which included a simple four-question test (which I had my 13-year-old son take) and a coupon. Within a week I received their literature and a longer test. I was to complete this and hold it until one of their "counselors" contacted me. (Use of the word counselor when applied to salesmen is, I've learned, one of the more frowned upon practices in this field and forbidden by accrediting agencies.) A few nights later a young lady phoned advising she was from "the IBM school" (another much abused and much criticized but apparently common practice), and that a counselor would be in my area the following evening. I wasn't going to be but we did manage to develop an appointment. Coincidentally, their counselor was available at about any time I suggested although their literature had implied that these interviews had to be worked into a tight schedule and many times there is a long wait.

Like the Granny Goose man, he intimated they get lots and lots of applicants and have to select the right few, in this case "the right color clay." He graded my test (which again my son had taken) right away with my help. He gave me a sheet with the correct choices which I read aloud while he scored. He didn't tell me how I'd done but proceeded to "build a personality profile," using a four-page form which contained such probing questions as: what are your goals; what do you want out of life; do you ever procrastinate; are you always self-confident; and why do you want to better yourself.

He continually assured me he was "here to help you and if I can't help you I certainly won't hurt you." This, in fact, was almost his opening comment and was his parting statement. At one point he said pensively, "You might well wonder what I'm doing sitting here in a humble place like this, talking to a girl like you when you know all that I've accomplished." He ticked off his accomplishments—string of degrees, two of them honors degrees; speaks German and Japanese fluently; traveled all over the world; bought and sold a couple of small companies; owns a large and lovely home with a THREE-car garage; made a million dollars before he was forty. But he was here. Why? Because he likes to help people!

He pressed hard on goals. I generalized and he wanted something specific, like making a million by age 40 (a goal he had set for himself when he was 34). When he failed to inspire my ambition sufficiently, he sighed deeply and said he was afraid he was going to have to write down "no specific goals," clearly implying this was not going to help my profile

any. When we came to self-confidence, he drew me a little diagram having to do with fear, failure, faith-in-self and success. I learned the only way to build a bridge from fear over the chasm of failure to faith-in-self and success is with courage, GUTS. Having failed to measure up in ambition, I suppose I was to aspire to GUTS.

Somewhere toward the middle of the interview he got back to the test which had been nonchalantly put aside. He turned the answer sheet over slowly and dramatically. "I didn't want to get to the test first because I didn't want to stimulate you to overexcitement too early." He placed the sheet in front of me. "Just look at that score!" (My son is just an average student.) It was A+. "I've never seen such a score and do you know I've had engineers fail that test—ENGINEERS!"

He covered the edp field rather briefly by taking me page by page through a notebook full of stats of articles about programmer shortages and high salaries, making me read portions aloud. Pictures of the school and brief course descriptions also were included. When we'd closed the book he tossed off some "typical examples": a woman of 54 who works at the data processing center operated in conjunction with the school making $23,000; a young girl of 23 who teaches at the school after only three years in the field (the state's Bureau of Business Education, Bureau of School Approval requires five) and is making $16,000 working only five hours each day; and a young man of 19, making $19,000 (at what he didn't say).

He finally let me know he thought I might be "the right color clay." Like the Granny Goose man, he made it clear he wasn't empowered to enroll, only to recommend (but he let me know his recommendation was vital) and to take an application and a registration fee. Their programmer course is 440 hours and costs $1895. They like $200 as a registration fee.

"Would you like me to recommend you? Are you a doer or just a dreamer? Do you really want to better yourself?"

I told him I wanted some time to think and he deflated like a punctured balloon. "I don't understand this hesitation. Where have I failed?"

Such pressure to close was missing from the interviews conducted in the schools, but there were catches to some of these, too. I've given the "beauty is only skin deep" label to a single-branch, privately owned school which seemed to be all front. It's located in a medium-sized, three-story office building on a major boulevard. Three large signs on the front and side of the building with the school's name, plus a fourth proclaiming "IBM Training," give the impression that this is quite an establishment. Once in the lobby, though, it's difficult to find the Skin Deep school's name in the building's lengthy directory. A Veteran's Information Bulletin they put out says, "the building has been internally designed specifically for a computer training school." It would be interesting to know whether the landlord and other tenants know.

The whole atmosphere is casual. The only people I saw were the director, a receptionist and a young woman who was answering the phone, administering tests, and emptying ash trays. Everything is on a first name basis right from the start even with the casual telephone inquirer, judging from one conversation I overhead (" . . . are you a veteran, Harold?"). They give the standard IBM programmer aptitude test. I'd taken it before so I decided to vary the fare here and there (patterns on the answer sheet) to make things interesting. I got an A so this must be a good method.

My interview was with the director. There was no motivation analysis, no build-up, just the happy advice I could, because of my aptitude and background (?), get into a course which had started two days earlier. The cost would be $3000 for 375 hours. I asked about faculty background and was told only that they have "one guy who teaches the operator segment who's been around the industry for years and knows all about it." They have a computer, a Univac 9200, which I saw in their "specially designed" computer room, for which the director apologized because: "We're having temperature problems. We're going to have to get an air conditioning system." He was very proud of the computer, which also is used in a small service bureau he runs which shares equipment, staff and even a phone number with the school but is "a completely separate operation." They'd only had the computer a few months. "We had to train a lot of students to get that." Besides the computer, all I saw were a couple of empty classrooms and the keypunch room which was active but largely on behalf of the service bureau, I was told. It was a friendly visit but I wouldn't want to go back, especially not for $3000.

Equally friendly but a little more formal was the admissions rep with the We've Got a Formula school. This is one branch of a three branch system. The formula is up on every wall in the place. It's:

$$A\left(\frac{A_p + P}{i}\right) = S$$

This is how they select their students. The first A is for attitude. The $A_p$ is for aptitude. The P is for placeability ("after all, if you were 94 years old we couldn't find you a job no matter how good you were") and the i is for investment of time and energy (money wasn't mentioned). The S is success.

He seemed satisfied with my A and my P (said my maturity was highly salable, but then I'm not quite 94) and said they'd find out about the $A_p$. To do this they gave me the standard IBM programmer test and found out I should have "become a programmer years ago." So I guess the S was there for the i and in dollars this would mean $1950 for a 650 hour course. I found no serious misrepresentations in this approach, only a tendency to flattery and a highly questionable evaluation of my prospects. This school is accredited by the National Association of Trade


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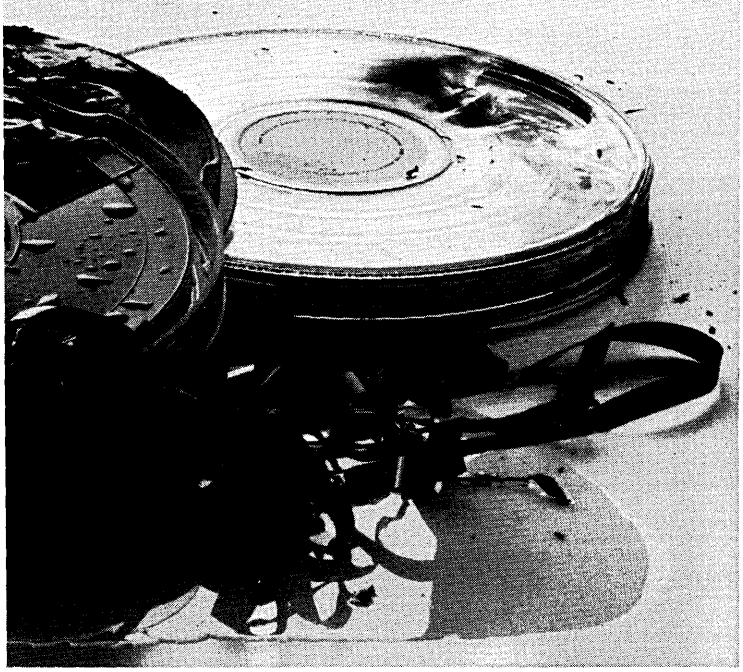

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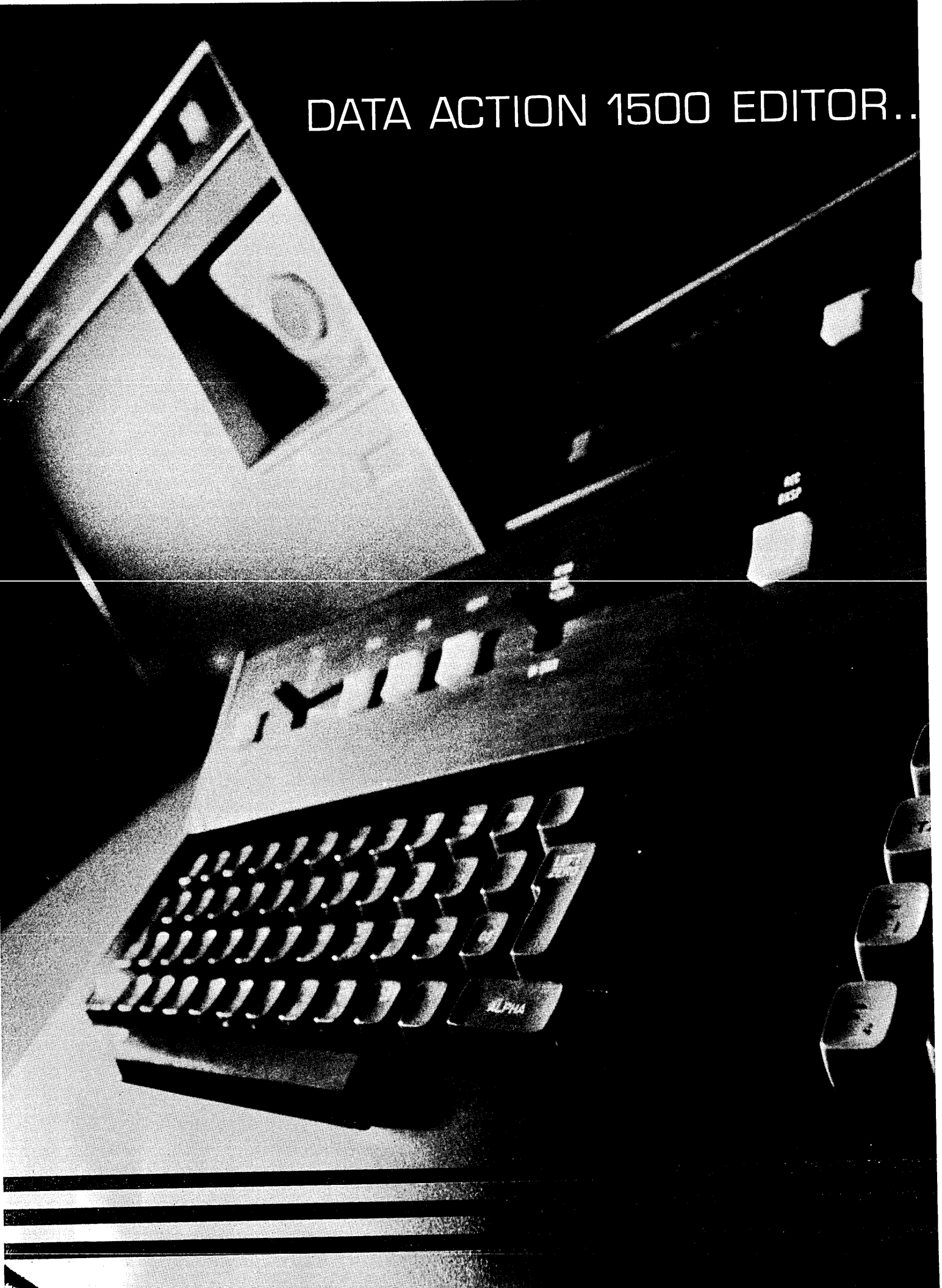

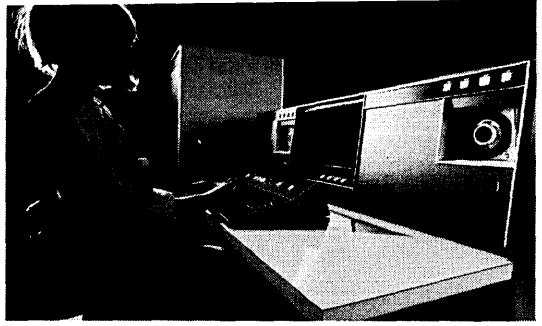

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and Technical Schools (NATTS), one of two private accrediting bodies in the field recognized by the Department of Health, Education & Welfare. Of some 1,000 private edp schools in the country, only 82 can make this claim.

Another which can is the Cake Bakers' school, a manufacturer-owned institution. It gives a first impression of busy, businesslike efficiency. Some 10-12 other applicants were being processed while I was there. A sign on the waiting room wall testified to a healthy number of graduates to date and students currently enrolled. Preliminary to the interview was a test, their own, which was shorter but harder than others I'd taken, and completion of a detailed personal information sheet. Both of these, I assume, were perused by my interviewer before I got in to see him since I had to wait awhile. And the first points he established were about the only ones not covered in the information sheet—that I had a car and an account with a local bank.

I was told the only thing holding the industry back is people—"they're crying for them." I suspect he tailors his approach to the applicant because he likened programming to baking a cake (if I'd been a boy just out of high school it might have been overhauling a car or planning a football strategy). "We teach you what sugar is and how it acts, what butter is and how it acts, and how to put all the ingredients together to bake a cake. And the beauty is, you're your own boss. Your superior brings you all the stuff and tells you to make a three-layer white cake with green decorations and six candles. You make it any way you want to. He just comes back every so often to see how you're doing."

Their 600 hour programmer course costs $1800, offering one of the lowest hourly rate available. He assured me all of their graduates are placed right away, many before they graduate. He offered examples (again tailoring the approach) of mature students. He told me of a 51-year-old fireman who had just signed up and already had his job waiting. The interview was interrupted by a phone call which came, I was told, from another student in his 50s who had just landed a job.

We toured the school and I saw lots of classrooms, lots of busy and happy-looking students, lots and lots of equipment obviously dedicated to the school, lots of students getting hands-on time, a very nice lunch room and teachers who looked like teachers. The place looked like a school, smelled like a school and felt like a school.

## A different story, at last

Two schools qualified for the "telling it like it is" label. One (Like It Is—A) is part of a chain of six schools. The company also runs service bureaus. The other (Like It Is—B) is mother school of a network of 50 business colleges nationally.

Like It Is—A is accredited by the Accrediting Commission for Business Schools, the other HEW approved accrediting agency. The school's literature was full of typical promises of instant success and the good life and there was a notebook in the waiting room containing copies of the same articles I'd been seeing all over plus a new (to me) one by a girl programmer who made her life and her job sound like being in the jet set. But the interviewer was straight. They give a very simple aptitude test but little was made of it. He implied everybody does well. I never felt as if I were being evaluated. He told me about the school, showed me a course outline, spelled out the costs ($1995 for 800 hours) and even showed me their contract. Their class starts are casual—whenever they get enough students. Maximum class size is 24 but they'll start with as few as 10 as classes can be combined, he said, when they get beyond the elementary stages. We toured the school. I saw five or six classrooms but only one small class in session and this, I was told, was a combined class. The computer room, with a 360/30 and lots of peripherals, is shared with the associated data center and the extent of student use wasn't made clear. They offer placement assistance but admit they can't place everybody and that placement sometimes involves relocation. The school had a lonely feel to it. The front office was large, with lots of desks but only one girl. This and the lack of any attempt at evaluation were the only sour notes. I felt he was "telling it like it is," as far as he went.

The man from Like It Is—B, I felt, went all the way. "We're just an old-fashioned vocational school where you learn by doing." The school was started in 1954 as a school for grocery checkers. They moved into new fields through the years as they saw needs arise.

Most interesting in this approach was his tendency to discourage me, very tactfully, too. "People our age, when set about taking up something new, must realize this is an age geared to indulging youth and we have to give out twice as much and prove twice as much . . . " He asked me to give that a lot of thought because, unless I was willing to try harder, "there wouldn't be much point."

## End of a quest

They give the standard IBM test and he said I could take it if and when I wanted to. He doesn't think the results of the test are very significant. "You'll pass. Almost everybody does." He feels a person's attitude toward the test is more important. "If you find it fun, it could be you're suited to programming but if it turns you off, you can be sure you're not." His overview of the industry was good, as was his description of a programmer's job. He admitted the demand isn't what it once was and that their $2000, ten-month course provides entree only to trainee level positions. I felt like a successful Diogenes!

A high-ranking officer in an organization of edp schools was quoted recently as saying, "The private schools are OK for preparing entry level personnel, but before they can do much of that they will have to clean themselves up. Today they stand in rather poor favor with DP managers, and the general public." A first step might be to clean the face they present to the public to a point where "telling it like it is" is the rule rather than the exception.

An industry veteran told me before I started my rounds of the schools I'd find "they're all just like used car dealers." I believe this is a half-truth on two counts because even some used car dealers are playing it straight these days. But, it's the old story of one rotten apple . . . ■

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CIRCLE 41 ON READER CARD

**There is an alternative to accepting the contract**

# Write Your Own

by Frederic G. Withington

In the good old days, a computer contract was a couple of pages of fine print that specified such minutiae as who was responsible for insurance when computers were being shipped. It didn't speak of the important things—the amount and duration of free service, the quantity and quality of software, training, compatibility. These were either taken on faith or were covered by verbal agreements. This arrangement worked pretty well because all parties had developed an understanding of what was "normal" and also because none of these factors had anything like the importance they presently have.

Now, the ballgame is quite different. Each manufacturer has his degree of unbundling and is likely to change his policies tomorrow. Compatibility with the existing program library, dependence on the quality of the operating system and availability of qualified help spell the difference between success and failure; the user knows that he can no longer take these matters on faith.

It is hardly likely that the manufacturer will volunteer a contract which satisfactorily specifies all these matters. Most of the software, service, training, and compatibility areas can at best bring him very little revenue and at worst can cost him a great deal if a contractual specification is clearly violated. The salesman will generally prefer to rely on "policies" of varying degrees of generality and to soothe the customer with bland assurances. He has no choice, though, but to take note of a document formally presented by the customer. Therefore, it is logical for the customer to think of drafting a contract that suits him and then inviting the vendor's acceptance of it. Sometimes this is incorporated in the initial request for proposals; more often it is produced during final negotiations after a vendor has been selected (at negotiation time, the selected vendor's contract form will be available and the user can use it as a base).

Most users naturally shy away from the unfamiliar contract-writing role, but computer service contracts are generally rather simple. With a lawyer's assistance, the user can write contractual clauses as clear as those of the vendor. Even if the user's language is sloppy or imperfect, the vendor in his rebuttal is likely to improve the language, so there is no need to worry about imperfect language in the first draft.

A more logical question is: what good will it do? IBM in particular sticks very tightly to the letter of its standard contract, and most of the other vendors will attempt to do the same. If the user asks for too much or if his contractual clause is in absolute contravention of the clause being offered to all other customers, surely the vendor will not accept it.

However, the user's requirements can often be met without asking the impossible. If the user's basic desire is assurance of reliable service, perhaps the manufacturer refusing to accept a penalty clause can, as a substitute, arrange for charge-free and rapid service bureau backup, which is very likely better. In lieu of 10 man-years of free service, perhaps the manufacturer will guarantee to take the responsibility for recompiling the program library. The beauty of the user's taking the effort to put his requirements in contractual form is that it makes them absolutely clear to the salesman. Then, a counter-offer acceptable to both may be made. This would not happen without the user stating his requirements formally, so the effort is bound to be worthwhile.

To guide the user who is attempting for the first time to write a computer contract, the following is a list of some subjects which the user should attempt to specify. Each absolutely requires some formal understanding and can be specified somehow without contravening firm policies of vendors.

## Equipment

This is generally the best covered area in the standard computer contract, but several additions are usually advisable.

The duration of the contract becomes important in these days of frequent policy change. There are two different time periods: one is the period for which the stated prices are guaranteed, and the other is the period for which the service specifications (free service, training, software, availability of manpower) are to be effective. Manufacturers' forms ordinarily specify only a single duration; both should be explicit.

The user should be protected against the effects of machine breakdowns. While few vendors will accept a penalty clause for excessive down time, cash penalties are not usually what the user wants anyway. What he wants is a guarantee of successful throughput: a more mutually acceptable arrangement to cover excessive down time would be a guarantee of an equivalent backup system (available within a specified number of hours) with a commitment that in the event of excessive down time on the user's own system, there will be no charge for unlimited use of it.

The user should have a guaranteed level of responsiveness for maintenance service. The subject of full time on-site maintenance for a very large or a very remote system should be considered, and the response time for after-hours maintenance should be specified. Also, it is useful to have an advance understanding of the time of day or week when preventive maintenance is to be performed.

The user should specify his right to connect independent suppliers' peripheral equipment to his system, whether he initially intends to or not. If he knows ahead of time what equipment he wants, he

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CIRCLE 33 ON READER CARD

should specify it and obtain the system manufacturer's guarantee to support the equipment at a specified price. If he does not, he should at least obtain the manufacturer's commitments that independent peripherals are acceptable in principle and that equitable maintenance arrangements will be considered.

Contractual specifications in this area depend entirely on the manufacturer's unbundling policy. The primary requirement is to determine precisely what the policy is at a given time and for how long it will be guaranteed. If there is to be a charge for any part of the software supplied by the manufacturer, the user should obtain specifications of the amount of free installation assistance that will come with each package, and a guarantee of successful operation (usually a commitment of responsive, free assistance when bugs are suspected, and a stipulation for nonpayment of software charges when failure is clear). The user's right to cancel part or all of his software usage should be explicit, and (if this is an issue) the number of mainframes on which a given software package is to be used without additional charge should be specified.

A key area these days is compatibility of the new product with the existing program library. If direct emulation of existing programs is to be performed, a guarantee should be provided that this will work without any user-performed conversion. If (as is more often the case) some degree of conversion, recompilation, change of job control cards or the like is anticipated, the responsibility for this and the assistance to be provided by the manufacturer should be clear.

Since the success of the installation will often be determined by this compatibility-conversion issue, the user should incorporate a stipulation that the new equipment will not be considered available for use (i.e., paid for) until the manufacturer's accepted responsibilities for conversion and emulation are completely carried out.

## Assistance and training

Obviously, the quality and quantity of any free assistance should be specified. The quality issue is difficult to deal with, but the user can at least insist that any personnel assigned to his account should be acceptable to him, and that he has a unilateral right to veto any individual he considers below the expected standard (and stop paying).

Almost all manufacturers now charge for some portion of their training and will probably be charging for more in the future. The list of courses for which there is no charge (if any) and the duration of this specification should be explicit.

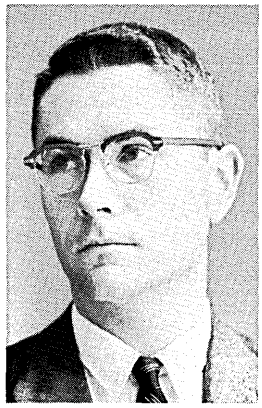
As in every other area, the precise schedule of charges should be incorporated with a guarantee that they will not be changed for some period of time.

The question of ownership rights to any software developed with the assistance of manufacturer personnel should be explicitly handled. Perhaps the user does not anticipate that anything novel or potentially salable will appear in his installation; if so, he might as well explicitly absolve the vendor of responsibility. If there is a chance that something valuable may emerge, or that trade secrets will require protection, the user should at a minimum make sure that the vendor guarantees to apply his best efforts in good faith to avoid using any knowledge explicitly gained from the user.

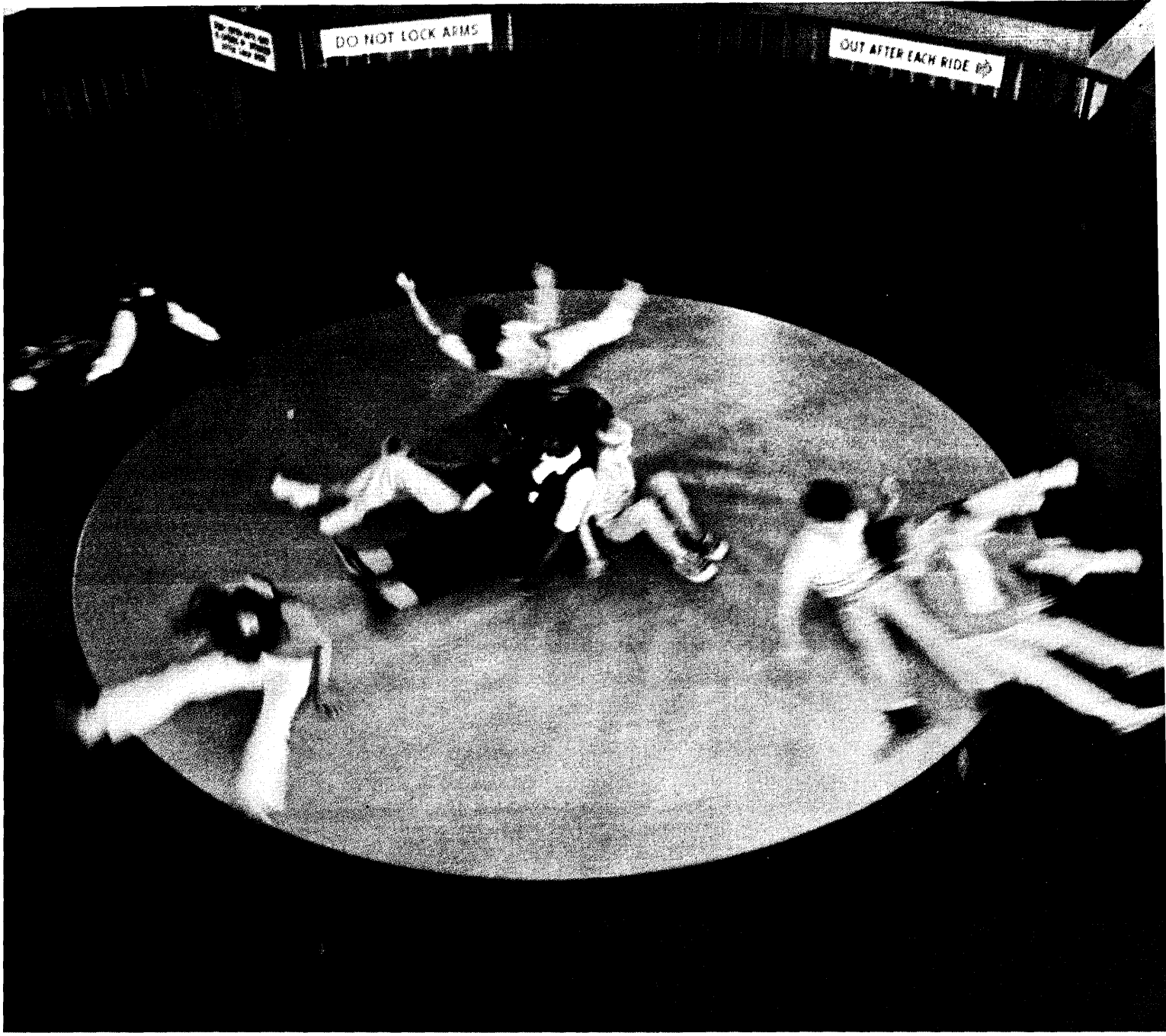
One of the toughest issues is the question of the vendor's responsibility for the results of his people's work. If the vendor is contracting for a piece of software under his sole management, the problem is not so hard; adequate specification of the product suffices. If (as is more common) the two organizations work together in developing a program for the user, it is very difficult to ask the manufacturer to take any responsibility for the result. Often some compromise is possible, depending on the particular situation. In any case the manufacturer should not be permitted to simply state that all joint work is the user's responsibility and that no useful outputs from his own people are guaranteed. Wherever possible, any job on which the manufacturer is to work for a charge should be specified ahead of time, and the manufacturer should guarantee to meet the specifications within the originally estimated time and money budget. A clause to this effect should be in the original agreement.

Situations vary very widely, of course. Not only do manufacturers' policies and users' needs vary a great deal, but data processing contracts also cover an increasing territory. Contracts for independent peripheral equipment, contract software, service bureau services, facilities management, and a dozen other classes of products or services must be negotiated. Fortunately, the basic guarantees the user needs are always somewhat the same. The above list of issues, while partial and oriented toward the procurement of mainframes, applies at least in part to almost any kind of data processing product or services contract.

Even if none of the user's contractual clauses end up in the final draft, even if it is finally determined that the manufacturer's standard contract is satisfactory, the attempt to write the "ideal" contract is bound to be rewarding. It shows which issues are really significant and which are not. It identifies the areas of potential trouble, disagreement, and negotiation that are likely to arise during the duration of the contract. And at the very least, it is bound to produce a better initial understanding between user and vendor. Why not try it? ■



**Mr. Withington has been with Arthur D. Little for over 10 years as a data processing consultant. He was previously with Burroughs Corp. and the National Security Agency. He is the author of** The Real Computer: Its Influence, Uses and Effects **and of** The Use of Computers in Business Organizations, **both published by Addison-Wesley, and is a DATAMATION contributing editor.**

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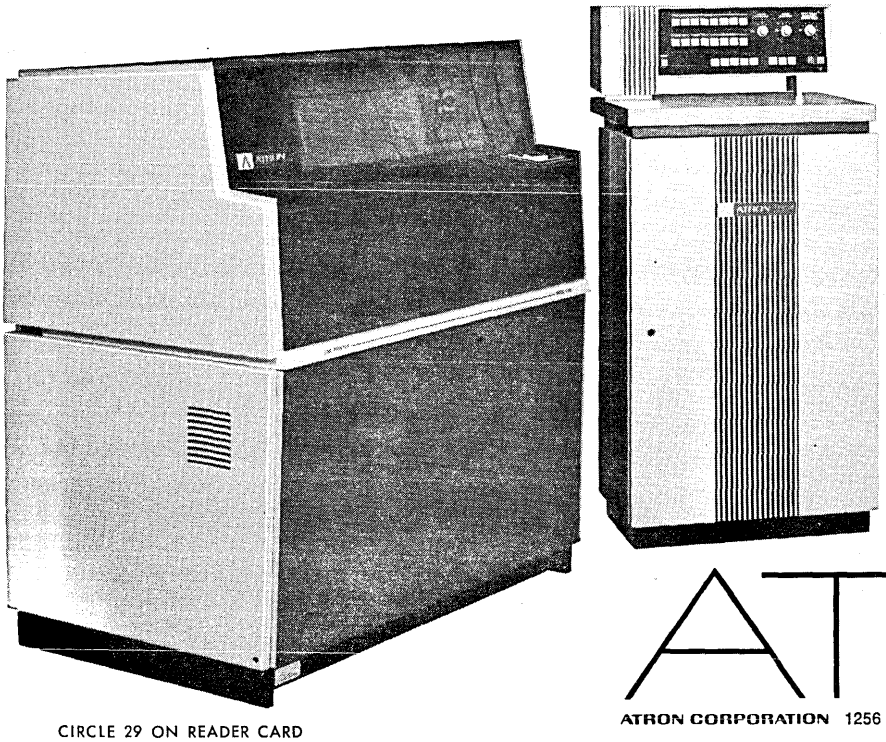

ATRON

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CIRCLE 29 ON READER CARD

# Communications and Display

by Frederick A. Bland, Australian Editor

The subject chosen for the opening exhibition at the U.S. Trade Centre in Sydney during the week June 29/July 3 was computers. With 4,000 square feet of exhibition space, there eventually had to be some subdivision to obtain a coherent theme. So in line with developments for the '70s "Computer Communications and Display" was chosen. Some 24 exhibitors were attracted, many showing to the public new products—some having their first showing in the world. Of the 24, three were completely new to Australia themselves and were seeking representation: American Data Systems of California, Courier Terminal Systems of Arizona, and the Houston Instruments Division of Bausch and Lomb in Texas.

A conference lasting for four of the five days attracted 250 delegates. The main message obtained by this observer was the length of time it takes for an invention to become of practical use in spite of the speed we associate with the development of the computer. No one forecast anything dramatic for the '70s.

In the part of his keynote address devoted to reminiscence, Professor John Bennett of Sydney University noted that in 1950 ingenious programmers at Ferranti in Manchester, England, were using bright or dim dots to change patterns on a crt face to provide graphics. He also recalled visiting MIT in 1951 and seeing the bouncing ball display on Whirlwind and in the same year calling on Dr. Grace Hopper at Remington Rand where he was shown the direct creation of magnetic tape from keyboard, which was then uneconomic. This latter type of equipment has only been around in Australia for the past two years.

## CRT's will dominate

Malcolm Macaulay, the chairman of Information Electronics, Canberra, was one of the speakers to make a prediction about the future in his talk on "Computer Display Devices." He said he was going to be gloomy: "I believe that the next decade will show little alteration in the components available to the display equipment engineer. Although we have been promised revolutionary new display mechanisms, specifically the plasma display panel and the electroluminescent screen, I believe the crt will continue to dominate the field. The reason for my belief is as simple as a crt itself. A single source of electrons deflected to the display point desired is easy to control. A display panel with hundreds of thousands of points which must be selected is difficult to control. The crt is in common mass production."

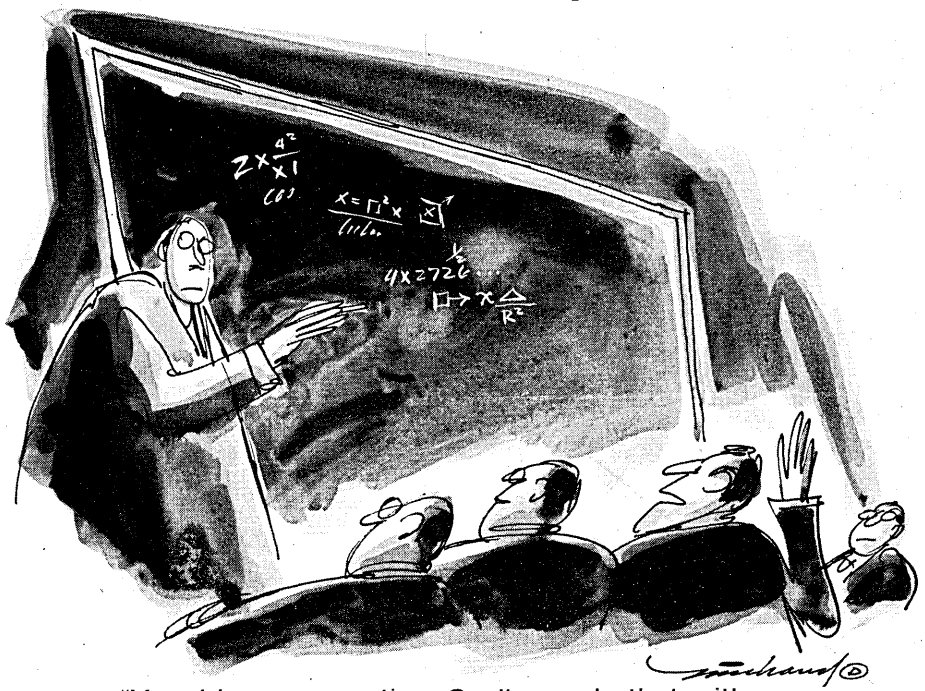
He continued: "I believe that display terminals will return to an earlier simplicity. It may make sense for a remote terminal to incorporate editing features, permitting people to add lines, insert characters or words and so on, but what is right for the remote location can be illogical when the terminal is in the environment close to a computer, which can do more logic per dollar than the special purpose hardware can provide."

Mr. Macaulay was speaking as a specialist peripheral manufacturer, the only one Australia has (though he hails from Minneapolis).

Merlin Smith, from the IBM Thomas J. Watson Research Center at Yorktown Heights, pointed out that large-scale integration can lead to a 17% reduction in price in an alphanumeric display. In these circumstances, "if we elect to forfeit our 17% savings, we can have instead several times as much logic and memory in our system." So the effect of LSI might be more function per dollar.

In a follow-up discussion, chairman Walter Kosinski stated: "It is natural that a major scandal could eventuate in someone tapping into someone else's data base within the next 24 to 48 months." Mr. Smith replied that a cryptographic function could be built into a terminal for around $100.

G. D. Clark of the Australian Post Office quoted figures which will enable American readers to gauge the size of the data communication market in Australia during the next few years. Currently there are 500 modems in use for data transmission and "this is expected to increase tenfold



"Yes, I have a question. Can't you do that without squeaking the chalk?"

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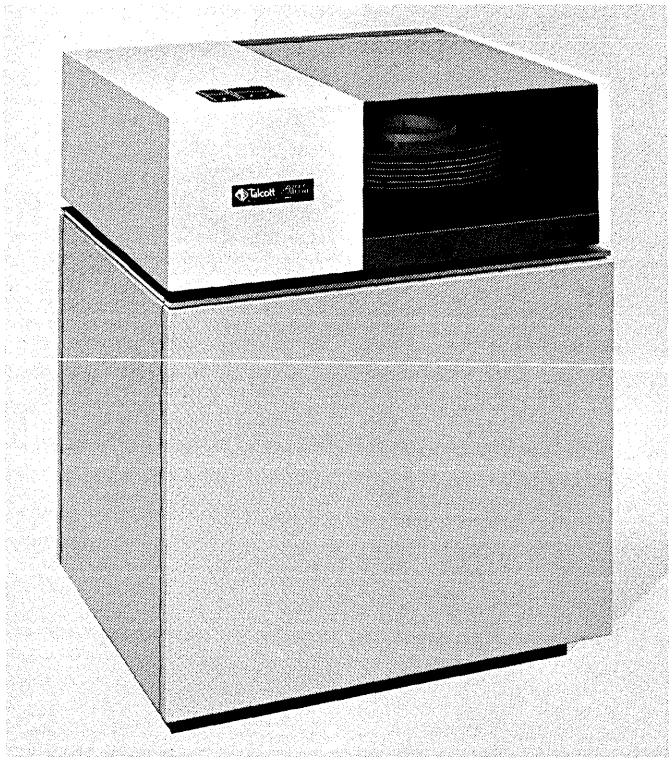
# $10,000 REWARD!



When you consider the fact that there are no premium charges for extra shift work on the Talcott 9311 Disc Drive, you can quickly calculate even greater savings than this on just a three-year lease. But that's just for one unit. In actual use, you can connect up to eight 9311's to one 2841 Control Unit. They can even be intermixed or directly interchanged with the 2311 or similar disc unit. Complete plug-to-plug compatibility. The Singer Company, Friden Division has engineered the 9311 to give greater reliability—with a unique servomechanism instead of a hydraulic system. Now consider this: dependable service by the worldwide Friden Customer Service Organization; leasing arrangements to give you maximum savings by Talcott Computer Leasing. Ready to "unbundle" your 2311's? Contact your local Friden office or write: Friden Division, The Singer Company, San Leandro, Calif. 94577.

Talcott

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in the next five or six years." Any device to be linked into the post office network has to be approved: no acoustic coupling device has yet been given approval.

Karl Machover, vice president of Information Displays Inc., stated that there will be no graphics language in the near future, although attempts will be made to produce one through PL/I and FORTRAN. It will be up to the supplier to provide a turnkey solution so that the user need not get into the software to use the graphics.

Dr. Robert Lucky for Bell Telephone Laboratories stated that it would be a long time before digital transmission overtook analog transmission and that modems would become more compact and more like computers themselves with one doing the job of 240 required at present. Edward Fuchs, also from Bell, instanced a growth rate of 85% p.a. for datasets and data access arrangements and suggested the growth areas in new systems would be in credit checking, on-line cash registers, and meter reading. Dr. Lawrence G. Roberts described the ARPA network, saying that an aim was that the communications costs should be less than 25% of the computing costs, which is in contrast to the more normal 50/50 break in commercial application. In discussion later he stated, "I believe in separating functions—the more I see of military and special purpose systems, the more I believe in specialization."

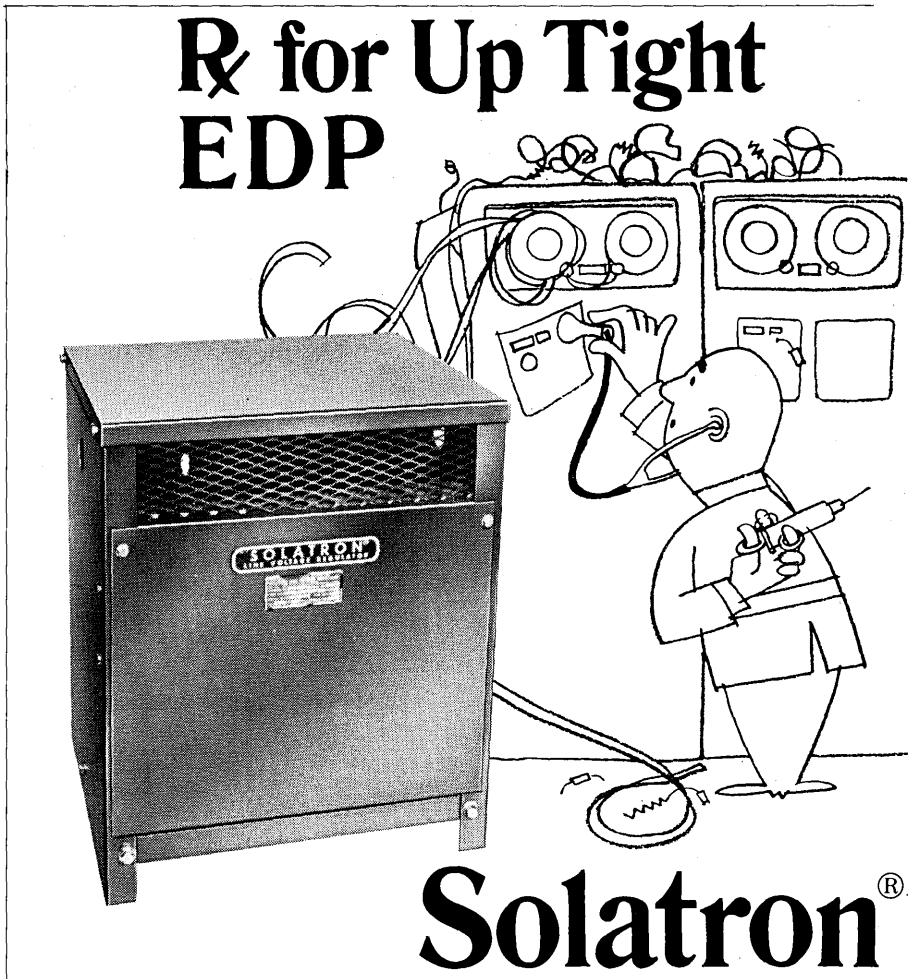
In the application of computer graphics to the analytical laboratory, Richard Rabin, g.m. of Varian Graphics and Data Systems Division of Palo Alto, forecast, that besides sample changers with automatic identification of the sample: "There will be a standard set of operating techniques in software, typically a macrolanguage designed for easy use by the chemist and the operators so as to permit simple modification of experiments and preparation for new ones."

## Men and machines

In discussion later Mr. Macaulay said that today the limits are not hardware or software, but the human being. "We have poor output mechanisms; for instance, our hands move slowly. With terminals we are aiming for the man/machine relationship that existed in the warm friendly days when we just had computer people and not engineers and programmers. The trend is to bring people back to the computer and the terminal will do this. However, we have a tendency to think that if we get a terminal for $3.98, all our troubles will be over."

At a conference like this the words flow out over the listeners, who succumb and fall into the technological stream. In initiating the Wednesday afternoon discussion the chairman, Walter Kosinski, asked: "Surely someone would like to defend the human race?" There was a "deathly hush" from the audience and it was a speaker rather than a listener who eventually came to the defense of humanity.

The conference ended on a high note on Thursday with a workshop session in which some of the speakers set themselves up as a company manufacturing terminals to order. A very human enterprise, that. ■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CIRCLE 63 ON READER CARD

# GOOD BREEDING SHOWS! THE NEW M-200D, THE COMPLETE HEAD-PER-TRACK DISC MEMORY OUT OF APPLIED MAGNETICS.

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***BORN FROM A COMPUTER:*** Critical head-to-disc interface relationships have been designed using a mathematical model and a proprietary computer program to assure consistency of flying characteristics of all heads within the memory.

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# NEWS SCENE

## Datran, Two Partners Plan Satellite System

Plans for a new domestic satellite system were on the verge of being announced at press time; it would provide a full complement of communications services to 52 metropolitan areas and compete directly with AT&T.

"Satran" (Satellite Transmission Corp.) is the tentative name of the system operator; it will be a joint venture of Datran, UCC's communication subsidiary, an unnamed aerospace firm, and a communications equipment supplier. Total initial capitalization will be $426 million.

A public stock issue is likely, once Satran's satellite plan has been approved by the Federal Communications Commission. Each partner's one-third interest would then decline, possibly to 10%.

Satran's proposed system includes one to three synchronous satellites in operation, plus backup capability. Each bird would be equipped with 24 transponders. One video channel or a minimum of 1800 voice-grade channels would be provided by each transponder. Reportedly, the communications supplier in the Satran consortium is working on an improved transponder capable of providing up to 10,000 voice-grade channels.

Satran's satellites would be linked to 150 ground stations, all but about 10 of them capable of two-way transmission. Datran officials estimate that it will cost about $300 million to build the system. Revenue in the first year of operations is projected at about 10% of the total domestic communications load "suitable for satellite transmission." In 1975, this total is estimated to be slightly over $1.1 billion. Satran's expected revenues that year would be "somewhat less than $150 million." Datran officials believe it will take "18 months to two years" to get the satellite project past the FCC.

Datran is one of nine companies or groups that recently notified the commission they may want to operate domestic satellite systems. Among the others were Microwave Communications, Inc., and its affiliates. "MCI carriers have studied potential satellite operations and are currently engaged in reaching a final decision," said their statement. It isn't certain, though, "whether a separate satellite is required for MCI carriers to service the public adequately."

Jack Goeken, MCI's president, when asked directly whether MCI would apply for a domestic satellite

## Hertz Wants Top Execs to Be in Driver's Seat

Top U.S. business management has increased its use of the computer for high-level prognosis and decision making only a few percent in the last five years, according to Dr. David B. Hertz, of McKinsey and Co., Inc., N.Y. management consultant firm. In an address before the Japan Computer Usage Development Institute in Tokyo, Hertz exhorted executives to try harder.

"In spite of increased levels of computer spending (from $8.3 billion in 1965 to about $25.5 billion in 1970), executives are still not getting the payoff they should," said Dr. Hertz. "Not only are top executives barely increasing their use of computer output, but they're also lagging behind in getting the right kind of output . . . receiving nothing but spin-off information from accounting-oriented data bases . . . and other after-the-fact information. What they should also be getting requires a more decision-oriented data base that can be used, for example, to identify potential market demands, indicate improvements in operating costs, and show profit profiles of alternative investment plans."

Hertz was pained by the statistics on executive implementation of computers, which showed that the percentage of computer resources allocated to "produce output for top management will average only 18% of the total this year, with 38% going to middle management, and 44% to operating supervisors. The 18% figure is up only slightly from 14% in 1965, and will increase to no more than 25% in 1975."

At that rate, perhaps operating supervisors will be top management by 1975 if they take advantage of the somnolent attitude of the higher echelons. With a projected $51.5 billion computer expenditure in 1975, there'll be lots of room up there.

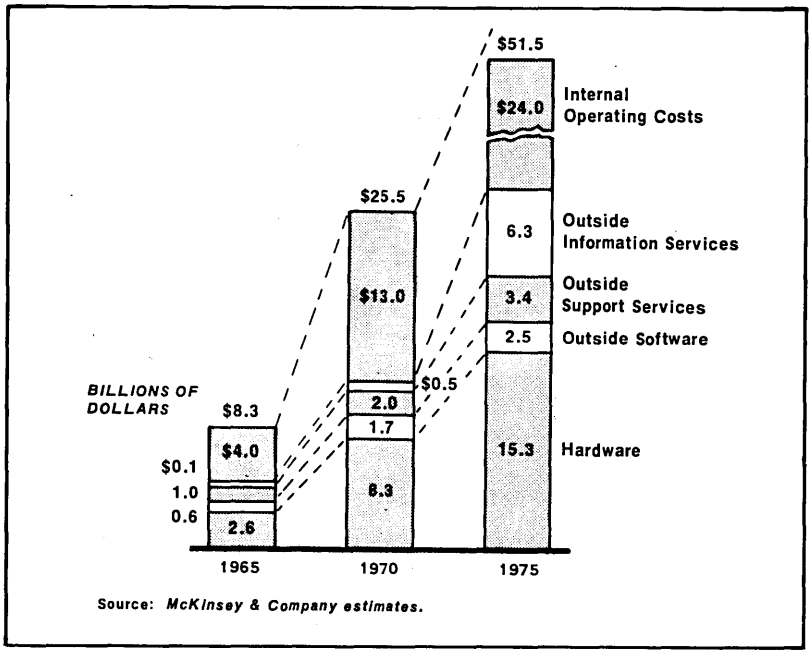
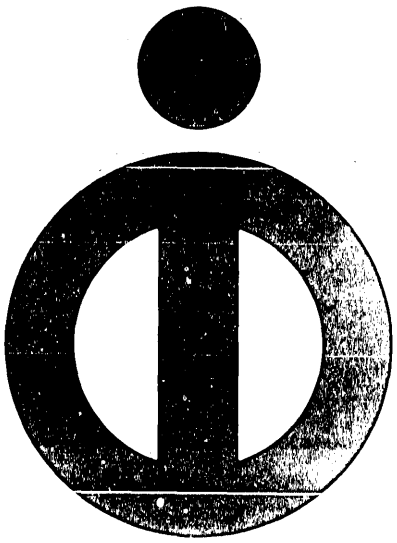



Chart indicates projected doubling of computer expenditures in 1975, although expenditures tripled in last five years. Exercising extreme caution?

# Introducing the 20lb. key-to-cassette video terminal that can cut your computer input costs 20, 40, even 60% to pay for itself within a year



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If you'd like to learn more about the Term-mite, write DID — **Data Input Devices, Inc.** — Tinkham Industrial Center, Derry, New Hampshire 03038. Or, telephone (603) 434-4551 today.

CIRCLE 31 ON READER CARD

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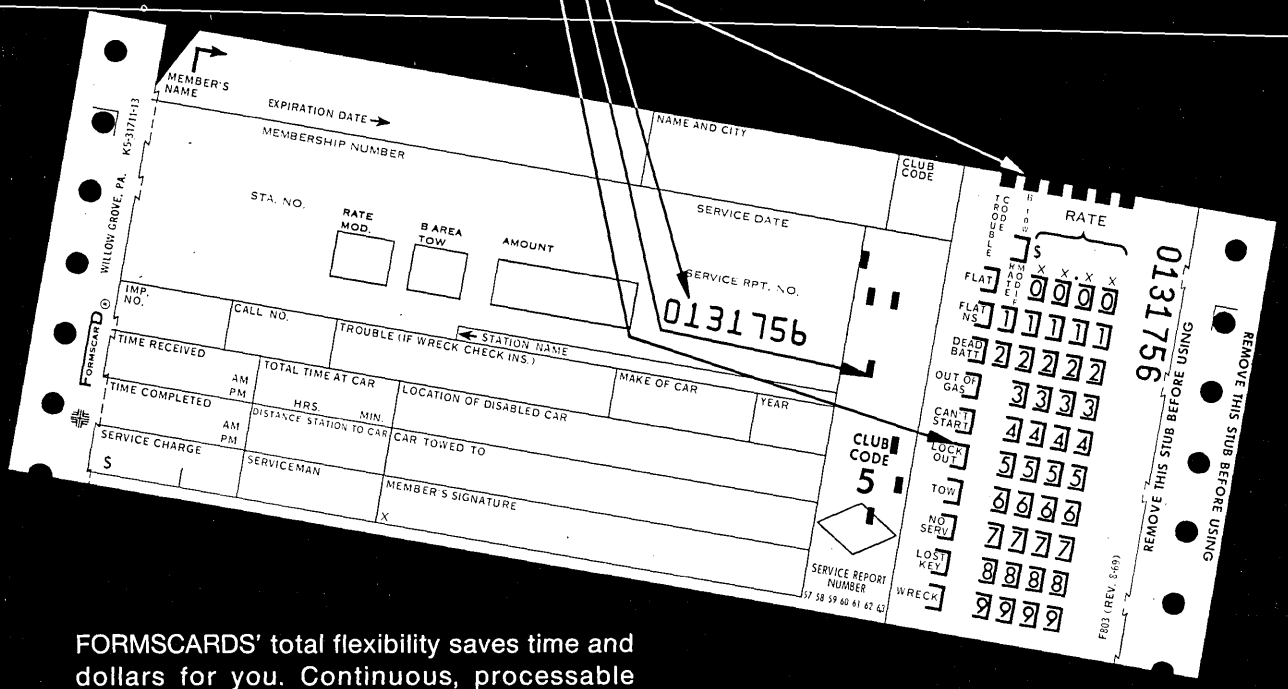


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license, said he thought it would depend largely on whether others offered to put up systems able to meet MCI's needs. "Money (to build the system) is not our main problem," he added. Goeken implied that if MCI decides to put up a satellite, the service will be aimed primarily at special users. Switched private communications system operators and educational tv broadcasters were explicitly mentioned. He indicated that a joint venture between MCI and users in either or both of these groups is a possibility.

Besides Datran and MCI, the following organizations told FCC they are thinking about going into the satellite business: Hughes Aircraft and TelePrompTer Corp., who apparently are planning a joint venture; RCA Global Communications; GT&E; Comsat; AT&T; and the three major tv networks.

Earlier, Western Union filed the first actual application for a domestic satellite system. Russ McFall, president of Western Union, said the projected system will provide his company "needed expansion capacity for its present and planned electronic data communications services."

One of the many questions FCC must resolve is whether the limited frequency available for satellite transmission should be assigned only to operators of multipurpose systems.

Western Union answers with a resounding "yes!" The company argues that membership in the satellite club should be further restricted to common carriers. But AT&T should be kept out because of its vast investment in terrestrial facilities. This investment might constrain AT&T "consciously or subconsciously in satellite innovation and planning. Western Union does not have such constraints."

Datran vp Ed Berg disagrees with Western Union, at least to some extent. He believes any company that wants to take advantage of satellite technology should be allowed to do so. But Berg is concerned about the number of systems authorized: "I would like to see three, or a maximum of four, because our market research studies show that the 1974-75 satellite transmission market won't support more than that number."

MCI's Jack Geoken also opts for competition. He adds that if special-purpose and multi purpose satellite operators are authorized, competition will resolve a number of policy questions that otherwise probably will have to be decided by the FCC. But it may be significant that Goeken says nothing about limiting the number of systems authorized.

The tv networks stated the underlying issue even more plainly when they told the FCC: "It is of major importance that no policy determination constituting an obstacle to . . . a specialized satellite system for network transmission . . . be adopted in connection with the Western Union application or any other application that may be filed."

## Timeplex to Offer Private Line Service

Private line service between Washington, D.C., and New York City will be offered at bargain basement rates starting in January. The supplier — Timeplex, Inc. — is a 14-month-old multiplexor manufacturer headquartered in Norwood, N. J., and headed by Western Union alumni. The company plans to derive up to 70 secure channels from a standard 4 Khz voice-grade line and sell them to separate users. Each channel will carry up to 150 wpm. A typical user will save nearly $100/channel/-month, says marketing vp Lloyd Bond.

Leasing a Washington-NYC private line direct from a common carrier costs about $315/month plus the Teletype rental, he explains. The comparable cost for a typical Timeplex channel will be: $47 for the line, $100 for use of Timeplex multiplexing equipment, plus about $70 for modem and local loop charges.

Savings are greater on longer hops, Bond adds. Between New York and Cleveland, the user charges are cut about $200/channel/month. Cleveland is one of "a number of cities" Timeplex is considering if and when the initial system is expanded. Chicago and Boston are other possibilities.

Besides providing private-line channels, Timeplex also will obtain Teletypes, other hardware, and related maintenance for a customer; "but we will act only as his agent, not as his supplier," Bond says.

The Timeplex service is one of the first of its type. A somewhat similar offering, involving wideband private lines (Series 11,000) has been announced by Series 11,000, Inc., New York City, a subsidiary of National TeleConsultants, Inc. Beginning next spring, this company plans to offer shared use of a communications line between New York City and Chicago that can be subdivided into 60 voice-grade channels. The user is promised a saving of 50% below what he would pay AT&T for a single private line between the two cities.

Both of these offerings are made possible by recent tariff changes that allow any of Bell's or Western Union's private-line customers to share lines and line charges with "joint users." The tariff forbids the customer to become a common carrier, meaning he must use a portion of any line capacity he leases; also, the customer can't make a profit from the charges he levies on joint users.

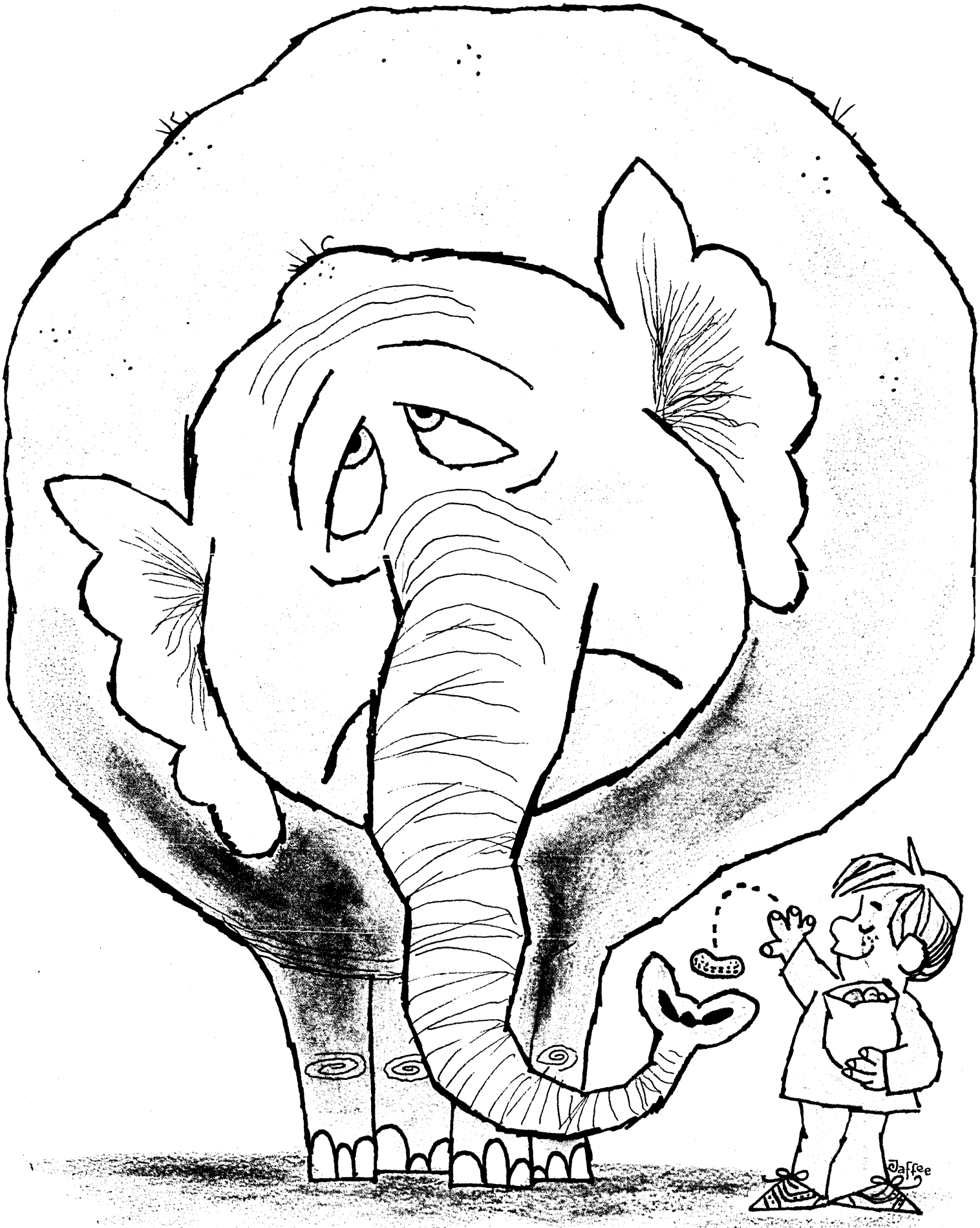
"Our profit will come from the multiplexor charge," explains Bond. "We will use a portion of our private-line capacity to demonstrate the Timeplex MC-70 multiplexor to prospects."

Asked whether special-service carriers like MCI and Datran pose any threat to the new service, Bond admitted they do, assuming FCC authorizes them to operate on the Eastern Seaboard. He thought this blessing wouldn't be forthcoming for quite a while. If the authority is granted, though, and serious competition does develop, he indicated that Timeplex could happily fold its tent and go back to marketing multiplexors exclusively.

The company regards its new shared private line service as a means, not an end, Bond said. The underlying goal is development of a future market for the MC-70 among telecommunications users who don't have a big enough transmission load right now to justify acquisition of their own multiplexor equipment.

## Western Union Making Good on Utility Claim

Western Union has characterized its computer efforts as a utility ever since it entered the field. Now it has a good basis for this designation. The communication company is 46% owner of Western Union Computer Utility, a franchiser of service bureaus which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Inforex feeds hungry CPU's. It does electronically what other forms of data entry do mechanically.

**The Inforex system** gathers data from eight keyboards into one disc memory unit. Data may be sight or key verified. Built-in logic performs check digits, left-zeros and balance totalling. Jobs are pooled onto 7 or 9-track compatible tape. Optionally, it will operate on-line directly to your central processor.

**Keypunch/verifier functions.** Starting with the familiar 64-character keyboard, each Inforex keystation performs all keypunch and verifier functions: Automatic check-digit computation. Automatic left zeros. No digit by digit keying is necessary. Electronic skipping and duplicating rather than mechanical. Auxiliary duplication or two additional levels of program control. Automatic + or − signing of fields.

**Simultaneous entry and verification.** All eight keystations input to one disc memory unit. Each keystation is assigned an area as it enters. Any keystation can access any assigned area at any time. Since each keystation has both sight and key verification capability, one keystation can verify work entered on another and if desired, verification can be done simultaneously with data entry.

**Keyboard to tape functions.** Inforex automatically pools input from up to eight keystations onto 7 or 9-track compatible tape. One easily entered statement transfers a series of batches. Only one keystation is required to initiate the transfer, and all keystations are functional during transfer. There are no cartridges to handle or identify, no special equipment needed for pooling.

**Recallable programs.** Each program has four levels of control. Once the program is keyed, it can be stored for future use and recalled by any operator merely by keying its appropriate program name. Up to 128 different program controls can be stored. There's no program card or tape mounting and no repetitive program control keying.

**Self-balancing.** Zero balancing is an integral part of the Inforex system. Each operator may accumulate a control total during data entry. Edit controls allow rapid correction. Adjustments to the balance total occur automatically during verification.

**125-character records.** With Inforex Intelligent Key Entry, the record length is variable up to 125 characters.

**Full record display.** For added accuracy, each keystation displays an entire 125-character record with moving cursor and position counter. The system has a forms capability that allows data entry and verification in a "fill-in-the-blank" fashion. Operator messages for direct interaction with the system along with search and paging of a file are standard.

**Attractive office decor.** Inforex design innovation doesn't stop with the components. Each Inforex keystation is built into an attractive contemporary walnut and black steel desk designed for operator ease and comfort. And remember, the system is electronic, not mechanical, allowing a quiet, comfortable atmosphere to work in.

**Inforex monthly rental cost is $50 per keystation. $560 for control unit (up to 8 keystations). $960 for a complete 8 keystation system, including maintenance.**

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CIRCLE 44 ON READER CARD

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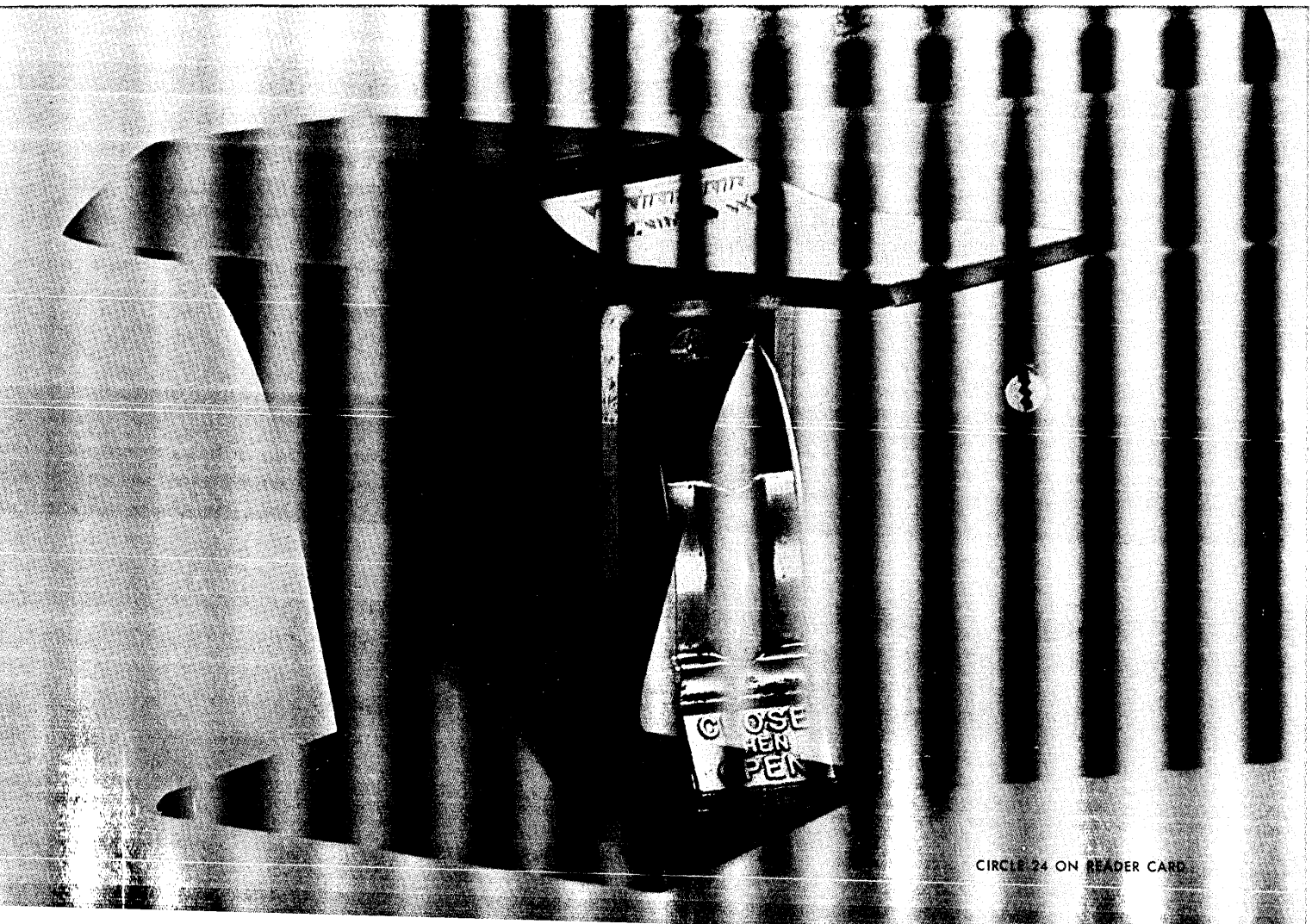


CIRCLE 24 ON READER CARD

eventually will be gathered into a national on-line network.

Less than two years old and selling franchises since April 1969, WUCU has sold 39 and let options on 63. One energetic entrepreneur, Computer Utility of Mid-America, bought four and optioned 41. The price for each is $30K. In 1969 WUCU revenues from license sales and royalties were $467,313. For the first half of 1970 sales were $379,298.

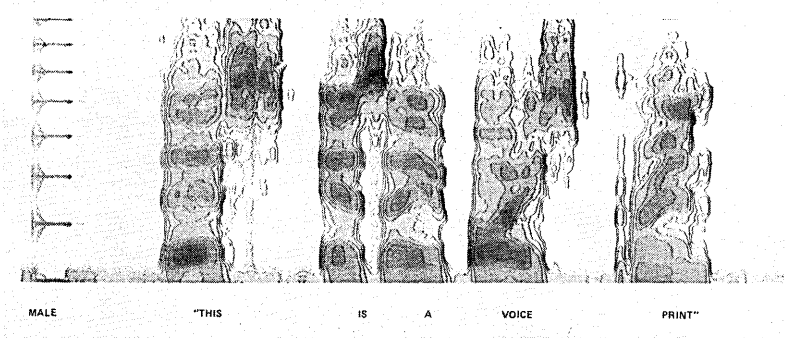
WUCU is the brainchild of Boris Ellison, a long-time New York City service bureau operator who is the president of the company and owns a 46% interest in it. The remaining 8% is publicly held. Ellison sold his Associated Sales Analyst company to CAI in 1965. Restricted by a four-year covenant to operate only in Florida, he spent the time developing a scheme for establishing 300 service bureaus nationwide and producing application packages for the IBM 360/20.

Ellison is credited with making the marriage with WU's Russ McFall. The simplicity of his offering probably had a lot to do with it. WUCU, for the $30,000 (usually $10,000 down with two- or three-year terms) and 10% of monthly gross, provides the licensee with a territory, two weeks' training, some sales support (mainly application brochures for direct mailing), the library of 150 application packs (accounts receivables, payables, payroll, etc.), and programming support.

The franchisee must buy the Mod 20 and hire operations and sales people. They find this investment cheaper than going into business alone. One buyer said initial costs were about $80,000, including the fee and one-year charges for the computer and personnel.

All program modification is handled by WUCU at its Ft. Lauderdale headquarters. Total staff there is 35, with the majority doing programming. Ellison said this enables WUCU to control its product. There is no per-job charge for programming; it is covered by the 10% royalty.

Another selling point grasped by franchisees is the promise, made in the prospectus and elsewhere, of the eventual joining of the individual Mod 20 centers into clusters around a more powerful regional center and combination into a national on-line network. They talk of being able to service dispersed company operations and of the advantages of WU's communications — conversation that stirs memories of WU pronouncements in 1965.




This is a voiceprint, and there isn't another exactly like it. Voiceprint Laboratories Div. of Farrington Manufacturing Co., Somerville, N. J., is developing a Varian 620/i-based speaker recognition system which stores and compares such prints to provide verification of a person's identity. Who goes there? Joe Smith by any other name will turn up Joe Smith using this system because, says the company, no two voices are exactly alike and a voice-signature cannot be counterfeited.

No regional centers have yet been established, although Ellison claims WUCU will be into time-sharing by the first of the year. He said equipment more suitable to time-sharing must be placed in the centers. WUCU's 25%-owned International Data Terminals, Inc., will provide the equipment. Right now the only peripherals they have are the Punch Verifier, for verification of punched cards, and PowerGuard and Envirogard, devices for monitoring power fluctuations and computer room temperature and humidity.

The performance of franchisees is heartening. WUCU claims they should easily make 10% over costs and that $5000 a month is sufficient for breakeven. This is the case at least with Computer Utility of Atlanta, a subsidiary of RT Systems, Inc. In operation since October 1969, it had built revenues to $14,000 a month by July. About $6000 of this comes from sister subsidiaries such as U.S. Van Lines. It has 12 subscribers.

Although only one-third of existing franchises have connections with a corporation, WUCU is now partial to such prospects. Ellison believes they are more corporation oriented and profit conscious, whereas the individually owned center reflects the entrepreneur's personality. Also, the corporate-backed groups can spread faster. Computer Utility of Mid-America is an example of this. Owned by Milwaukee-based Time Holding, Inc., it had four franchises in Indiana and recently bought 41 more. Its territory now includes all of Indiana; parts of Illinois, Missouri, Iowa, Minnesota, Nebraska; and Denver. The first centers went into operation in early August. All 45 must be in operation in three years under its agreement with WUCU.

## Honeywell-GE: How the New Company Looks

Honeywell has been moving to eliminate its seven divisions in the Computer and Communications Group and mold them into a single unit around the EDP Div. News of the move came up last month as the company was preparing to ask its stockholders to approve the Honeywell-GE merger at a Sept. 18 meeting.

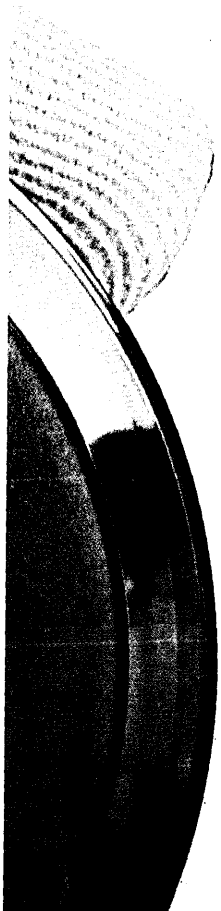
Top man in the new organization will be Clarence W. Spangle who holds the title of president of Honeywell Information Systems, Inc., name of the new venture. Edward C. Lund, Spangle's No. 2 man, heads the U.S. operation. Allan L. Rudell continues in the top international post. Robert P. Henderson of EDP will coordinate marketing for the new organization.

Many of the GE people who will switch over to the new company will get top field marketing posts. A Bull-GE man will be assigned the No. 2 spot in the international operations under Rudell.

There were indications that the new organization won't be able to di-

# The name
# makes a
# in disk

# on the label difference packs.



When the name on a disk pack is "Scotch" Brand, it comes from the world's most experienced producer of magnetic computer products.

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## The barrier breakers.

CIRCLE 48 ON READER CARD

# Quantor 100

# ...the first part of Quantor 1·2·3

CIRCLE 91 ON READER CARD

gest the entire merger in one gulp. Honeywell has announced layoffs in its EDP and Computer Control units, and more could be coming. The French government is said to have been successful in protecting most or all of Bull-GE employees as part of the price for governmental approval of the merger.

Honeywell's disclosure that the GE computer operations it is taking over were marginally profitable in 1969 has touched off speculation about GE's domestic time-sharing operation. Some feel that GE tried to unload this unprofitable activity, too, but Honeywell wouldn't take it.

As for equipment, Honeywell's 200 series seems to be safe, as do GE's small and large machines. GE's 400 series, though, should be an early casualty. Another casualty may be GE's advanced design and development on its new line. There is still plenty of life left in the new computer company's existing products, and work on Honeywell's new line is said to be proceeding smoothly — although somewhat behind schedule, with an announcement due next year.

## Youth, Chapter 11 May Yet Make a Best Seller

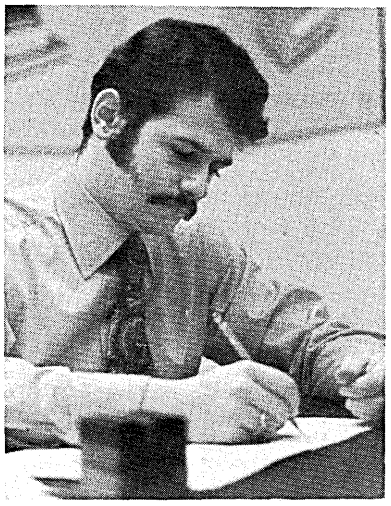
On the surface at least, the fate of Logitron, Inc., of Cambridge, Mass., would appear to be fairly representative of the fate of many young computer terminal companies these days — Chapter II: assets of $112,000; liabilities of $374,000.

However, as this is written, the firm

Logitron president Derick O. Dahlen.

was on the verge of being acquired by "one of the Fortune 500 companies," which wants to continue producing Logitron's portable crt/keyboard terminal, the Logiport/1 (*Datamation's* April product of the month).

Logitron was hit by the same problem that has been hurting virtually all of the small and new computer peripheral companies — the tight money market. Besides that, the Massachusetts company experienced additional difficulty because of the youth of its managers. Nicholas Covatta, chairman of the board, now 24, was 22 when the company was formed; and Logitron's president, Derick



Chairman of the board Nicholas J. Covatta, Jr. . . . "People objected to our youth."

Dahlen, just 20 when the firm was established, is still only 22.

"People objected to our youth," said Dahlen, in reflecting upon the reasons for the firm's bankruptcy. "We found that many people were uncertain of our ability to run a company. But, looking back, I don't think we made any big mistakes in marketing or manufacturing, although maybe we should have sensed the deteriorating money market earlier, and maybe our r&d program was too ambitious."

Besides Logitron's portable terminal, the firm — which had once grown to a staff of 35 employees — was developing a whole line of computer peripherals. In all, Logitron shipped 20 Logiport/1s, which are priced at $2950 for a single unit and below $2500 in large quantities.

"We'll concentrate on the Logiport/1 at first," says Dahlen. "We feel very strongly that the Logiport is our bread and butter product. Later on, we'll round out our product lines."

Others who have examined the Logiport terminal and the company itself have praise for the design and concept of the product, although the big question now seems to be whether the industry is ready for a portable crt/terminal. Be that as it may, Logitron will have to do some missionary selling to be successful, and an alliance with a large firm would likely be a valuable asset for this purpose.

Although Dahlen feels Logitron may have overdiversified too soon, and may have spread itself too thin in the r&d area, in the long run he is convinced the company must have a balanced product line if it is to be successful.

What he finds particularly galling are the orders he says he has been unable to fill. "I just had an order for 50 units the other day," he says. "We have a firm backlog of over $750,000 in orders right now, and that's pretty good, I think."

If the proposed acquisition does go through, Dahlen said Logitron will remain in Cambridge as a wholly owned subsidiary of the parent firm. Logitron, which was formed promarily by a group of MIT and ex-MIT students, has kept 10 employees active in the company, and these are expected to form the nucleus of the proposed subsidiary. Dahlen expects to begin small volume shipments in October, and to increase production over the next few months. He figures Logitron will have 35 employees again in January.

Dahlen won't divulge the name of the company he said is interested in acquiring Logitron. Other sources, however, report that one firm that has shown an active interest in Logitron is Litton Industries.

## Lease Deal Adds to Sanders Credibility

Sanders Associates Inc. of Nashua, N.H., a company that made its fame and fortune in antisubmarine warfare and electronic counter measures, is picking up more and more credibility for its stated intention of becoming a major force in the computer industry.

The latest development: the establishment of a leasing company under joint ownership with the Randolph

Computer Corp., which is a subsidiary of the Travelers Corp. In the new company — which is a 50-50 agreement between Sanders and Randolph — the emphasis will be on leasing Sanders low-cost displays — the 620 and the 720. Sanders will act as the rental agent and be responsible for customer interface in the new firm.

Says Joel Kosheff, Sanders' treasurer: "Plans provide for purchase by the leasing company of up to $20 million of Sanders data-display equipment for lease to Sanders customers." The leasing company will lease only Sanders equipment.

Many industry observers view the establishment of the leasing company as the precursor to the unveiling of a new line of low-cost programmable desk-top display terminals. The firm has been working on the system for at least several months now, and it is possible that working terminals could be ready for the Fall Joint Computer Conference.

When asked whether the terminals would be offered through the new leasing company, Mr. Kosheff would say only that new display equipment might or might not be offered by the new firm.

Equity financing for the new leasing company is being supplied jointly by Randolph and Sanders. In addition, a group of financial institutions headed by Walter E. Heller & Co. is providing part of the financing.

In another development at Sanders, Solitron Devices — a manufacturer of electronic components — revealed that it has taken a stock position in Sanders. The presidents of the two companies met recently, and it was stated that Solitron has no intention of seeking any union with Sanders. However, Solitron is a supplier of components to Sanders and the fact that Solitron has taken a stock position in Sanders is not expected to have an adverse effect on Solitron's business with Sanders.

### IBM Off the Hook. Or is it ADR?

In one way it was a surprise and in another, it wasn't last month when Applied Data Research dropped its antitrust complaints against IBM.

The vociferous defender of independent software and priced programs agreed to withdraw its charges in return for $1.4 million to cover some legal expenses and a promise by IBM to purchase a minimum of $600,000 worth of ADR's Autoflow over the next three years. Also dropped were charges from Programmatics, a subsidiary which ADR has since sold to Computer Machinery Corp. of Los Angeles.

Neither company would comment on the precipitous settlement; but it was known that ADR could use a little capital to offset the losses it experienced in the first half of this year. Also contributing to the settlement was the recent departure from ADR of Dick Jones who was its president when the suit was instituted in April of 1968. And it's also thought that the anxiety of the software industry has eased since IBM unbundled, at least sufficiently for ADR not to wish to continue the cost in time and money that an antitrust action requires. An annual $1.5 million legal bill for a $6 million-a-year company indicates that ADR may have been unrealistic in starting the whole thing.

IBM, always the realist, realized that $2 million is much less than the $900 million in treble damages ADR asked in its suit. It also must have realized that with ADR out of the way there is no one to argue the case for software. The ADR complaints included patent misuse; patent fraud; premature announcement; tie-in sales; and the monopolizing of software packages, customer software and services, processing services, hardware, maintenance, and education.

Meanwhile, there was no indication from Control Data, DPF&G, and the Justice Dept. that they are intending to withdraw their suits.

IBM can be persuasive, however; and time is on its side, since no one expects any decision on the antitrust suits for three or four years.

The ADR-IBM settlement came only three weeks before the hearing that would have decided ADR's latest suit against the computer giant. The software company had asked for a preliminary injunction to halt distribution of three IBM packages, including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CRJE, a conversational remote job entry program which ADR claimed would deprive it of a substantial market for its ROSCOE package (Aug. 15, p. 67).

ADR executives at that time felt they had a very strong case and even held a press conference to present their position. ADR said it had invested what amounted to $600,000 in ROSCOE — which coincidentally is what IBM offered for the Autoflow purchases. Meanwhile, freed from the injunction, the big company immediately resumed distribution of CRJE and probably closed out ROSCOE from the market completely.

## Presidential Study Delays Wimmix RFP

Release of the Wimmix (Worldwide Military Command and Control System) specs has been delayed again.

DOD's front office wants to analyze a "highly critical" GAO report which discusses planning for the big buy. The report was requested by the House Appropriations Committee.

Another delaying factor is the Fitzhugh Report, particularly its recommendation that the Joint Chiefs of Staff operations responsiblites be transferred to another group. One of those responsibilities is its management of Wimmix.

The Fitzhugh report was prepared by a group headed by Gilbert Fitzhugh, board chairman of Metropolitan Life Insurance Co., which was named by President Nixon to review DOD management policies and practices.

A key member of the Wimmix implementation team had said he expected the RFP would be out by Aug. 1 (July 15, p. 83). It was felt this latest halt in the Wimmix countdown meant that final specs wouldn't be released until some time this month. An even longer delay was extremely likely.

## NBS Launches First Compatibility Study

The National Bureau of Standards has begun studying how to interface cpu's and tape drives of different makes. In three or four months, hopefully, a five-member task force will report whether, and where, opportunities for standardization exist.

The task force may then begin drafting a federal standard requiring tape drive and cpu makers to modify their present I/O hardware/software; the goal would be development of drives that could be mated with any of the cpu's commonly used by Uncle Sam. Following the tape drive study, there will probably be others aimed at this same basic goal. The second one is likely to involve disc drives.

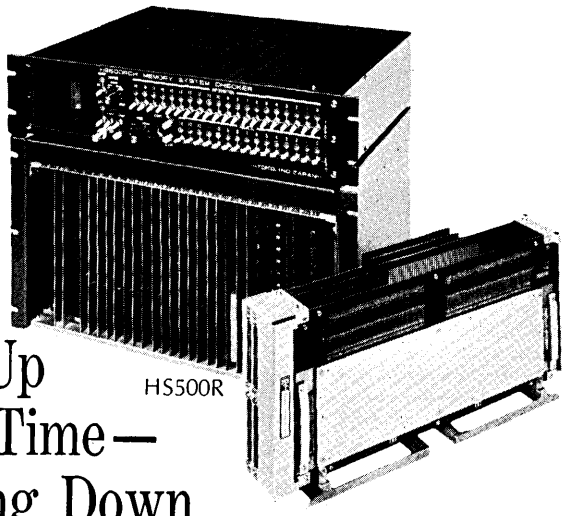
While the NBS studies are under way, the feds hope that independent tape drive manufacturers, on their own, will develop adapters and/or modify their existing hardware. GSA is reported to be thinking of encouraging them by releasing an RFP covering replacement of a number of tape drives connected to non-IBM cpu's. Now, the independents offer compatibility only with IBM computers. NBS officials believe there are nearly 900 Burroughs, CDC, and RCA drives that could be replaced with compatible units at a profit to the manufacturers and a saving to the government. This is the carrot that will be dangled in front of the industry by GSA if it releases the RFP.

According to one estimate, the taxpayers would save $8-10 million if all of these non-IBM drives were replaced by units renting for $610/month and selling for $18.5K apiece. This probably represents the approximate price range GSA will be shooting for if it asks for bids.

The General Accounting Office has predicted that if manufacturers of all the commonly used peripherals exploited existing opportunities for greater plug-compatibility, the government could save on the order of $100 million. Equipment now leased from a system supplier could then be purchased from either an independent or a system supplier.

Peripheral makers haven't been exactly excited by the feds' sales pitch or the promise of increased compatibility. However, this skepticism may be fading. University Computing recently established a special


What Memory-System Maker Is Speeding Up the Cycle Time— But Holding Down the Price? Toko. Of course!

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CIRCLE 74 ON READER CARD

products development group to develop peripheral adapters, and EG&G introduced one fairly recently — the Mod 832 Data Interface. EG&G's device works only with minicomputers, but federal officials think the company's approach is promising — it consists basically of using interchangeable logic cards to adapt a particular peripheral to a specific cpu.

An industry source applauds the NBS task force study. "The interface problem has never been adequately defined," he says, adding that "we'll have to wait and see whether the study resolves the confusion enough to begin work on an interface standard."

## Certify Professionals: Who and How?

Should a CP become a CCP? This means: should a Computer Professional undergo tests to qualify him as a *Certified* Computer Professional?

The American Federation of Information Processing Societies felt the subject was worth considering last January when it called together a group of 19 industry people for a round-table talk with former Labor Secretary Willard Wirtz. Its 21-page report was released this summer.

Certification, thought the conferees, should be concerned with the following professionals: system analyst, system designer, system engineer, programmer, equipment design engineer, manager of computer operations, computer operator, maintenance engineer, auditor and control person, instructor at schools and universities, researcher, and consultant.

The report recommends that before such tests be established, AFIPS find out the following: what a computer professional should do; what minimum standards are required for him to do his job; what kind of examinations exist for him to take; what ethical questions should be asked of him; how should the public be informed of what is being done.

Questions. Questions.

But the conferees strongly recommended AFIPS move ahead with a project on certification. "The public is becoming more concerned about the impact of the computer on society, and the harm the computer may cause ... Unless the computer field sets up a system of self-policing, federal and state governments may step in ... Now is an appropriate time to consider the question before fast action is needed."

## '70 BEMA Show Short on Computers

Has top management failed the computer? The Business Equipment Manufacturers Assn. wonders.

And BEMA's 1970 business equipment exposition and conference opening in New York City Oct. 27 should provide some answers. Dr. Robert Weinberg, Anheuser-Busch, Inc., will address this question in his keynote speech. And a glance at the exhibitors list at this writing gives the impression that the computer manufacturers feel management has failed. Only CDC and Honeywell represent the major manufacturers at the four-day exhibition. Varian and Wang Laboratories are the mini standard bearers. Systems companies are more numerous.

Theme of the accompanying conference (Oct. 27-29) will be "Business Minded Management in a Systems Environment." The American Management Assn., handling the conference, will depart this year from the Hilton habit and will hold sessions in the Americana Hotel.

Some $40 million in equipment will occupy 96,000 square feet of the New York Coliseum. Last year, 100,000 square feet were used. The decline is attributed to the economy. No decline is expected in attendance. Since 65% of the attendees are within 300 miles of NYC, BEMA expects very close to the 62,000 who came last year.

## Latest Association: Programmers & Analysts

As if there weren't enough professional societies already in the computer industry, another was launched in August: the Association of Computer Programmers and Analysts.

The new organization, founded by eight senior analysts and programmers, aims to become a national group with local chapters. Its goals are to upgrade the "skills and qualifications" of its members and improve

**Some of our systems users. Their prospecting is now paying off.**

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Eli Lilly
Ethyl Corporation
First New Haven National
General Adjustment Bureau
B. F. Goodrich
The Hartford Insurance Group
Hobart Manufacturing
Itek Corporation
Johns-Manville
Manufacturers Hanover Trust
Manufacturers & Traders Trust
Mohawk Airlines
Monroe Calculating
Motorola, Inc.
The University of North Carolina
Owens-Illinois
Pepsi Cola
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Royal Typewriter
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# The software rush may be starting for some, but our systems users struck it rich long ago.

**If you're prospecting for software products, take a few tips from some 'old-timers'...**

Today, most data processing executives are out prospecting for packages to enrich the efficiency of their computer installations. From retrieval and reporting . . . to file maintenance . . . to complete management information systems . . . they are digging for pay dirt.

As old-timers in the business of software systems, we'd like to offer a few words of caution.

**First,** consider products that have been tried, tested and proven—and are constantly improving their capabilities.

**Second,** consider adaptability to your own unique requirements. No system will do everything—so look for optimums, not panaceas.

**Third,** be sure the system is flexible enough to expand to your own growth as well as adapt to the inevitable changes in computer hardware.

**Fourth,** look for a system that is easy to install . . . easy to understand . . . easy for your people to use.

**Fifth,** if you are considering doing it yourself, internally, compare the economics with a ready-to-use system. Compare actual costs—salaries, computer test time, overhead, documentation, etc.—not just out-of-pocket costs. And consider, too, the profit of using the system many months sooner.

Information Science has been supplying software systems and services to major organizations for over five years. User applications range from personnel to marketing to inventory and quality control.

We don't have all the answers, nor do we pretend to. But we do have plenty of experience. And we can give you as much information as you need to help you make decisions. Also, we have provisions for testing our systems yourself, on your own files.

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**The Data Analyzer—a distinctive advance in generalized retrieval-reporting systems with unlimited computational capabilities; expedites management decision-making by presenting data in more usable form; statistical routines and graphic presentations include bar charts, matrixes, point plots, as well as all standard reporting formats. Modular structure of the system offers flexibility for expansion to unique user applications.**

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CIRCLE 26 ON READER CARD

the "conditions and systems" under which they work.

The ACPA apparently sees itself as a protector of programmers and analysts, filling a need not met by DPMA or ACM. President Paul Notari, former director of communications at the Business Equipment Manufacturers Association, explains it this way: "There are two other professional associations (which) profess to represent the analysts and programmer. But ... in one case the hierarchy of the association consists almost entirely of edp managers, many of whom never have been a computer programmer or analyst. In the other case, the association was founded by and still caters very heavily to the needs of the scientific programmer, much to the exclusion of the business analyst/programmer who by far is in the majority."

The ACPA thinks programmers and analysts have become whipping boys for problems in edp operations. The association's chairman, William M. Newell, a teleprocessing consultant for Complex Systems, Inc., says, "this is nothing more than a 'cop-out' on the part of those individuals who are looking for a scapegoat to explain why their operations have repeatedly failed to meet their objectives."

While programmers and analysts are unjustly blamed, the "real problem," as ACPA sees it, is threefold: First, "in many cases hardware has been designed with too little regard for the existing skills of the personnel involved." Second, business has been guilty of a "wholesale neglect ... to provide continuing education for its personnel responsible for application of the hardware." Finally, there is a "lack of data processing know-how on the part of data processing management. Thousands of edp installations today are being headed by managers who came up through the ranks of accounting, finance, eam administration and the like, and who are befuddled by the complexities of modern edp system analysis and programming. And these are the men who are controlling the destiny of the edp industry."

ACPA will attack each of these problems. It will establish liaison with manufacturers in an effort to influence the design of future systems with consideration of the human elements involved. It will apply for membership on ANSI's X3 Data Processing Standards Committee. It will launch a public relations campaign to "convince upper management that edp operations must be managed by edp professionals." And ACPA will conduct educational programs for members. Interested parties may contact ACPA in Suite 1500, 2 Penn Plaza, New York 10001.

▪▪▪▪

### Certification Program

The National Association of Computer Assisted Analysts, formed 1½ years ago as a group of operators of time-sharing terminals, primarily Datatext and ATS, and currently seeking recognition as a more general time-sharing organization, has moved to enhance the status of its operator members with initiation of a certification program. Dr. Richard Lynn, a project engineer at North American Rockwell and a psychologist specializing in measurement, is working with NACAA to develop a certification test that will measure an operator's ability in terms of education and experience.

▪▪▪▪

### ISA Joins AFIPS

The Instrument Society of America has joined the American Federation of Information Processing Societies as an Affiliate Society. AFIPS president Dr. Richard I. Tanaka said ISA has made "many important contributions to the computer science and data processing field." ISA's interests include information acquisition, automatic control, telemetry, and data processing. It maintains a department that includes Data Handling and Computation, and Telemetry divisions. ISA joins seven other affiliates, including such diverse groups as the American Institute of Certified Public Accountants, the American Statistical Association, the Association for Computational Linguistics, and the Society for Information Display.

## Car/Puter Fixes Car Costs

A clear consumer benefit is being effected by the computer through the services of the Car/Puter Co., Great Neck, N.Y., which provides computer printouts of dealer costs of new cars.

For just $5, a car shopper can obtain a detailed list of exact dealer costs of the automobile and accessories, as well as suggested list prices and delivery charges.

And if this isn't sufficient to enable the customer to haggle a low price, an affiliated organization, United Auto Brokers, will obtain the car exactly $125 above cost, retaining $25 of that amount as its fee. Unless you want a Cadillac, Lincoln Mark III, or a Corvette ... then the price will be higher because of limited production.

At present, about 4% of Car/Puter customers subsequently purchase a car through UAB.

It may seem simple on the surface, but the firm now handles 374 models of domestic cars and trucks and foreign cars, with literally thousands of possible combinations of equipment. It would cost a lot more than $5 to provide such information without a computer. A (time-shared) Hewlett-Packard minicomputer is all that's needed, although the firm foresees a need for its own computer in the future.

Car/Puter is a division of Cost-/Puter, Inc., which intends to expand into other consumer areas. It will establish a Cost/Puter Club in January for distributing costs of major appliances. Recreational vehicles will be listed by April, and used cars by next summer.

## How Do You Kick a Teletype's Tires?

After five minutes in the Ford dealer's showroom, you decide on an LTD with air, power steering/brakes/windows, vinyl roof, and green exterior/black interior. Can you get immediate delivery?

The smart salesman, knowing he has a better chance at a sale if he can get you one today or tomorrow, will break his back to find one. Otherwise, he'll have to ask you to wait three weeks while he orders it. Next step: frantic phone calls to neighboring dealers with whom he has a friendly relationship. At some dealerships, an inventory might exceed 1,000, and a manual search takes time. Multiply that by the number of dealers that must be polled, and the wait becomes interminable.

A computer application? Several

people have thought so, including year-old McDa Co., Los Angeles, an eight-man firm headed by Tom McJilton and Dick Davis. Using the firm's conversational Telequest software package, McDa is trying to sell local Ford dealers on the idea of forming 10- to 12-dealer pools, allowing their total inventory to become the stockpile of any one of them. A dozen dealers is seen as the upper limit of a pool, three as the lower, but at last count there were only two signed up.

The pricing schedule, apparently still tentative, calls for a minimum $100/month for the Teletype terminal and line costs, $2 for each entry, 2 cents a day while the entry is in the field, and 25 cents for each inquiry or transaction. A salesman could place a "hold" on a car in the file, and that counts as a transaction. As an added fillip, McDa offers a periodic inventory to each dealer, a feature that reportedly pays for up to six months of the dealer's subscription costs. They cite, for example, a dealer who recently closed his shop for an entire day just to take inventory, during which time he was unable to make any sales.

The average dealer, they say, has from 200-300 cars in his inventory, although some may go above 1,000. Again on an average, a car sits in a lot for 45 days, a time span McDa hopes to cut to 30. Some 50-60% of a dealer's sales are said to be of cars on another dealer's lot. Combining the size of any given seller's inventory with the time required to perform a manual search for a car with specific features, and adding the frequency with which such searches are made on someone else's lot, McDa figures the on-line mode would have wide appeal.

If the idea doesn't sell in Los Angeles, reknowned as an automobile town, where can it succeed? In the past, it's been tried in the Midwest and in the Southwest. Through 1968 and early '69, Com-Share had a car locator system that tied in all Chicago-area Ford dealers and the regional distribution center. A salesman then had an inventory of as many as 15,000 Fords on dealer lots and at the regional center. Accessing this data base, he could specify by model and options, get back a printout of serial numbers and locations. Com-Share, however, closed its Chicago data center. About the same time, Computer Complex had a similar package on its computers, but this service too has been discontinued.

Undoubtedly there have been more, for the service is akin to those offering real estate listings or job openings. Mindful of this are the people at McDa, who anticipate expansion to these other services. But first they want to get this auto inventory service off the ground. When they do, they can then expand the list of services to car dealers, offering also to set up a spare-parts inventory on a pooling basis and to prepare and print out parts labels, not to mention management reports and the typing of post-sale letters (thanks for buying, time for an oil change).

McDa's system, residing in Telecredit's 360/40, allows inquiries to be made in dialog fashion and codes to be substituted for the full names of models and options. With a system like this, who needs a salesman?

## BART to Have Commuter Displays

Another first is scheduled for BART (Bay Area Rapid Transit system), the San Francisco paragon of modern mass passenger transport. It will install an information display system for commuters, announcing train destinations, schedule changes, arrivals and departures, interspersed with weather reports, news, and sports messages.

Advertising messages also will be sold and the revenue used to pay for the system. The $5 million-plus contract with Stewart-Warner Corp. for designing and implementing the system gives the contractor exclusive rights to the first 10 years of display advertising revenue.

S-W, which used to make its own computers, will purchase them for the complete 75-mile route, including a central computer at an Oakland station that will also house the train control computer and controllers for the other 32 stations.

Sensors in the tracks will alert the station controllers, flashing train data on a total of 276 double-faced displays near the platforms. Between times, the central computer will take over the general news. When a train is full, the displays will tell the passengers to board the next one. First segment of the system is scheduled for startup in August 1971. Transit authorities in Washington, D.C., and New York City already have been approached by S-W for similar systems.

▪▪▪▪

### Baggage Barrier Broken

Docutel Corp., which in mid-summer dropped work on its computerized baggage-handling system, even with a $3 million contract from Pan American Airways in pocket, has picked it up again, apparently pressured by PanAm, which was committed to provide such a system for its new terminal at Kennedy Airport.

But Docutel still was seeking "additional financial arrangements." The firm dropped the baggage handling work in favor of its more profitable automated currency dispensing system after the PanAm order was the only one it received when three were expected. The firm said the break in activity, which amounted to two weeks, "should not materially affect" its target for installation of the PanAm system in May '72.

▪▪▪▪

### In the Cards

Looking forward to the time when passengers self-operate ticket vending machines at the airports, American Express has arranged to go over to magnetic-stripe card encoding compatible with airline specifications. It has installed equipment from Data Card Corp., a yearling Minneapolis company whose Series 1500 is apparently so named because it can both emboss and record machine-sensible data on mag tape affixed to credit cards turned out at a 1500/hour rate. American Express already has participated in a field test of an automatic card terminal designed to cope with multi-issue but standard-make cards that promote interchange.

## NEW COMPANIES

One way to start a company is to form it from part of the company you worked for — if you have the wherewithal (one dictionary definition: "that with which something can be done"). Donald Ryan and Dave McFarland,

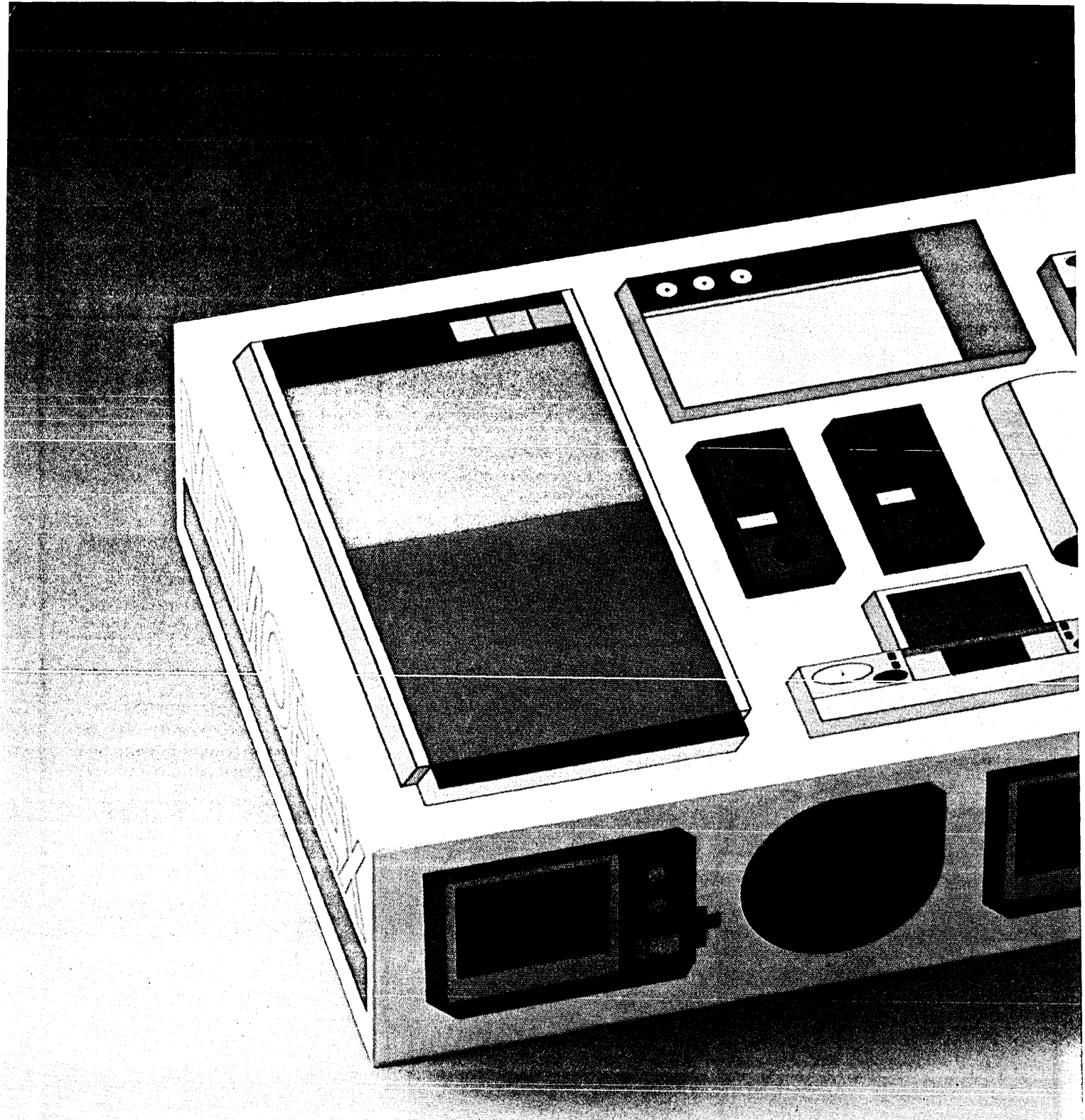
former vp's of Digitek Corp. in L.A., have bought that company's systems programming division and launched the **Ryan-McFarland Corp.** to deal in compiler-based programming and commercial application systems. Ryan also was one of the founders of Digitek.... **Satellite Computer Service,** Philadelphia, added "Inc." to its name after Harvey H. Plowfield, Jr., bought it from Scienscope.... A European marketing company offering service to domestic concerns not wanting to undergo the expense of setting up their own overseas agencies is **Nanotek International,** operating from L.A. The company also furnishes market surveys, systems and applications engineering, and maintenance support. Other offices are located in Boston, London and Geneva ... Software services to the transportation industry are the specialty of **Kencomp, Inc.,** Lexington, Mass., formed as a subsidiary of Thomas K. Dyer consulting engineers, which has devised several programs for railroads ... **Formation, Inc.,** is the name of a new technical management consultant in Cherry Hill, N. J., offering evaluation, planning and design to suppliers and users of info processing. Principals were all formerly with RCA Computer Systems Div. ... **Integrated Software Systems** in San Diego, Calif., was set up by four devisers of an Ames plotting package for the Navy, will deal mainly in plotting software — three-dimensional packages and mapping.... **Digital Methods, Inc.,** Glastonbury, Conn., is offering random data analysis on a digital computer at a cost it says is competitive to real-time analysis systems....A stand-alone self-contained credit card verification device is the project of **Orom, Inc.,** organized in San Jose, Calif., with plans for actual production by early 1971. The prototype will be based on a "near instant" electro-optical read only memory.... Down South, **Computer Educational Services** in Atlanta is offering professional computer courses, management seminars, and educational advisory service for in-house training.... And in Columbus, Ga., **Automated Information and Management Systems,** a data center organized by six former GIs from Ft. Benning, is offering accounting and property management services.

## MERGERS, ACQUISITIONS

An agreement has been reached between **Cambridge Computer Corp.,** NYC, and the nonprofit National Wholesale Druggists' Association, for Cambridge to take over the acquisition of drug sale and "related products" information in the U.S. and accumulate a national data base on some 4,000 pharmaceuticals. It would do this by acquiring NWDA's stock in **Drug Distribution Data, Inc.** Cambridge previously had an interest of 20%, but this would increase its holdings to 80%, and the remaining 20% is being negotiated. In return, NWDA will "urge its members and drug wholesalers generally to give total support to Cambridge." The NWDA information also could be of value in other applications.... **Delta Data Systems, Inc.,** is merging with two other Washington, D. C.-area firms, **National Institutes of Computer Professions, Inc.,** and **Computer Marketing Industries, Inc.,** the aggregate to be known as **Delta Automated Systems, Inc.,** with 1970

Stromberg DatagraphiX adapted its 4440 computer-output-microfilm recording system for use in Japan where five banks have announced plans to install the system. Jan Katayama shows blow-up of character matrix containing Japanese Kana characters. The matrix, about the size of a thumbnail, is a metal disc with alphanumeric and symbolic characters etched through. It's located in the recorder's crt, which DatagraphiX calls the "Charactron." The General Dynamics subsidiary, which of late has come upon hard times, says the Japanese order represents a major breakthrough for it in the international market.

sales projected at more that $3 million. The idea is to consolidate formerly duplicate operations. CMI, specializing in direct mail marketing, will close its center in Fairfax, Va., with that function to be taken over by NICP's data center in Silver Spring, Md., where it will continue operating a programmer school. DDS will continue to furnish proprietary software and management services.... Similar consolidation of services is projected by **NCS Computing Corp.** and **Computer Power, Inc.,** both of Jacksonville, Fla., both owned by Dallas financial and oil concerns; they'll provide dp financial services.... **National Computer Services Corp.,** NYC accounts receivable dp specialist, has acquired **Automated Statements, Inc.,** ditto, of East Orange, N. J.... **Amer-Mex Data, Inc.,** keypunch center in Laredo, Tex., will triple its output, already nationwide, on acquisition by **World Computer Corp.** of Dallas. WCC is in both computer software service and hardware manufacturing/sales.... The subscription fulfillment, association management, and list maintenance business of **Systemetrics, Inc.,** Mountainside, N. J., has been acquired by **Princeton Time Sharing Services, Inc.,** and will operate as a division.... NYC marketeer, **Datasonics, Inc.,** has acquired **Automation Search Consultants,** recruiter for programmers and systems analysts. ... Second-thoughter: **Diversified Data Service & Sciences, Inc.,** and **Nytronics, Inc.,** NYC, revised the terms of their merger, carried over from January before the stock market did its thing. The old transaction value was $12 million, the new $8.25 million.... Backouts: The **Academy Computing Corp.-Compute America Corp.** merger fell through. **Computer Learning and Systems Corp.** hasn't acquired the **Institute of Computer Management Schools** after all. **Janis Research Company, Inc.,** and **Princeton Applied Research Corp.** terminated negotiations in that New Jersey town because of "uncertainty in the general economy." **Management Data Corp.,** Philadelphia, sold off the **Provident Credit Corp.** to "lessen our dependency upon the banking community in this period of tight money." **Multidate, Inc.,** an L.A.-area-based minicomputer manufac-



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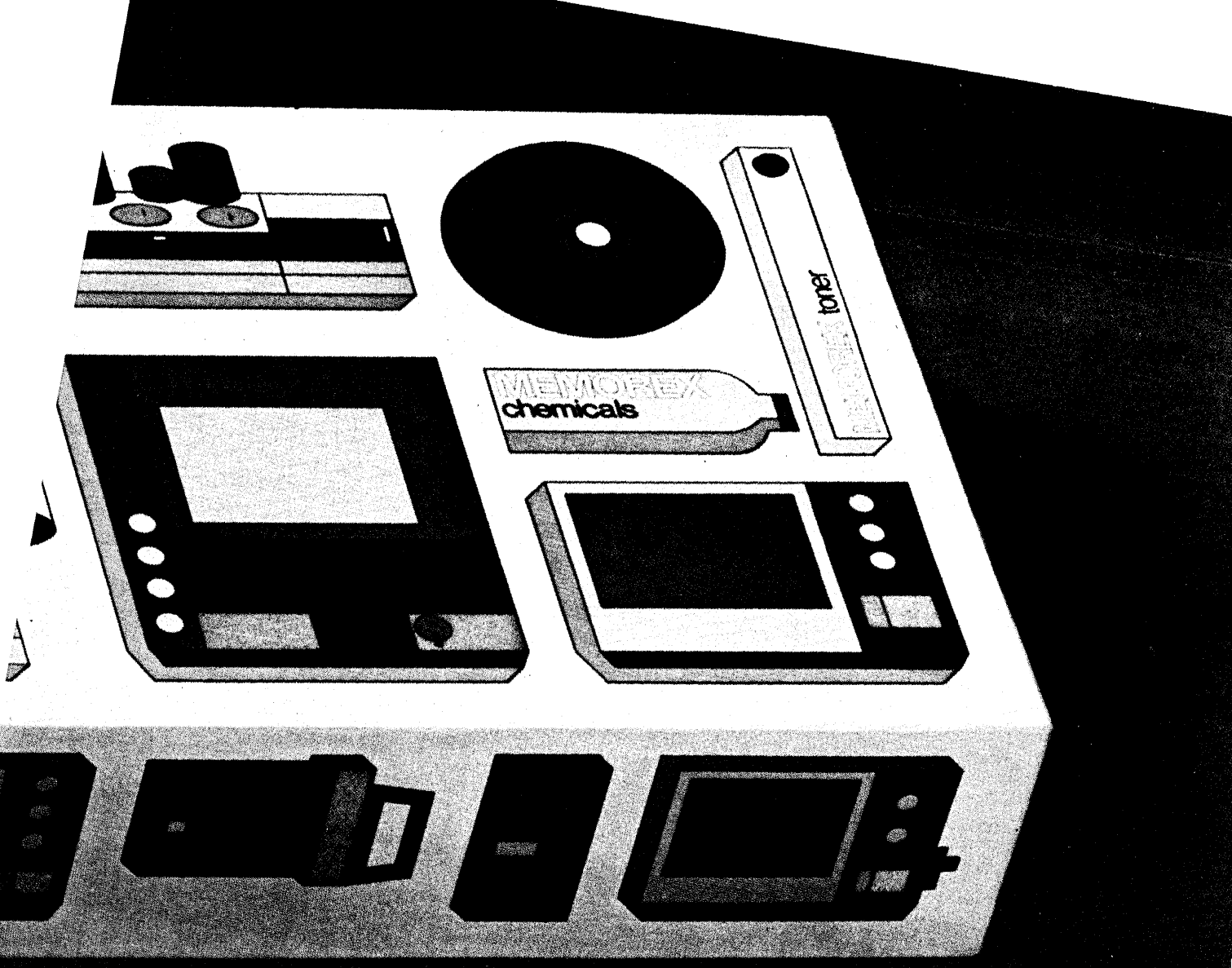
Order our complete COM package including (1) our System 360 compatible on-line 1603 Microfilm Printer with its trouble-free fiber optical system, (2) our 1610 Developer, a table model film processor with automatic threading, (3) the Memorex 1630 Previewer for film editing and cassette loading, (4) the 1620 Duplicator that transfers data from master roll film onto thermal or diazo duplicating film at up to 100,000 lines per minute, (5) the 1625 Diazo Developer which attaches to the 1620 for non-vented anhydrous developing of diazo duplicate film, (6) our 1642 Desk-top Cassette Viewer and 1643 Autoviewer, (7) the Memorex 1650 Viewer Printer that gives high quality, 8½ x 11 inch paper prints in 20 seconds.

For more information write: Memorex/Equipment Group, San Tomas at Central Expressway, Santa Clara, California 95052.




CIRCLE 51 ON READER CARD

MEMOREX

turer who pulled out of a deal to be acquired by Saxon Industries, has now agreed to acquisition by **Systems Engineering Laboratories, Inc.,** of Ft. Lauderdale, Fla., in return for payment of certain debts and 17,500 shares of stock.

# NEWS BRIEFS

### Novar Says Yes

The Ultronic Systems Corp., Mt. Laurel, N. J., a part of the information group of Sylvania Electric Products, White Plains, N. Y., a subsidiary of General Telephone and Electronics (got that, now?), has acquired the Novar Corp., Mountain View, Calif., for an undisclosed sum.

Bill Bennett, Novar president, who will continue in that capacity, stated that the acquisition will not only provide his firm with money to support its leasing agreements, but will enable Novar to offer expanded maintenance service through 57 field offices operated by Ultronic. Novar's chief product is the model 5-50 terminal, which is built around an IBM Selectric typewriter, a 3500-bit delay line buffer, and a mag tape cassette recorder. The company has installed 150 of the terminals, with a 1000-unit backlog.

### Northwestern Base Secure

The Atomic Energy Commission has been a friend in need to Computer Sciences Corp. by extending its contract for five more years and $18 million to continue providing dp and science support to AEC operations at Richland, Wash. Amount of the contract is based on CSC's services for the past five years, valued at $18.6 million. Extension of the contract not only continues the jobs of 200 mathematicians, systems analysts, engineers, and other information sciences specialists who also are doing research in industrial diversification for the area, but enables CSC to go on supporting its INFONET time-sharing center there, on which it has spent $9 million of its own money, and which it uses to service Seattle, Tacoma, Portland, and other Northwest urban areas. The software used in INFONET's nationwide t-s network was originated at Richland.

### Honeywell Education Net

Honeywell has taken the first step in a planned network of education service centers that will provide administrative and instructional services to schools. The first center, opened in Minneapolis this month, serves more than 50 Minnesota elementary schools, high schools, and colleges. Additional centers are planned. Each center will provide: access to Honeywell 1648 time-sharing, including an educational subroutine library; access to an on-line administrative system covering pupil, staff, financial, and property accounting; access to specialists familiar with computer-based instruction and school administration; a staff of professional education consultants; and sharing of programs developed at the education service center.

### New Science Adviser

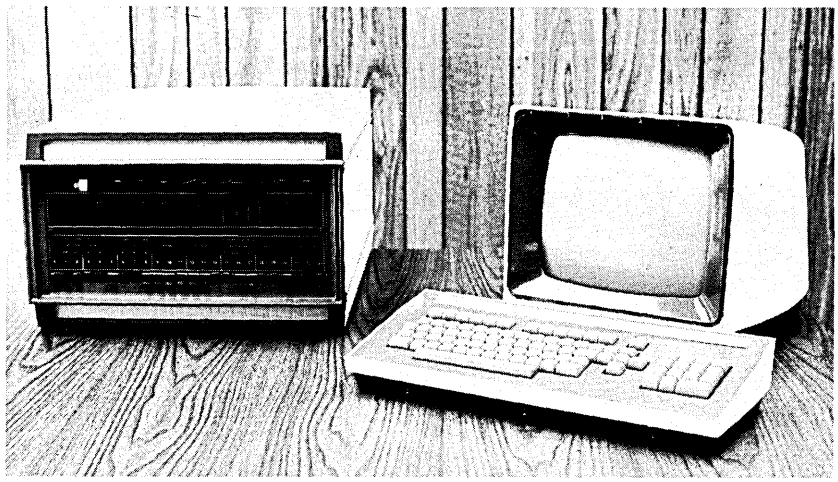
A specialist in computing science is President Nixon's new science adviser, replacing Dr. Lee DuBridge, who retired this summer. Dr. Edward E. David, former executive director of communications systems research at Bell Telephone Laboratories, has been responsible for Bell's electronic systems research laboratory, the computing sciences research center, and the communication principles research lab. He joined Bell in 1950 and since 1963 has specialized in computing science research, doing work on advanced computing techniques with emphasis on man-machine communication. Dr. DuBridge left the Administration in a huff after failing to untangle red tape and overcome interagency rivalry which crushed his attempts to secure larger funding for research projects.

# Shortlines

Control Data Corp. has announced it will manufacture as well as market in Canada, and is preparing to set up plants in Toronto and Quebec, financed with $56 million, 40% of which it expects to get from Canadian government grants. It will operate through its subsidiary, Control Data Canada Ltd. CDCL president W. Gary Glover is chairman of the dp seminars at the CBEMA show in Toronto, Oct. 5-8. The show is combined with the Canadian DP Conference.... The International Computer Exposition for Latin America, scheduled for next July in Mexico City, already has sold 50% of its exhibit space. The show is sponsored by the Computing Society of Mexico, and the American Management Association has set it's 4th Inter-American dp conference to meet concurrently.... It looks as if no firm support for applying patent law to the protection of computer programs abroad is emerging from the series of patent legislation studies going on in Europe. Most countries are in the midst of reviewing the law. France has excluded programs, and Britain has now reached the same decision.... Univac hq at Blue Bell, Pa., is having to move over to make room for the Remington Rand division of parent Sperry-Rand, heretofore based in NYC, together with three of its subdivisions: International and Production; and Office Machines from Norwalk, Conn. Reason for the move was given as a combination hoped-for synergy and more room to expand (137 acres). Also, by inference, economy.... Reservations World has sealed a deal with Japan Airlines and its associated Nipponese travel tie-ins, to be their only U. S. agent, and is particularly happy because of anticipated rewards from Expo '70 traffic.... Katakana, the standard dp language for Japan that is difficult to machine read because of the broken lines in its characters, is now being coped with by Recognition Equipment's Electronic Retina computing reader. The OCR equipment can absorb typed or printed material, or information preprinted on a line printer. The Katakana characters can be translated to Roman alphabet form.... And REI duly announced it had secured $10 million in contracts, including one for an undisclosed amount from Jarome Sewing Machine Co. in Japan, which represents its first penetration into the Asian market.... One of the largest internal time-sharing networks has been inaugurated at TRW Inc., with a CDC 6400 linked to 110 terminals, used by 1,200 scientists and engineers from L.A. to Washington, D. C. TRW's main scientific computer is a compatible CDC 6500, and the t-s system can access either of them with a standard keyboard terminal. ■

# Product Spotlight

## Intelligent Display System



For less than the cost of a single IBM 2848/2260 crt display system, you can have a 24-terminal system attached to a 24K-byte cpu possessing the computing power of a 360/30, a 200-lpm 132-column printer, two moving-head disc drives, and a card reader. System IV/70 is one of the first products to realize many of the advantages of MOS/LSI technology: increased computing speed, reduced cost, reduced size, and reduced maintenance and maintenance costs. (The cpu in the System IV/70—equivalent to 70,000 transistors—is on a single card; and if the cpu fails, it can be replaced on site and the defective cpu thrown away!)

System IV/70 can control up to 32 crt terminals, performing data validation, error checking, formatting, and local processing and storage before transmission to the main computer, simultaneously refreshing the displays and communicating with the host system.

The 1.9-usec semiconductor memory is expandable from the basic 6K up to 96K, and the processor knows 120 instructions, including variable-length character instructions, binary fixed- and floating-point arithmetic, translate/test, push/pull stacks, interregister and list processing instructions. A decimal add/subtract command requires 5.1 usec per byte. Eight I/O channels (64 devices/channel), and eight levels of nested hardware priority interrupt are standard, with a maximum I/O rate of 265,000 bytes/second.

System IV/70 crt units display up to 1,152 characters in lines of 40, 48, 80, or 81 characters, with 6, 12, or 24 lines per screen. All 96 ASCII symbols are a subset of the 128-character font the vendor claims is designed for optimum legibility and reduced error rates. Displayed information is refreshed from the same memory accessible to the System IV/70 computer, resulting in higher output rates and a video terminal price of $980.

The 85-key alphanumeric keyboard offers upper, lower, and control shift for generating all ASCII codes, including 11 assignable function keys. Seven cursor control and edit keys, allowing operations such as insert, delete, roll, erase, and tab, and a 14-key "data island" are all standard.

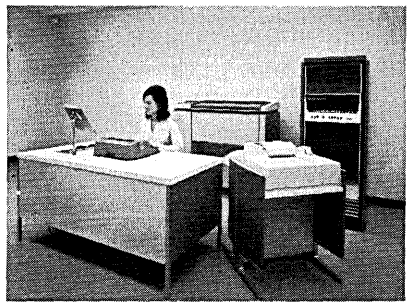
Foreground video-display control packages, including an IBM 2848/2260 simulator package, terminal communications software compatible with IBM OS/DOS BTAM and QTAM), a disc operating system with sort routines, and basic operational software is supplied, allowing users to communicate with IBM 360/370 computers and their data bases using unmodified IBM software.

Available peripherals include fixed- and moving-head disc drives, printers, readers, IBM-compatible tape units, and others.

Purchase price for a 32-terminal system with 24K bytes, a disc drive, communications interface, and a printer is $62,400. A 16-terminal configuration with 6K bytes is $1,450 per terminal, or $23,200. System IV/70 will be available in January for single unit and OEM orders. FOUR-PHASE SYSTEMS, INC., Cupertino, Calif. For information:

CIRCLE 350 ON READER CARD

## Text Editing System



VARITEXT, a system for creating and editing documents, consists of a console unit housing a Selectric typewriter and two cassette tape recorders; a tty; a printer; and the vendor's 620/i minicomputer.

After initial program loading (using the tty), the operator can either enter text onto one of the cassette tapes, or edit text by entering a line number. Under control of the mini, the cassette input skips down to the line of text where changes are required. The operator can insert and delete information and/or delete typing errors. Each time a line is completed it is written on the output tape. After the operator completes the changes, a listing of the document can be obtained either on the printer or the Selectric.

Software controls the layout, providing automatic pagination, headings, and footings; and justifying the lines for either left, center, or right blocking, etc. Up to eight tab stops are allowed, as is changing the page layout completely at any time. (You might decide that left justified and double spaced looks better than center justified, single spaced.)

Two models will be available in January: The VARITEXT-2, allowing up to eight operator stations and requiring 8K of core. This unit can also be interfaced optionally to a 7- or 9-track 800-bpi drive for input to a larger computer.

A VARITEXT-1 can be purchased for approximately $60K. The systems can also be leased. VARIAN DATA MACHINES, Irvine, Calif. For information:

CIRCLE 351 ON READER CARD

*(Continued on page 86)*

# You'll find it easier than ever before to attend FJCC... PRE-

### "Convenience" Key to Houston FJCC "Systems and Society" Conference Nov. 17 to 19.

This year the world's largest computer conference and exhibition will also be the most convenient. Houston's famous Astrohall will house an extensive technical program plus computer hardware, software, and services valued at over $200-million.

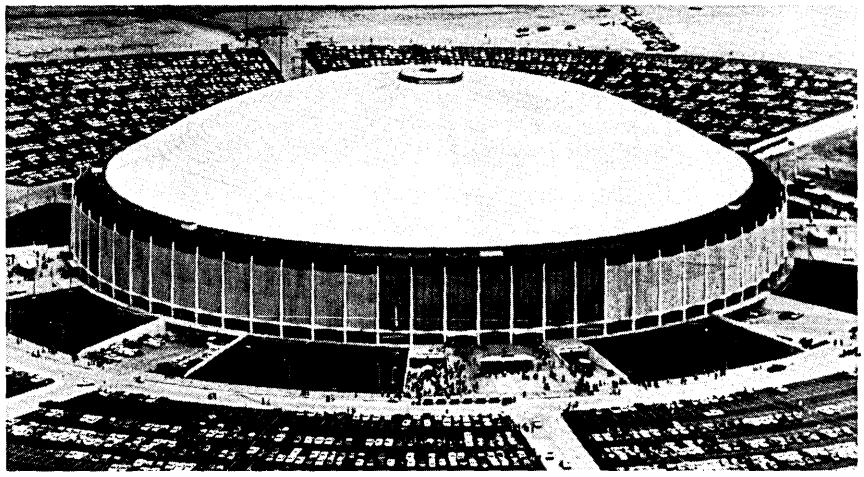
Air conditioned busses will add to the convenience by shuttling you between your hotel or motel and the Astrohall. Special tours of NASA's computer complex have been planned with transportation provided.

The conference committee has done everything possible to make your FJCC attendance pleasant and convenient — but there's one thing they can't do for you — PRE-REGISTER. These Advance Registration and Housing forms will allow you to avoid on-site registration. A confirmation card will be mailed to you as soon as your completed forms are received. (Hotel rooms will be assigned on a first-come basis.)

### '70 FJCC Broadens Program Appeal

A unique feature of the FJCC technical program will be a *Special Survey Session* which explores new developments and industry trends and provides a broad, general view of where the industry stands and where it's headed. This *Special Survey Session* will allow specialists to keep abreast of developments in other fields and will give generalists a full industry overview.

In addition numerous technical sessions will cover the latest developments in hardware, software, systems and applications of major importance to the computer field and users of EDP systems.



*Site of all FJCC exhibits and educational sessions is Houston's Astrohall, the world's largest single convention facility.*

### NASA TOUR HIGHLIGHTS FJCC ATTRACTIONS

The role of the computer in the successful Apollo moon flights and the dramatic rescue of Apollo 13 is a source of pride to the industry. Tours of NASA's Manned Space Flight Center have been scheduled which will take you into areas not usually open to the public, especially the Simulator Lab where space flights are "rehearsed" prior to launch. Such critical simulations made possible the safe return of Apollo 13.

**Government Control and the Computer Industry** — A panel will discuss existing and pending legislation which affects the computer industry. Congressman Jack B. Brooks, Dr. Herbert R. J. Grosch of the National Bureau of Standards, and representatives of computing equipment firms and user groups will participate.

**Interfacing Computers and Education** — A special session will explore the implications of bringing the computer into the educational process, with special emphasis on the reaction of students to computer aided instruction, training system users and integrating programming skills with competence in subject matter.

**Ross Perot to Keynote Conference** — An internationally recognized computer leader, Ross Perot, will keynote the conference, addressing the theme . . . "Systems and Society".

**Art, Vice and Games** — An intriguing session will take a fresh look at the possibilities and limitations of computers by reporting on their unorthodox use in art, games and vice.

## Avoid that last minute crush... fill in these forms and mail TODAY

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### REGISTRATION — 1970 FJCC

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NAME Last First Initial

COMPANY

ADDRESS

CITY-STATE ZIP

WIFE WILL ALSO ATTEND ☐ YES ☐ NO

**OCCUPATION (Check One Only)**

1 ☐ Management/ Administration
2 ☐ Engineering
3 ☐ R & D
4 ☐ Consultant
5 ☐ Teaching
6 ☐ Sales/Application Eng.
7 ☐ Systems & Procedures
8 ☐ Programming Application
9 ☐ Full Time Student

**FEES**

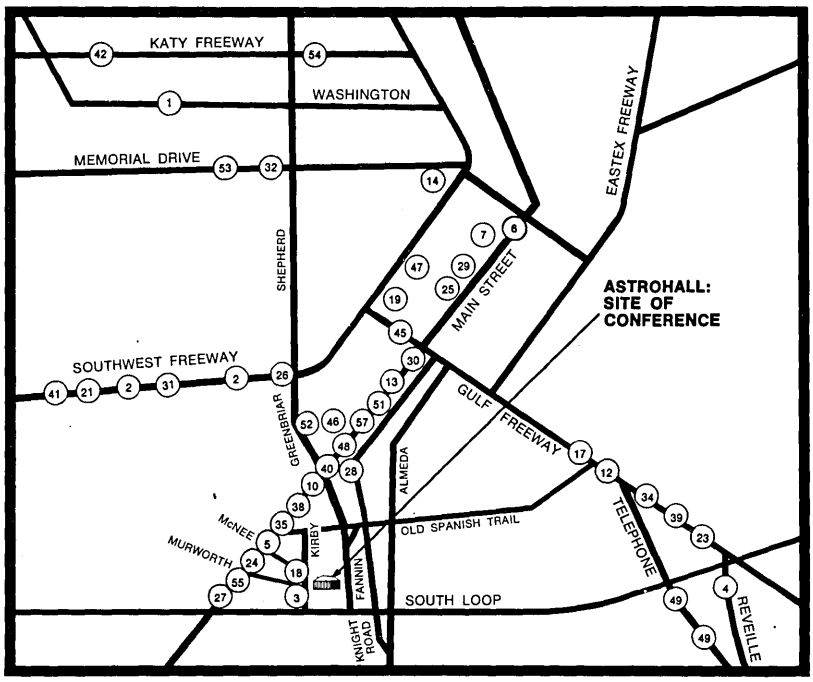
☐ MEMBER OF: $20.00 (Check all applicable)

1 ☐ ACM
2 ☐ IEEE
3 ☐ SCI
4 ☐ ACL
5 ☐ AIAA
6 ☐ AICPA
7 ☐ ASA
8 ☐ ASIS
9 ☐ ISA
10 ☐ SIAM
11 ☐ SID
12 ☐ SLA

☐ Non-Member: $40.00
☐ Full-Time Student: $5.00
☐ Texas Bar-B-Q $7.50
☐ Luncheon $8.00

**TOTAL:**

# REGISTER NOW!




*Numbers not shown on above map are in Houston area and will also be served by conference busses.*

| HOTELS/HOUSTON | SINGLE | DOUBLE | TWIN | SUITE |
|---|---|---|---|---|
| 1. ALAMO PLAZA | 8 | 10 | 14 | 1-3 rm., 25-up |
| 2. ALBERT PICK MOTOR INN | 15-16 | 19-20 | 19-20 | 2 rm., 38-up<br>3 rm., 75-up |
| 3. ASTROWORLD HOTELS | 14-26 | 16-30 | 16-30 | 40-up |
| 4. CARROUSEL MOTOR HOTEL | 12-16 | 15-18 | 16-18 | 4-Jr. 2-2 rm., 30-up |
| 5. CHIEF MOTEL | 16 | 22 | 25 | |
| 6. CONTINENTAL HOUSTON MOTOR HOTEL | 13-15 | 17-19 | 17-21 | |
| 7. DOWNTOWNER MOTOR INN | 12-13 | 15-16 | 18-19 | |
| 8. FIELD INN — KATY | 14-17 | 18-21 | 20 | 3-2 rm., 33-up |
| 9. FIELD INN — NORTH | 17-19 | 21-24 | 21-24 | 12-3 rm., 24-28 |
| 10. GRANT MOTEL | 10 | 12 | 14 | |
| 11. GOLDEN KEY INN | 13-17 | 15-19 | 15-19 | 35-up |
| 12. HELENA MOTEL | 12 | 15 | 17 | 1-3 rm., 35 |
| 13. HOLIDAY INN — CENTRAL | 11-15 | 15-17 | 15-17 | |
| 14. HOLIDAY INN — CIVIC CENTER | 13 | 19 | 19 | 38-up |
| 15. HOLIDAY INN — EAST | 15 | 15-17 | 15-17 | |
| 16. HOLIDAY INN — KATY | 12-16 | 16-19 | 16-19 | |

| HOTELS/HOUSTON | SINGLE | DOUBLE | TWIN | SUITE |
|---|---|---|---|---|
| 17. HOLIDAY INN — MIDTOWN | 11.50-16 | 16-18 | 18 | |
| 18. HOLIDAY INN — S.W. 610 | 13-15 | 16 | 17 | |
| 19. HOTEL SONESTA | 16-24 | 20-24 | 23 | 10-2 rm., 65-110 |
| 20. HOUSTON AIRPORT INN | 12 | 15 | 15 | |
| 21. HOUSTONAIRE MOTOR INN | 14 | 17 | 18-26 | 32 |
| 22. HOWARD JOHNSON MOTOR LODGE — KATY | 14 | 17 | 20 | |
| 23. HOWARD JOHNSON MOTOR LODGE — GULF | 13-16 | 16-20 | | |
| 24. KING MOTOR LODGE | 14 | 20 | 20 | |
| 25. LAMAR HOTEL | 13.50-24 | 17.50-24 | 20-25 | 11-Jr., 25-45<br>6-2 rm., 30-60<br>4-3 rm., 60-90<br>5-Exec., 48-50 |
| 26. LA QUINTA MOTOR INN | | | 16 | 5-2 rm., 20 |
| 27. LAS VEGAS MOTOR HOTEL | 12-13 | 15-16 | 17.50-23.50 | 1-2 rm., 65<br>1-3 rm., 85 |
| 28. MARRIOTT MOTOR HOTEL | 16-21 | 21-26 | 21-26 | 35-up |
| 29. McKINNEY HOTEL | 10-13.50 | 12-14.50 | 16.50 | |
| 30. MITCHELL INN | 11 | 14 | 18 | |

| HOTELS/HOUSTON | SINGLE | DOUBLE | TWIN | SUITE |
|---|---|---|---|---|
| 31. QUALITY COURTS MOTEL | 12.50 | 16.50 | 15.50 | 1-Jr.<br>1-2 rm., 20-50 |
| 32. RAMADA INN — ALLEN PARKWAY | 10-11 | 13 | 19 | 2-2 rm., 30 |
| 33. RAMADA INN — EAST | 13 | 15.50-18.50 | 15.50-18.50 | 10 Jr., 1-2 rm. |
| 34. RAMADA INN — GULF FREEWAY | 14.50 | 16.50 | 19.50 | 2-Pool, 19.50-up |
| 35. RAMADA INN — MAIN | 14 | 18 | 22 | |
| 36. RAMADA INN — S.W. | 12.50-15 | 17-20 | 17.50-20 | 2-Jr., 6-2 rm.,<br>2-3 rm., 30-up |
| 37. RICE HOTEL | 10.50-20 | 16.50-22.50 | 17.50-28 | 39-2 rm., 42-up |
| 38. ROADRUNNER INN | 9.50 | 9.50 | | |
| 39. RODEWAY INN — GULF FREEWAY | 10 | 12 | 15 | |
| 40. RODEWAY INN — MAIN | 9.50 | 12 | 15 | |
| 41. RODEWAY INN — S.W. | 11-13 | | 15 | 2-Fam. rm., 25<br>2-2 rm., 16 |
| 42. RODEWAY INN — KATY | | | 16 | 25-up |
| 43. ROYAL COACH INN | 18 | 25-26 | 25 | 28-Par., 40<br>9-Tur. suites, 40<br>5-Bi-level, 55 |
| 44. SAM HOUSTON HOTEL | 7-8 | 9-10 | 12-14 | |
| 45. SAVOY FIELD INN | 16-19 | 20-23 | 22-23 | 6-1 rm., 20-28<br>6-2 rm., 35-up |
| 46. SHAMROCK HILTON HOTEL | 14-30 | 20-36 | 20-36 | 2 rm., 45-up<br>3 rm., 80-up |
| 47. SHERATON LINCOLN HOTEL | 16-22 | 23-27 | 21-27 | 10-2 rm., 40-80 |
| 48. SHERATON OAKS MOTEL | 12 | 14 | 18 | 30-up |
| 49. SKYLANE INN | | 12-16 | 14-18 | 5-2 rm., 22.50-25 |
| 50. TEXAS STATE HOTEL | 10 | 14 | 15 | |
| 51. TIDELANDS MOTOR INN | 16-18.50 | 18.50<br>20.50 | 22.50-24.50 | |
| 52. TOWERS HOTEL | 12-18 | 16-20 | 16-24 | |
| 53. TOWN HOUSE MOTOR HOTEL | 8.50-16 | 11-18 | 12-22 | 5-2 rm., 24-30 |
| 54. TRAVELODGE MOTOR HOTEL | 10.50 | 14 | 15.50 | |
| 55. TWENTY NINE PALMS MOTOR INN | | | | |
| 56. VAGABOND MOTOR HOTEL | 9-10 | 12 | 14 | |
| 57. WARWICK HOTEL | 18-30 | 28-30 | 28-30 | 2-2 rm., 64-240<br>3-3 rm., 90-275 |
| 58. WHITE HOUSE MOTOR HOTEL | 16-20 | 20-22 | 25-30 | |
| 59. WILLIAM PENN HOTEL | 8.50 | 9.50 | 11 | |
| 60. HOLIDAY INN — NASA | 12.25-14.25 | 16.25-20.25 | 18.25-20.25 | 2-Jr., 2-2 rm.,<br>1-3 rm., 32.50-up |
| 61. NASSAU BAY HOTEL | 15 | 20 | 24-28 | |
| 62. RAMADA INN — NASA | 12 | 14 | 16.50 | Jr.-$20<br>2 rm.-$35<br>3 rm.,-50 |
| 63. SHERATON KING'S INN | 20 | 20 | 20 | 3-3 rm., 60-up |

| HOTELS/GALVESTON | SINGLE | DOUBLE | TWIN | SUITE |
|---|---|---|---|---|
| 1. FLAGSHIP HOTEL | 18.75 | 21.75 | 21.75 | |
| 2. GALVEZ HOTEL | 17.50 | 21.50 | 21.50 | |
| 3. GAIDOS MOTEL | 20.00 | 24 | 26 | |
| 4. HOLIDAY INN | 13-18 | 17-22 | 17-22 | |
| 5. JACK TAR MOTEL | 16 | 18 | 20 | |
| 6. COMMODORE HOTEL | | | | 22 |
| 7. DRIFTWOOD HOTEL | 11 | 14 | 16 | |
| 8. SEAWALL HOTEL | 14 | 16 | 16-18 | 22 |
| 9. TREASURE ISLE HOTEL | 12 | 16-20 | 16-20 | |

## MAIL HOTEL RESERVATIONS TODAY to:

**FJCC Housing Bureau**
**Housing Visitors &**
**Convention Bureau**
**1006 Main**
**Houston, Texas 77002**
**USA**

## HOTEL RESERVATIONS — 1970 FJCC

FJCC Housing Bureau — Housing Visitors and Convention Bureau
1006 Main, Houston, Texas 77002

**Accommodations Desired:** — **Rate Desired:** — **Hotel Choice**

___Room(s) 1 person (single) $_____ 1_____
___Room(s) 2 persons (double) $_____ 2_____
___Room(s) 2 persons (twin) $_____ 3_____
___Room(s) ___ persons (double-double) $_____ 4_____
___Suite(s) parlor and 1 bedroom $_____
___Suite(s) parlor and 2 bedrooms $_____

**ROOMS WILL BE OCCUPIED BY: NAME (Please Print)** — **CITY & STATE** — **ARRIVAL HOUR — DATE** — **DEPARTURE HOUR — DATE**

**Please designate those who will share same rooms. List additional names on separate sheet. Be sure to show arrivals and departure. Please cover the full period of your intended stay, as it may be difficult to extend the time actually reserved.**

☐ **I want to stay in Galveston.**

**INDIVIDUAL REQUESTING RESERVATIONS:**
PLEASE PRINT OR TYPE

Applicant

Firm Name

Street Address

City State Zip

**Terminal/900**

# A new 2741-type terminal for $2315

This is the lowest priced conversational computer terminal on the market. It's also the most for the money. Here's why:

Compatible with 2741 software. Correspondence and BCD codes standard.

True full and half duplex mode operation. All-electronic keyboard.

Computerized tabset. Tabular format controlled completely by computer.

Better, faster plotting with optional reverse line feed that moves the platen in both directions, half spacing and a plotter printing ball. Plotter package: $218.

Self contained data set with ear muffs and hard-wire capability.

Parity control for accurate data transmission.

Business format, upper/lower case, super and sub script, 130-character line, changeable printing balls.

Thirty day delivery.

Call or write for more information and demonstration.

KSW

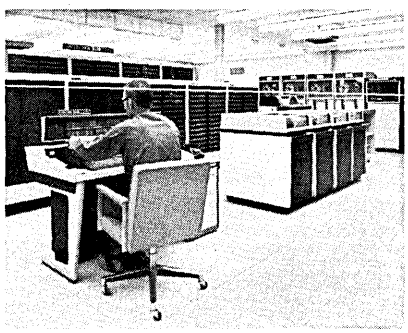
KSW Controls, Inc.
340 Post Road
Fairfield, Conn. 06430
Telephone: (203) 255-3483

CIRCLE 90 ON READER CARD

## Cost-decreasing Computer

A better model number might have been 3295, because the vendor advertises the 3170 as a reduced-cost 3300 for industries and businesses that require commercial and scientific calculations but face lower data processing budgets.

The basic configuration is a single processor (1 usec access time and 1.75 usec cycle time) with 48-128K 24-bit words. Add another processor for floating-point arithmetic, and/or another processor can be added for variable field-length business operations such as field searches, moves, editing, binary to BCD conversion, and numeric and variable 64-character BCD code compares. Maximum memory efficiency is assured by dynamic core allocation of 2K-word pages, half- and quarter-page segments, with hardware memory protection provided by a multipro-



gramming hardware module built into all models. From two to six data channels can be connected to any combination of 3300/3500 series peripherals.

The MASTER operating system keeps tabs on as many as seven concurrently processing jobs written in ANSI COBOL, or FORTRAN, with mass storage, tape sort, ALGOL, PERT, and terminal communications packages RESPOND and EXPORT/IMPORT available. Graphics applications are possible, being supported by the MARK IV package; KRONOS III handles time-sharing; and MARS III, a data management system, is offered.

With a typical-configuration lease rate ranging from $15-20K/month, the 3170 is a good foot-in-the-door model, field expandable all the way up to a 3500, and not a single control card has to be changed along the way. The purchase price starts at approximately $700K, and availability is 120 days ARO. CONTROL DATA CORP., Minneapolis, Minn. For information:

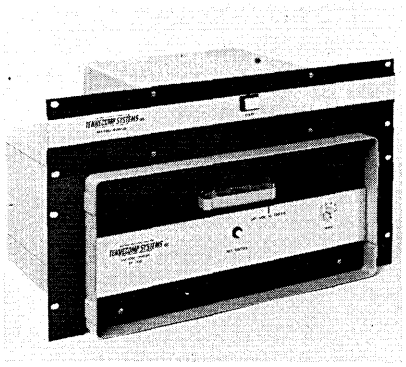
CIRCLE 353 ON READER CARD

## Portable Terminals

The model 3100 portable data terminal (Nov. '69, p. 304) has spawned three offspring with higher prices and additional capabilities: The model 3103 permits connection to voice response systems from any telephone, including GT&E phones with shielded receivers, and employs Touch-Tone keys for input. The model 3104 provides an acoustically coupled Bell 103 data set capability. It accepts digital signals from crt or Teletype keyboards and acoustically couples FSK (compatible with a 103) into the telephone, magnetically receives FSK, and generates digital signals to actuate line printers, teletypewriters, crt's, etc. Finally, the model 3105 performs the combined functions of the 3103 and 3104. It accepts Touch-Tone or FSK generated inputs; supplies a connection to the switched network; and permits the receipt of voice, hard copy, video, or line printout.

Prices for the 3103 and 3104 begin at $450 and decline to $200 in quantities over 1,000. Respective prices for the 3105 are $450 to $200. Delivery requires 30 to 60 days ARO. TECHNITREND, INC., Pennsauken, N.J. For information:

CIRCLE 352 ON READER CARD



## PDP-8 Cartridge Loader

A push-button program loader for the PDP-8 family of minicomputers uses a magnetic tape cartridge, making it possible to eliminate paper tape and automatically load programs seconds after the power has been turned on. The unit, called the TP-1369, is an extension of the firm's TP-1346 automatic program loader, which did not use a cartridge. The 1369 uses the TP-1351 mag tape unit with 300 feet of quarter-inch tape and 3.7 KHZ bit transfer rate. It can simulate a four-track disc by means of a programmable track select option. Word storage is up to 256K, so the largest PDP-8 program could easily be accommodated. Price of the TP-1369, including interface, is $2750, and oem discounts are available. Delivery requires 30 days ARO. TENNECOMP SYSTEMS, INC., Oak Ridge, Tenn. For information:

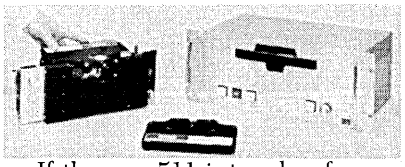
CIRCLE 355 ON READER CARD

## Long-term Data Acquisition

The DPM-511 long-term event recorder is, admittedly, a relatively low-speed cassette unit—.00238 ips, but it allows recording data continuously for up to 35 days on its Phillips-like cartridge. This might be handy for some applications where the rate of data recording isn't as important as the length of time—such as in many scientific, medical, and industrial fields.

Data is recorded on up to four tracks at 612 bpi, and the cartridge contains 600 feet of tape.

A companion to the DPM-511 is the DPM-521 reproducer which in two minutes can play back everything the recorder has taped.



If the DPM-511 is too slow for you, other models are five times faster, the cartridge only lasting about a week.

The DPM-511 recorder is priced at $340 and the playback DPM-521 is $2100. Cartridges are $35 each. 3M CO., St. Paul, Minn. For information:

CIRCLE 358 ON READER CARD

*(Continued on page 90)*


# IF OSCARS WERE GIVEN FOR THE BEST BUSINESS OPPORTUNITIES IN AMERICA

The odds are a certain Colorado based firm would win hands down. You'll be convinced of this when you read *"New Roads to Opportunity and Wealth"* booklet.

It is of special interest to those who are hamstrung by lack of opportunity. If you'd like to be the "boss" as an independent associate and have a modest amount to invest, there may be a great opportunity for you with this organization should you qualify. It deals with a service that commands the field. Its dominance is unquestioned, undisputed, absolute. A free copy of the booklet will be rushed to you on request.

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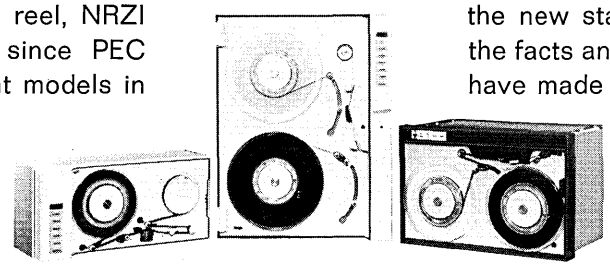
CIRCLE 42 ON READER CARD

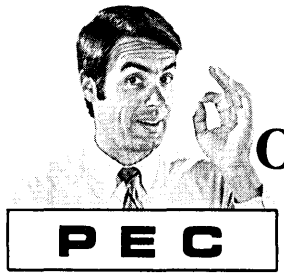
# Pssst...don't tell

# the big guys but PEC is bigger than they are in tape transports.

## And now they're second sourcing us.

Who would have believed it? PEC's now NUMBER 1 in digital tape transports. Some of the reasons: Our digital transports cost less and work better. Less than $3,000 buys a PEC 10½ inch reel, NRZI synchronous transport. And since PEC makes more than 200 different models in 3 reel sizes, there's a wider choice of tape speeds (6.25 to 45 ips) and densities (200 to 1600 cpi). What's more, PEC's huge new plant means on-time, come what may, delivery. With features like these it's not surprising PEC's become the new standard in the industry. For all the facts and figures on the transports that have made us Number 1, write Peripheral Equipment Corp., 9600 Irondale Avenue, Chatsworth, Calif. 91311, (213) 822-0030.





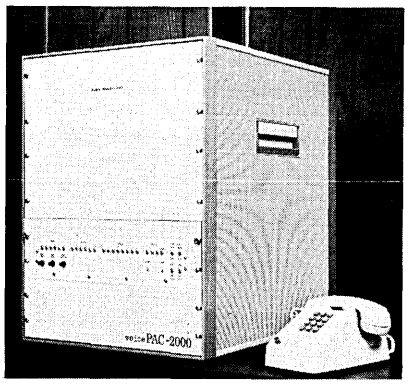

**Okay, now you can tell 'em.**

### Voice Response Unit

The vendor calls this voice response system "revolutionary," and it may be if the claims are true: unlimited word length, unrestricted maximum line capacity, and a standard vocabulary of up to 2,000 words, expandable to 10,000 in special configurations. Called VOICEPAC 2000, it's the first product of a company formed early this year with plans to put the product in user hands within four to six months.

The system is a buffered data communications unit that accepts telephoned digital inquiries, using Touch-Tone phones for input. Under program control, requests are relayed to a central processor, or, in a stand-alone configuration, to the VOICEPAC's own data files. When an inquiry has been processed, an encoded reply is returned to the audio response unit, and the inquirer hears a human voice.

Controller and interface functions are performed by either a Nova or PDP-8/L minicomputer. All organization and control functions, including lookup and buffering, are performed within the controller. A voice multiplexor contains the audio memory unit from which the output messages are assembled. A proprietary storage technique, using a disc, provides 30 msec random access to each word or part thereof. And the manner in which the audio is stored on the disc is said to facilitate the multiplexing

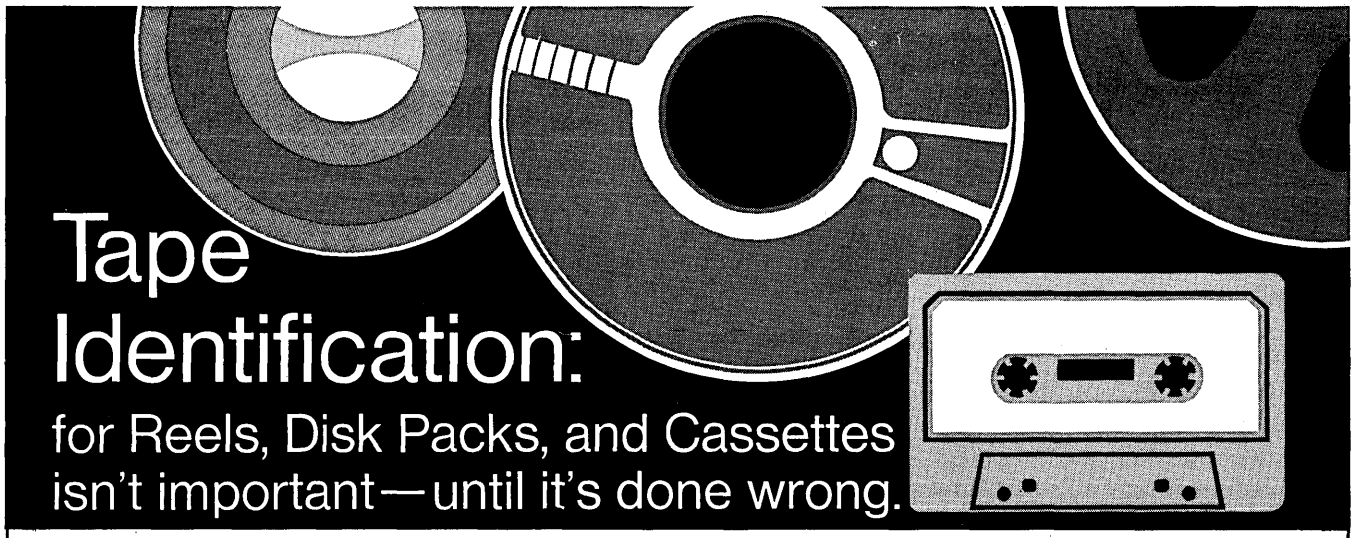



of output lines. The same or different messages may be directed simultaneously to as many output lines as desired.

For a stand-alone application, either the core memory of the minicomputer or compatible disc files serve as the data base. For a cpu-interfaced system, the interface emulates a tape drive, obviating the need for special communications software in the cpu. The VOICEPAC may also be configured as a remote audio response unit, connected to the cpu by a single voice-grade line. In this mode, messages are concentrated at the remote location. Transmission rates up to 9600 baud with full, half, or dual half-duplex modems can be accommodated.

The maximum number of I/O lines for the standard VOICEPAC is 120, with more available for special configurations. Extension of line capability or vocabulary can be accomplished on site. Redundant words and phrases may be eliminated under software control. Price of the VOICEPAC 2000 begins at $27K for a 40-word system, rising to $62K for the full 2,000-word vocabulary. PERIPHONICS CORP, Rocky Point, N.Y. For information:

CIRCLE 354 ON READER CARD


We do it right: You get a pressure sensitive label that says what you want it to say on the *correct* material for the job. A label unaffected by high spin—one that won't come off until you want it to—and then comes off without a trace or stain. Matching tough specifications is routine for us. But in devising identification systems we've worked out solutions to problems you may not even have yet. Try us—if we don't have a solution, we'll find one.

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*and other principal cities*

CIRCLE 39 ON READER CARD

### Store-and-Forward

First product of an ambitious six-man firm which is going ahead with its plans despite the recession is the IPC 5-15 communications switching system. The company is in the final stages of development of the dual-processor system based on Interdata Models 5 and 15 computers. The vendor intends to provide turnkey systems, including hardware, software, systems engineering, documentation and training, maintenance, and system planning and implementation.

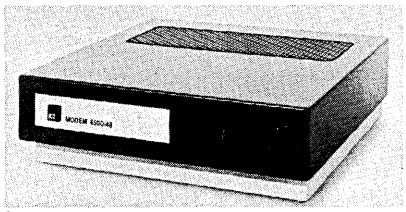
The IPC 5-15 will function either as a free-standing store-and-forward system or as a front end for a full-scale computer; it will be readily interfaced with System/360, Univac 1108, and B5500 cpu's. The system will also interface with all types of terminals and most peripherals, and translate codes and data formats where necessary, while permitting a free exchange of data and control information between all connected system elements. The 5-15 will also monitor the communication circuits, terminals, connected computers, and its own internal elements and initiate corrective action automatically or in conjunction with an operator. For the ultimate in back-up, a dual configuration is available, complete with four Interdata cpu's.

The basic IPC 5-15 will include 128K bytes of memory with a cycle time of 1 usec divided between the two cpu's. The I/O bandwidth of the processor is 750K bytes/second for each processor. An 8-million byte drum will also be employed. Peripherals will be provided according to individual system requirements. Prices start at $450K, and delivery requires six months. INTEGRATED PROCESSING & CONTROL, INC., Wayne, N.J. For information: ■

CIRCLE 356 ON READER CARD

### Modem

Specifically designed for users requiring dedicated full-duplex service (type 3002, C-2 lines), the 4500/48 modem automatically equalizes and adaptively tracks any changes in the amplitude or delay distortion characteristics of the line. This feature is self-synchronizing and requires no special programming. The 4800-



baud 4500/48 modem is priced at $7500 in small quantities. INTERNATIONAL COMMUNICATIONS CORP., Miami, Fla. For information:

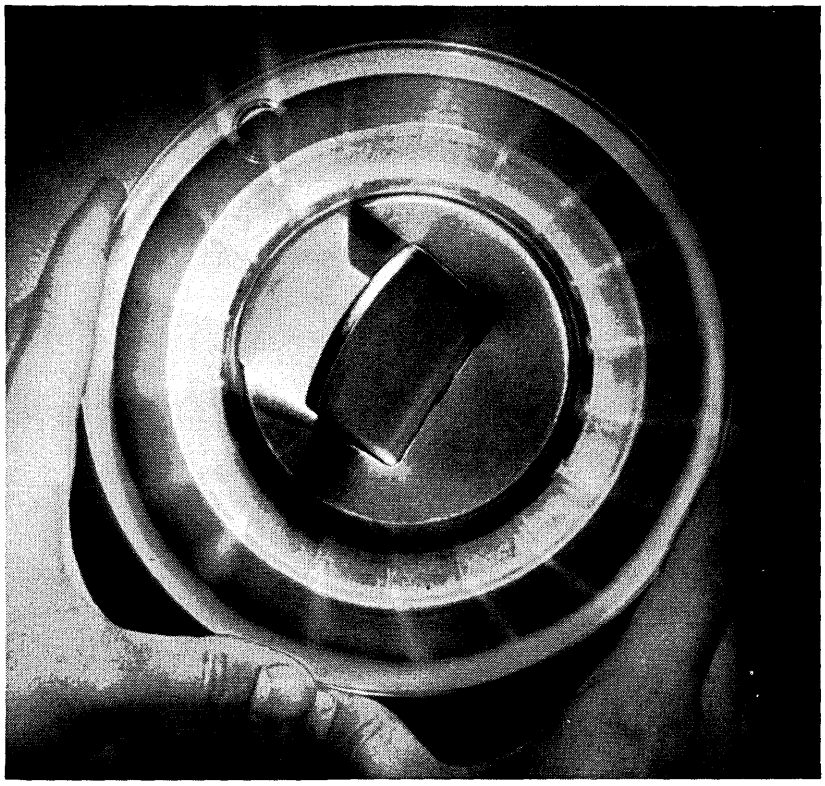
CIRCLE 357 ON READER CARD

### Acoustic Coupler

The 701B acoustic coupler is aimed at conversational terminals where data rates of 450 baud can be used. Interfaces to tty and standard EIA RS232 are offered, as are half- or full-duplex operation, acoustic and hardwire coupling. Sensitivity is claimed to be −50 dbm in acoustic mode. The single unit price is $425. OMNITEC CORP., Phoenix, Ariz. For information:

CIRCLE 359 ON READER CARD


Boole & Babbage



The Computer Tuner

It may look like tape. But it's a computer tuner.

They're so effective that typical customers improve system performance by 30% to 40% in the first few months. That amounts to yearly savings in the tens of thousands, and, in some cases, hundreds of thousands of dollars.

With savings like that you can hardly afford to be without a computer tuner. Write us for information on how the System Measurement Software products can increase your system's performance. And reduce costs.

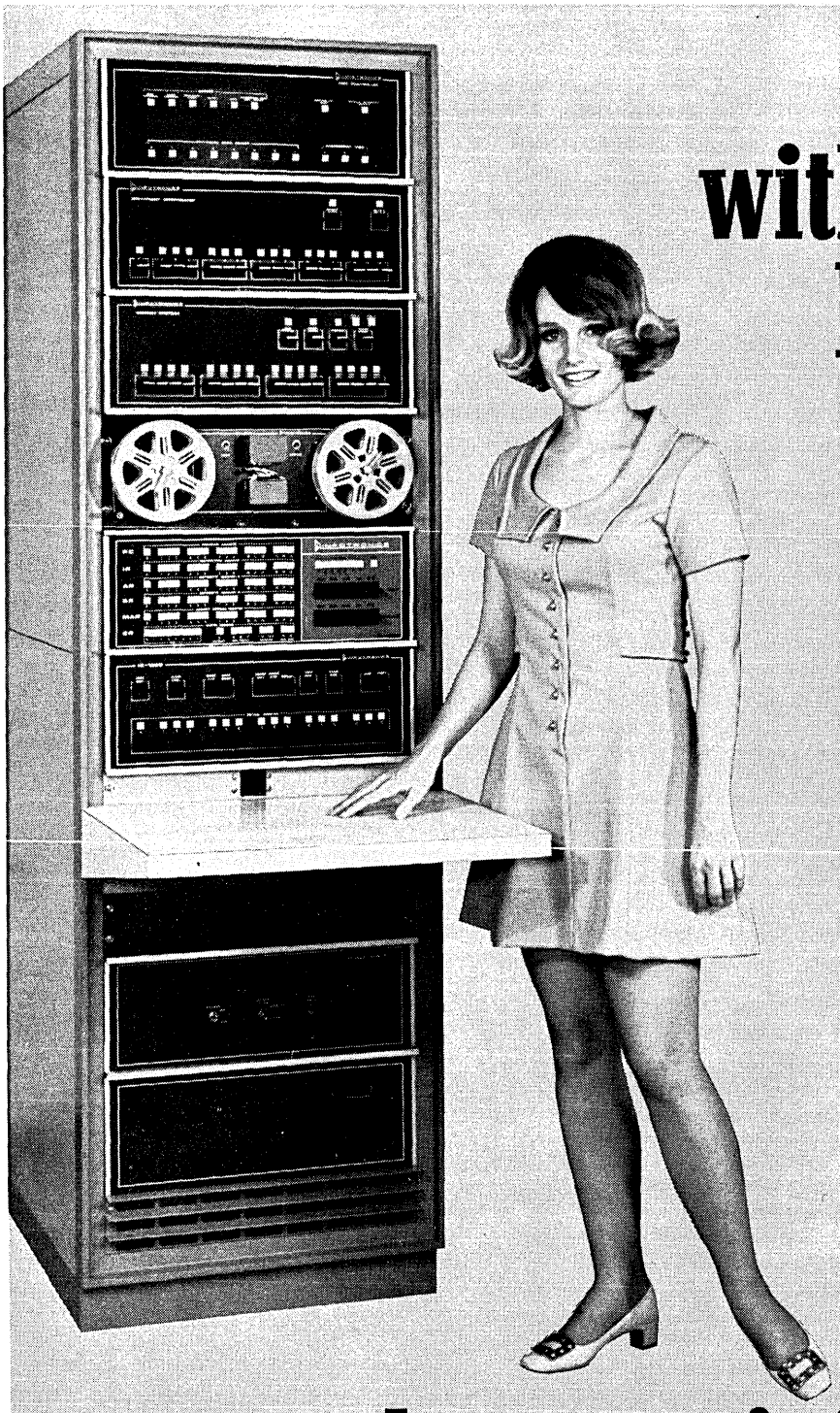
Start your savings plan today.

And its tuned computers for over two hundred of the Fortune 500. We call our extensive line of tuners Systems Measurement Software.™ They measure and evaluate system programs and hardware configurations to help you get your jobs through quicker. With reduced costs. And with no headaches.

Boole & Babbage, 1121 San Antonio Road, Palo Alto, California 94303

The Measure Men.

CIRCLE 32 ON READER CARD



# with features like these:

- realtime executive operating system
- *extensive* operations repertoire
- 16 addressable registers
- 7 flexible addressing procedures
- flexible memory (4K to 65K)
- up to 256 true priority interrupts
- up to 256 prioritied DMA ports
- up to 256 buffered I/O channels
- simple I/O interfacing
- I/O word, register, and status transfer
- data chaining
- floating point

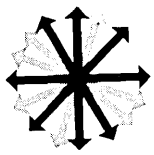
# it's more than a minicomputer

This powerful *mini/max** computer from Infotronics fills the gap between the minicomputers and the "big boys" but has a modest price tag. And the cost of adding peripherals is less for the *mini/max*, too. Get the full story on realtime executive and the *mini/max* by writing Infotronics, 8500 Cameron Road, Austin, Texas 78753 . . . or calling 512-454-3521.

* Trade Name of Infotronics Corp.

INFOTRONICS CORP.

521



SOFTWARE

## PL/1 Checkout Compiler

Someone must have yelled hard and long enough about vague diagnostic messages. The OS PL/I checkout compiler issues extensive diagnostics that pinpoint errors by statement numbers in either a short or long form at the user's option. The compiler also has new checking aids, such as a continuous record of program branches and statements that allow tracing to be turned on and off as desired during program execution.

Performing these services on 360/370 test runs should help to get them into production status quicker in either time-sharing or batch processing environments. Used in conjunction with the vendor's TSO program, the compiler allows monitoring of PL/I programs from remote terminals during development. Programmers at terminals can make corrections as problems occur during execution. It can also be used independently to develop and run a fully debugged program, or used with the output from the OS PL/I optimizing compiler, which allows programmers to obtain rapid execution of debugged segments as they run with other parts of the program being tested.

Storage requirement for the OS PL/I checkout compiler is approximately 100K bytes (including the user program and a related subroutine library). The compiler will be available in November of next year for $340 a month; the library required is an additional $25 per month. IBM, White Plains, N.Y. For information:

CIRCLE 370 ON READER CARD

## Mini Business Programs

The 16-bit systems have attracted a large user population, and here is a large pack of business programs that might help to make the population even larger. Mini-Computer Business Pack (MCBP), containing 30 programs in all, is written for machines with FORTRAN IV and DOS.

A 16K store is the minimum configuration—6K for the DOS and 10K for the operation of each program. The developer noted that the core requirement may differ depending on compiler performance, library handling, and the requirements of resident DOS.

The programs handle the regular business functions: accounts receivables and payables, payroll, labor distribution, inventory control, general ledger, P&L, balance sheets, information storage and retrieval, and file set-up and maintenance. All programs were originally written for a time-sharing package the company has been selling for the past year and a half. Currently two optional programs are also offered: open item on-line payables (OLAP), and open item on-line receivables (OLAR).

The pack is available with or without installation and support. The producer said that normally support is not furnished since most customers —usually time-share centers, service bureaus and manufacturers — take care of this themselves.

Installation of MCBP for a single system costs between $14,000 and $20,000, depending on the amount of conversion involved. The OLAP option costs $3000 and OLAR costs $6000. Separate terms can be arranged for support. COMPUTING CORP. INTERNATIONAL, INC., Englewood, Colo. For information:

CIRCLE 371 ON READER CARD

## Cross-assembler

Written in ASA standard FORTRAN, BIAS (Basic Iterative Assembly System) is a machine-independent cross-assembler that features automatic selection of short or long instruction formats, formation and placement of address literals, and freedom to use forward references in all argument expressions. Other features include conditional assembly, logical and arithmetic expression operators, program sectioning, external references, cross-reference listings of symbols and error lines, and continuation cards.

Under level G FORTRAN IV, typical speeds up to 350 cards/minute are achieved when assembling code for a DEC PDP-11 on an IBM 360 model 50 with a 100K-byte partition. Speed is achieved in part by the use of binary search techniques and data compression. BIAS employs one or more high-speed intermediate passes, permitting functions not usually found in small machine compilers.

Currently available for the PDP-11, the modular construction of the assembler allows readying BIAS for other target machines in only six weeks. Pricing is handled on a special royalty basis, or a one-time charge of $100. COMPATA, INC., Tarzana, Calif. For information:

CIRCLE 372 ON READER CARD

## Matrix Program

SOAM is a general-purpose programming system for applications that can be expressed in matrix notation. It consists of a language where each statement corresponds to one matrix operation, and a set of programs for processing these statements.

Free-format matrix input, 26 matrix arithmetic instructions, and automatic dynamic space allocation are all SOAM features, as well as provisions for storing conforming matrices as indexed strings under a common name, for storing comments on each statement, for flexible program flow control, and easy expansion. Extensive error diagnostics and efficient algorithms for symmetric and band matrices are claimed by the vendor.

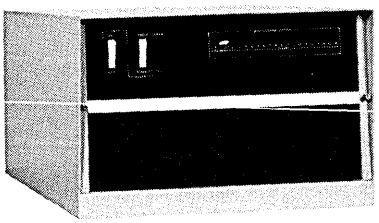
Written in IBM 1130 assembly language, SOAM needs a minimum 8K configuration with 2315 disc storage, a reader, and printer. A 16K version allows processing of fully populated 60x60 matrices or larger, depending on the operations performed.

A two-month period is allowed for evaluating SOAM. Sending the vendor a 2315 disc cartridge and $50 will bring SOAM, the supporting documentation (in English), and sample program decks back from Scandinavia. After two months you will either have to send $2450 more, or a letter that you have destroyed the cartridge contents. The vendor will correct any system errors that might crop up. S. O. ASPLUND AB, Goteborg, Sweden. For information:

CIRCLE 373 ON READER CARD

*(Continued on page 94)*

No Excuses Our Multiplexer Works



Yes, our TTC-2000/3000 Time Division Multiplexer really works.

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## Overlay Handler

For DOS 360 systems using a considerable number of overlay subprograms because of limited core capacity, POLYPHASE OVERLAY might substantially improve system performance. POLYPHASE keeps track of multiple subprograms, determining whether any subprogram is still usable in storage, eliminating many fetches from disc and permitting fresh reloading of the subprogram at the user's option.

A minor change in a single supervisor macro is required to run POLYPHASE, adding only six bytes, while POLYPHASE itself occupies 264 bytes, plus 20 bytes for each subroutine that will be in core simultaneously.

Subprograms called through POLYPHASE OVERLAY do not have to be recompiled when storage layout is changed; only a new link edit of the calling programs and called subprograms is necessary. This method applies to background and foreground jobs if the supervisor is generated with a Batched Job Foreground option.

Delivery requires 10 days after receipt of a $400 payment. INFORMATION EQUITIES INC., San Francisco, Calif. For information:

CIRCLE 374 ON READER CARD

## Cobol Compiler

A new DOS COBOL compiler for System/360 cpu's is claimed to require only about one-fourth the cpu time of the IBM version and produce tighter and speedier object programs, together with excellent diagnostics and cross-referencing. These results are said to be effected mostly by having a lot more of the compiler in core at one time than the standard COBOL. Minimum core requirement is 64K. Rental is $950 (Canadian) per month, or $10K a year, including maintenance, service, and updates. I. P. SHARP ASSOCIATES, Toronto, Ont., Canada. For information:

CIRCLE 375 ON READER CARD

## Cost Distribution

The Automated System for Cost Distribution (ASCOD) is designed to meet a number of federal and state requirements encountered by city governments in reimbursable programs.

It is basically a personnel cost system, calculating and allocating all costs of worked and unworked hours, and providing summary and detail reports on both program/project and department/division bases. Personnel costs are allocated either as a function of dollars spent or hours worked, handling all personnel, or operating on an exception reporting basis.

ASCOD is modular and may be extended to include capital expenditures, third-party contracts, and other nonpersonnel costs. The RPG/BAL program is tailored to the customer's installation, so the price ranges from $10-25K depending upon modules desired, hardware configuration, and population. SYSTEMS RDI CORP., New York, N.Y. For information:

CIRCLE 376 ON READER CARD

## Batch Proof Control

This batch proof control program accepts any type of card input and accumulates totals for three fields, which may be a control field for "hash totals" and two quantity fields. The purpose is to develop totals which are commonly used to balance an adding machine tape total of the input. Fields may be up to 12 digits in length and may be located anywhere in the input card. Their location is indicated to the program via an input parameter card which also indicates whether "cents" editing is desired for the amount fields.

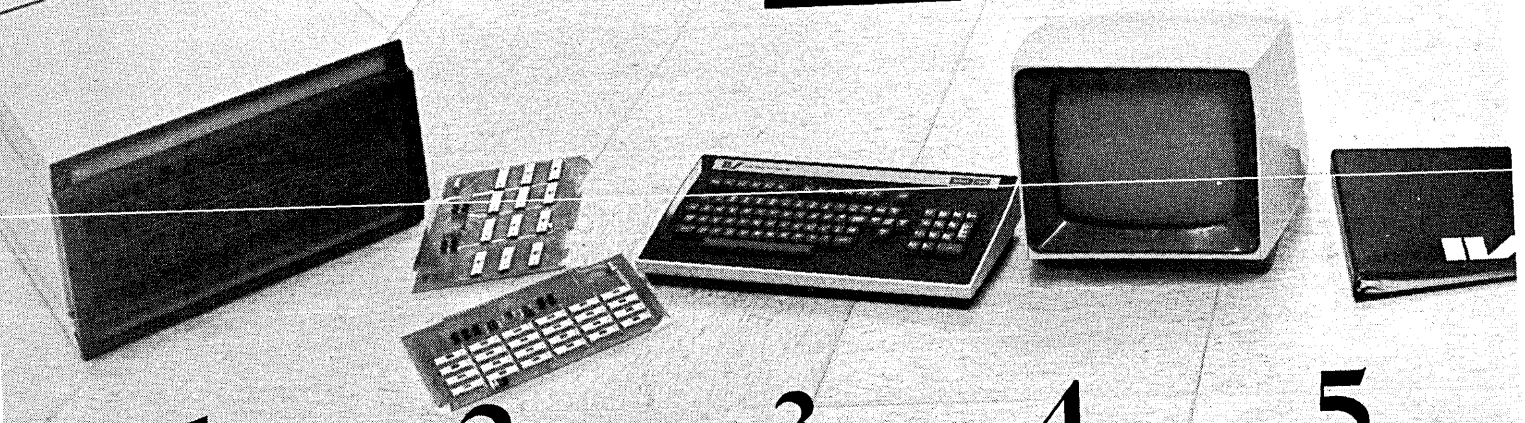
The totals may be developed by placing either a blank card or a control card at the point in the program at which the totals are desired. The control card, if used, should contain the totals the program is to balance to; e.g., the adding machine tape totals. The program prints the accumulated totals; the totals in the control card, if entered; and the difference, if any. The program is written in COBOL and runs under System/360 DOS with minimum 32K core. The price of $250 includes documentation. MATRIX COMPUTER SYSTEMS, INC., Rockville Centre, N.Y. For information:

CIRCLE 377 ON READER CARD

*(Continued on page 103)*

# Announcing System IV/70 the data-base access system of the 70's

# if:



**1**

You could put the computing power of a System 360/30 in a box this size,

**2**

and could put the whole 75,000-component CPU on one card, then give it the first *all*-semiconductor main-frame memory,

**3**

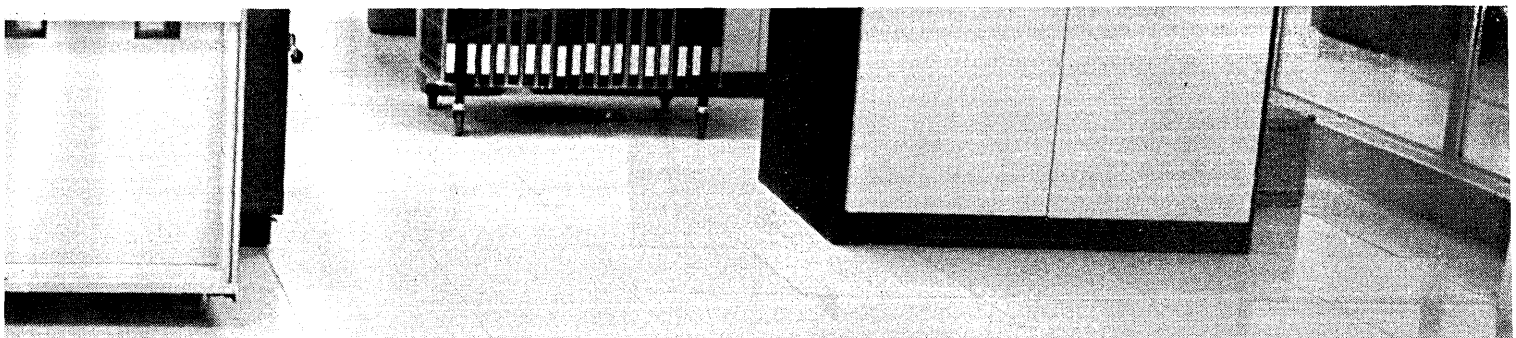
and be able to talk to it on up to 32 keyboards at the same time,

**4**

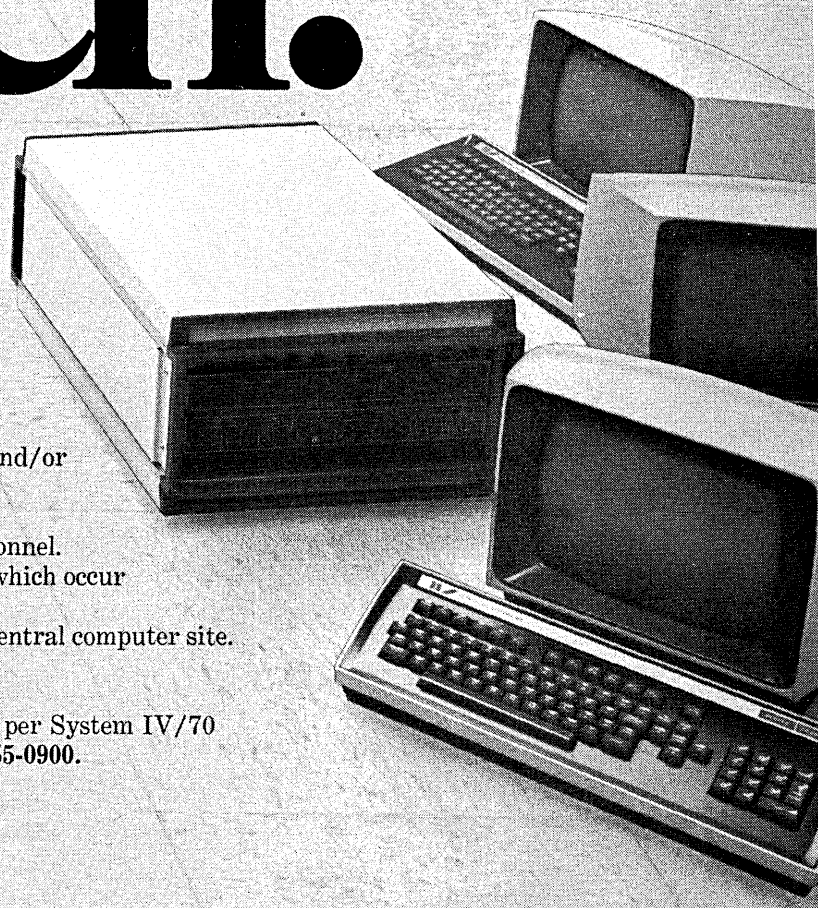
and have it talk right back on up to 32 video displays at one time,

**5**

and give it foreground terminal software in addition to disc and IBM-compatible communications packages,



# then:



**You'd have System IV/70—the data-base access system of the 70's** ☐ System IV/70 solves the data flow problem between the user and the computer. By integrating a computer with a cluster of video terminals, System IV/70 provides a more effective man/machine interface. ☐ Up to 32 System IV/70 video terminals are controlled by the IV/70 local computer which guides the user through the data entry steps, pre-processes and formats the data, stores it on disc for local use and/or transmits it directly to the central data base.

This cluster concept means:

- ☐ Increased output with fewer data-entry personnel.
- ☐ A reduction in the number of human errors which occur during normal multiple-step entry.
- ☐ Reduced connect and processing time at the central computer site.
- ☐ More efficient data transmission.
- ☐ Local format storage.

The result is cost reduction. The purchase price per System IV/70 terminal is $980! **Our phone number is (408) 255-0900.**

# specs.

**System Description**

System IV/70 is a display processing system designed for *data entry and retrieval* to and from data bases and computer systems. A maximum of 32 video displays may be connected to, and controlled by, a System IV/70 computer which, in turn, communicates with the central computer facility. System IV/70 interfaces with IBM 360/370 systems locally or remotely – and with unmodified IBM software through a System IV/70 foreground communications package. A subset of this package completely simulates an IBM 2848/2260 data station complex.

During normal System IV/70 operation, display and communication operating overhead is only 10 to 20%, leaving 80 to 90% of the System IV/70's time available for user background programs such as data validation, error checking, formatting and local processing and storage before transmission to the main computer.

**Video Terminal (Standard Features)**

**Characters per screen:** 1152.

**Screen Format:** 40, 48, 80 or 81 characters per line; 6, 12 or 24 lines per screen.

**Edit Capability:** Character insert and delete, line insert and delete, roll up/down, tab, erase, and 10 cursor control functions.

**Format Capability:** Split screen and protected display areas for "fill in the blanks" data entry, and selected transmission.

**Suppressed Display:** 1 to 15 character suppression for entry of confidential information or restricted access.

**System IV/70 Computer**

**Memory:** 1.9 $\mu$s cycle-time, semiconductor mainframe memory expandable to 96K bytes.

**Speed:** Character move, 2.5 $\mu$s/byte
Character compare, 3.8 $\mu$s/byte
Decimal Add/Subtract, 5.1 $\mu$s/byte
Binary Add/Subtract, 15.2 $\mu$s/24 bits

**Instruction Set:** 120 major instructions including variable length byte instructions, binary fixed and floating point arithmetic, translate/test, push/pull stacks, register to register, and list processing instructions.

**Input/Output:** 8 I/O channels; 64 devices/channel; 8 levels of nested hardware priority interrupt (standard); single firmware I/O interrupt instruction; maximum I/O rate 265,000 bytes/second.

**Peripherals**

Fixed and moving-head disc drives, asynchronous and synchronous communications interfaces, IBM compatible magnetic tape drives, high speed printers, card readers and paper tape reader and punch.

**Software**

Foreground video-display control packages including a 2848/2260 simulator package, terminal communications software compatible with IBM OS/DOS (BTAM and QTAM), disc operating system with sort routines, and basic operational software.

**General**

The System IV/70 may be configured for a variety of applications. A combination of sixteen $980 terminals and a 6K CPU results in an average per-terminal purchase price of $1450. A complete 32-terminal system with 24K CPU, disc drive, communications interface and printer would cost $1950 per terminal.

**FOUR-PHASE SYSTEMS, INC., 10420 North Tantau Avenue, Cupertino, California 95014**

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### Display Control

The use of crt's or other terminals is reportedly made more economical by the Display Control System. DCS provides real-time support for local or remote teleprocessing devices simultaneously with batch processing, without implementing MPS, BTAM, or QTAM, and without installing additional core. DCS uses a core-sharing technique said to allow interrupt jobs to operate concurrently with all jobs, thus utilizing core more efficiently. DCS operates as a monitoring system which becomes part of the supervisor. It runs under System/360 DOS; an OS version is presently being developed. The price, including installation, documentation, and support, is $12 to $15K depending on terminal configuration. AIDS ASSOCIATES INC., Huntington, Conn. For information:

CIRCLE 378 ON READER CARD

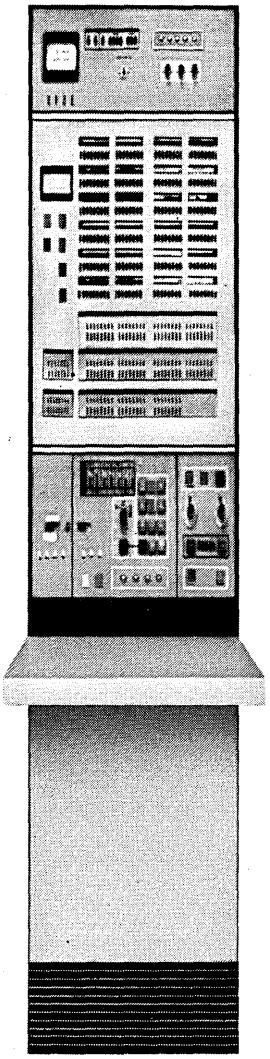
### Report Generator

The vendor of SARG (Self-Adapting Report Generator) designed it to satisfy emergency, annual, one-time, or user department requests. It is claimed that users with no data processing experience can request reports merely by filling in specification sheets for parameter definition. The user specifies the format of the report he desires, the data fields to be listed and summarized, and whatever decision factors that are involved in the report to select or bypass data. If calculations are to be made on the data, equations may be specified, as well as sorting parameters for final report sequence.

Other features include five levels of control, plus final total; 18 list fields and 10 horizontal total fields; page heading, total, and group indication; automatic decimal alignment; and calculation of equations of up to five factors.

Including documentation and implementation, SARG is priced at $2500. It will operate on all 360 models (except the 20) having at least 32K of memory and two disc or tape drives. OCCIDENTAL COMPUTER, Riverside, Calif. For information: ■

CIRCLE 380 ON READER CARD

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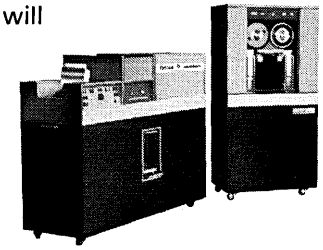

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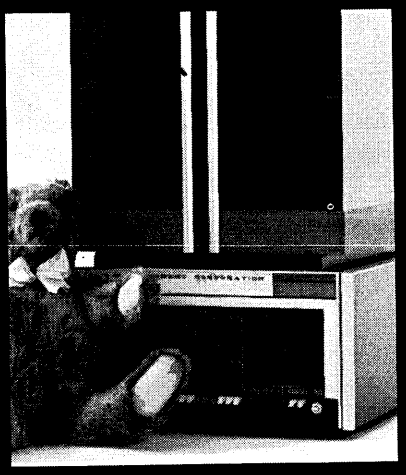

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**EXPORT TAX INCENTIVES GAIN IN CONGRESS**

The Administration's proposed export tax incentives have won substantial support in the House Ways and Means Committee. In fact, Administration officials are confident the incentives will be legislated even if Congress fails to enact the foreign trade bill of which they are now a part. Exporters would be authorized to establish special subsidiaries (domestic international sales corporations or DISCs) that would defer taxes until profits were passed to parent companies. The Ways and Means bill would phase deferral over four years: 50% of profits in 1971, 75% in 1972-3, and 100% in 1974.

Ways & Means deferred action on offshore assembly operations covered under a special tariff statute that permits duty-free entry of U.S. components previously exported until federal agencies have looked at the Tariff Commission special study (now completed). W&M asked the agencies to propose any changes needed to prevent these operations from endangering U.S. employment.

**NEW HOPE HELD FOR BANK HOLDING COMPANIES**

The Federal Reserve Board would enjoy wide discretion in regulating non-banking activities of bank holding companies under a bill passed by the Senate Banking Committee. FRB chairman Arthur Burns, who influenced this decision, thinks data processing services should be permitted. The bill would let non-banking subsidiaries operating prior to March 24, 1969, be retained. DP industry sources would prefer an earlier "grandfather clause" date and more specific prohibitions on non-bank activities.

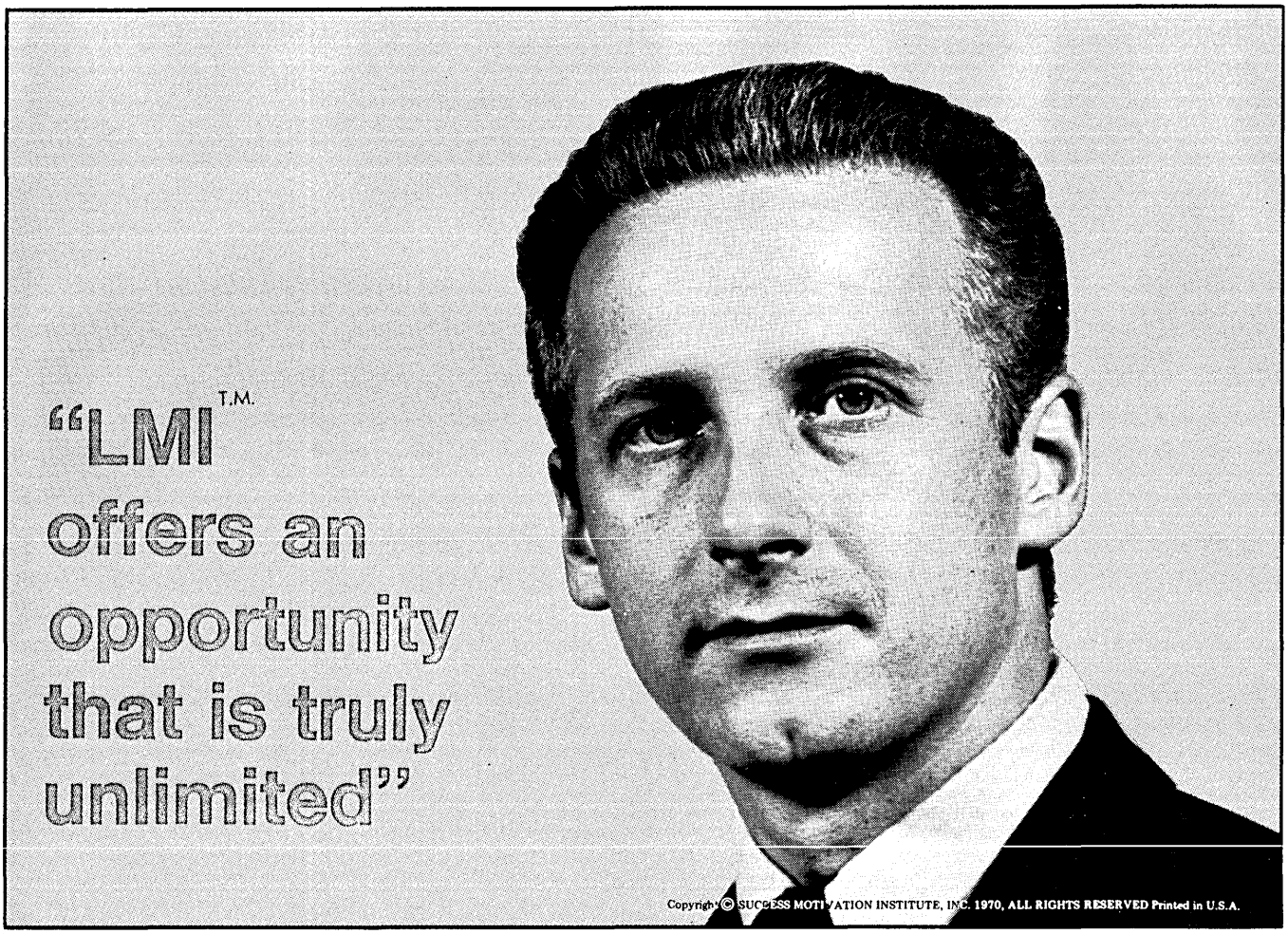
**ENVIRONMENTAL DATA BANK MAY BE CREATED**

Despite Administration opposition, Congress continues to push the creation of an environmental data bank. Michigan Democrat John Dingell of the House Merchant Marine & Fisheries Committee, sponsor of the idea, has amended his bill (HR 17436) to meet agency objections. It would tie together existing data banks throughout the country in a single federal system, probably centered in the President's Environmental Quality Council. Committee sources estimate costs of equipment and system very roughly at $20-30 million to set up, $10-15 million a year after that. In-house and outside expertise would both be used. The Senate is expected to go along, though no one is pushing for it currently.

**EIA SUPPORTS NAS REPORT**

In a recent report to the FCC, EIA has agreed with the NAS plan for certifying customer-provided terminal devices hard-wired to the switched phone network (Aug. 1, p 77). But EIA says NAS recommendation for licensing installation/maintenance personnel require more study.

Many independent suppliers say the NAS certification plan will take too long and cost too much to implement. Says one critic, "EIA could have supported a simpler scheme, like the one proposed by Ditberner Assoc. It assumes foreign terminals and interfaces are safe to use unless the carrier can prove otherwise."

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# BOOKS

***Computers and Telecommunications: Issues in Public Policy*, by Stuart L. Mathison and Philip M. Walker. Prentice-Hall, Inc., Englewood Cliffs, New Jersey, 1970. 288 pp. $12.50.**

It is incumbent upon serious computer professionals to understand all aspects of communications, including political and economic, from the viewpoint of the sophisticated user. This book is the best means yet presented for obtaining such an understanding of the terribly complex issues that confront national policy makers in comprehending and managing the marriage of computers and communications.

In this marriage computers may be likened to the young, aggressive male who seeks out the dull, stodgy widow as a bride because only she can provide what he needs to live on. The widow is Ma Bell, of course, because in the past communications has, for practical purposes, meant the Bell System. She's not a particularly desirable bride but she was about all there was. There's a new girl in town now, though, and the ardent swain is about to make googoo eyes at her. How will it end? Will Ma Bell return to her annuities, her antimacassars and her cats, or will the old gal put on some war paint, buy a mini-skirt and learn to do the Swim, the Fish and the Frug? Tune in next year.

The new girl is Microwave Communications, Inc., to whom the FCC gave the right in 1969 to construct a common carrier link between Chicago and St. Louis.

At the considerable risk of oversimplification, the basic issues revolve about the historical near-monopoly of the Bell System on local and long distance transmission. There are two questions of fundamental importance that grew out of this situation: (1) Should the status quo be preserved, and if so under what conditions? and (2) Whether or not the monopoly is preserved, should common carriers be permitted to offer data processing services, thereby using their natural advantage of close access to communications facilities?

The first question is what the Microwave Communications case was all about. In a close (4-3) decision the FCC decided to permit a third common carrier to enter the field of interstate transmission in direct competition with AT&T and Western Union. The decision was stated as if it is an experimental step, but it seems obvious that there will be no pulling back and that other route awards will be made in the future. UCC is presently mounting a massive effort to establish a nationwide network, for instance. What the FCC has apparently said, although it is carefully hedged, is that it is now prepared to experiment with new economic forms to replace the historic FCC policy of upholding the monopoly positions of AT&T and Western Union in interstate common carrier communications.

These new links will drastically lower the cost of long-distance data transmission and will force changes in operational aspects of the system to introduce much greater flexibility (e.g., line-sharing among unrelated customers) and range of frequency offerings (e.g., 2 kHz channel increments) than have been available up to now. Ma Bell is in agony, but bet on the old girl to face up and become competitive.

In the matter of data processing services a common carrier has an obvious opportunity to discriminate in its own favor. In April of 1970, subsequent to the publication of this book, the FCC issued its long-awaited decision[1] (three and a half years in the making) covering the relation of the carriers to data processing services. That decision provides that common carriers other than the Bell System may not enter the data processing services field except through completely separated subsidiaries (carriers doing gross business less than $1,000,000 annually exempted) and that data processing services making heavy use of communications (e.g., time-sharing service bureaus) will not be subject to FCC regulations. No specific prohibitions, other than the obvious one of not permitting carriers to promote or favor their data processing subsidi-

1. FCC 70-338, Docket No. 16979: "In the matter of Regulatory and Policy Problems Presented by the Interdependence of Computer and Communications Services and Facilities."


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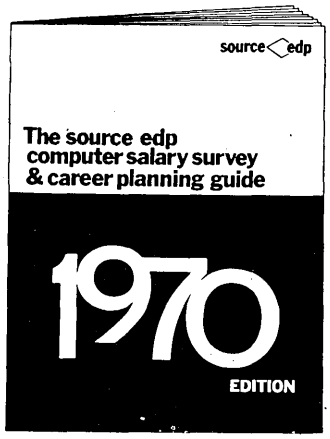


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ary, but all agreements and contracts between the two must be filed with the FCC to become part of the public record. The FCC did not go as far as Mathisen and Walker recommend. They hold that not only should such separation take place, but that the data processing entity should not be allowed to provide services to the carrier, *and* vice versa. The latter prohibition seems extreme.

(This decision by the FCC is not likely to cause a major change in direction of the carriers. Western Union, which has made no secret of its aggressive intent to pursue the data processing field, has already organized separate corporate entities for the purpose. So have several other carriers, including General Telephone and United Utilities. The Bell System situation is somewhat more complex. The Bell System is forbidden by a 1956 Consent Decree to engage in non-common carrier activities, and was "encouraged" by the FCC to sell off its TWX message system to Western Union. This would tend to indicate that Bell will be forced to restrict itself to its traditional role of voice carrier, plus whatever data communications services it can provide with present and future plant. On the other hand, Bell is experimenting with message switching using the newer ESS central office equipment, which could be interpreted as a desire to enter the message switching business. The latter is a carrier function, or could be so regarded, but today is also definitely a data processing service. Thus the picture is still not clearly resolved.)

Mathison and Walker are in agreement with the FCC in two other areas: (1) The non-regulation of data processing services, and (2) that there is at this time no need for additional rules or legal safeguards relative to privacy and security of data.

There are other issues also, and Mathison and Walker deal with them as well. As a comprehensive source of a description of the issues, and discussion of the pros and cons, their book is excellent and unique. Be warned that it is biased, but overtly. The authors have viewpoints and recommendations, as they indeed should, and in general their opinions are clearly identified and separated from the analytical discussions. Only in one instance did this reviewer detect a firm bias that was unfairly expressed. This occurred in connection with a discussion of bandwidth offerings, where the "straw man" argument was presented that implied that because the common carriers offered no modems between 2.4 kHz and 48 kHz such facilities were not available on either switched or leased lines. This is not true, which the authors state, but they then proceed to build the straw man anyway. This was, however, a singular lapse that does not really detract from the generally high quality of analysis.

The book is somewhat repetitious. To those unfamiliar with the field, however, this repetition may be advantageous. A more significant lack is the complete absence of discussion of the place of local regulatory bodies in the overall picture. It may be, however, that we in California are more affected by the State PUC than is the case in smaller Eastern states.

Terms are carefully defined, and both legalese and technicalese are avoided.

—Richard H. Hill


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# PEOPLE

In this Time of the Treasurer, there are some new appointments: **W. Bruce Quackenbush** has switched from the treasury of Control Data subsidiary, Commercial Credit Co., to take the same post in the parent company. His background is completely financial, having served as an investment analyst with Standard Oil, and with A. G. Becker & Co. . . . **John Jelillian,** formerly a Peat, Marwick, Mitchell man, has been elected treasurer and a director of Computer Investors Group, Inc., based in Larchmont, Long Island. . . . In yet another Computer Applications, Inc., NYC change, **Gerard K. Donnelly** has taken over as treasurer, succeeding **William F. Bott,** who has gone to be president of a CAI subsidiary, New Era Letter Co., Inc. . . . **Robert F. Guise,** founder of Com-Share, Inc., has given up his presidential post to **Richard L. Crandall,** but will replace **Glenn V. Edmundson** as chairman of the board and will remain full time, with more emphasis on affiliate companies. Crandall had been chief exec officer since September of '69. . . . Keystone Computer Associates, Ft. Washington, Pa., a software-service subsidiary of University Computing Co., has promoted **John E. Brennan** to president, succeeding **John Guernaccini,** who left the company for personal reasons after being in charge since its founding in 1965. . . . **Paul O. Gaddis,** vp of corporate development at Westinghouse since 1968, will command a new public systems and services group there, which will include Tele-Computer Systems Corp., civil systems and medical products. . . . **Robert J. Lynch** has been appointed president of Singer Information Services Co. (SISCO). He came to Singer with the General Precision Equipment merger in 1968, was originally with the Air Force as a missiles and air defense integration development planner. . . . SEACO Computer-Display, Inc., of Dallas, COM specialists with several subsidiaries, has made several new appointments: **R. Scot Clark,** senior vp in charge of corporate planning and development; **Charles J. Meyer,** vp of engineering; **Joe Keene,** vp of operations; and **Thomas B. Tansil,** vp of computer systems. . . . At Parsippany, N.J., Data Trends, Inc., has formed a Digital Accounting Terminals group, and recruited **Edgar H. Gibbons,** formerly Western Union director of programming and systems engineering, manager. He also was previously with GE for 15 years, and at MIT's electronics research lab. DTI plans "new developments for the general business market." . . . With the Air Force, **Maj. Gen. Kenneth C. Dempster** has been named assistant director for plans, programs and systems at Defense Supply Agency hq. He is a 30-year man (joined as an aviation cadet in 1940) with diversified staff and field experience, came from Clark AFB in the Philippines to assume his present post. . . . **J. Maldwyn Thomas** is now chief exec officer of Rank Xerox Ltd., the British joint venture. . . . New officers of the American Records Management Association (ARMA): **Donald F. Evans,** Union Oil Co., president; **Thomas G. Doyle,** New England Telephone Co., exec vp; **William H. Williams,** North American Rockwell, treasurer. . . . **Albert F. Wike** is coming over to Computer Entry Systems, Silver Spring, Md., from Addressograph-Multigraph Corp., which holds a 30% interest in CES. He will be vp of corporate planning. . . . **Lowell Weissman,** new exec vp at Information Machines Corp., Santee, Calif., originators of REGISTRON terminals, was formerly with a special development and acquisitions team at Consolidated Foods Corp., and served as board chairman for Computer Telecommunications Corp. in Chicago. . . . Perhaps the cleanest sweep on record has occurred at Dialog Computing, Inc., Fairfield, Conn., which tersely announced it had fired **Charles D. Ettinger,** chairman and president; **Edward W. Ajello,** exec vp; and **Eugene A. Dubs,** financial vp and assistant secretary. They were replaced, at the same meeting voilá, by **Walter V. Smiley,** former Systematics, Inc., president from Little Rock, who will start in the same position; and **Jean H. Felker,** a director at Colonial Life Insurance and Schulman Transportation Enterprises, who will be chairman of the board. . . . **Rowena Swanson,** DATAMATION author and research administrator for the Air Force Office of Scientific Research since 1961, has taken up new duties as professor of library and information science at the Univ. of Denver. ■

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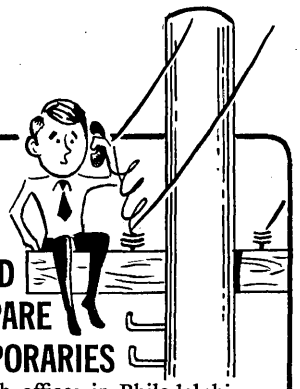

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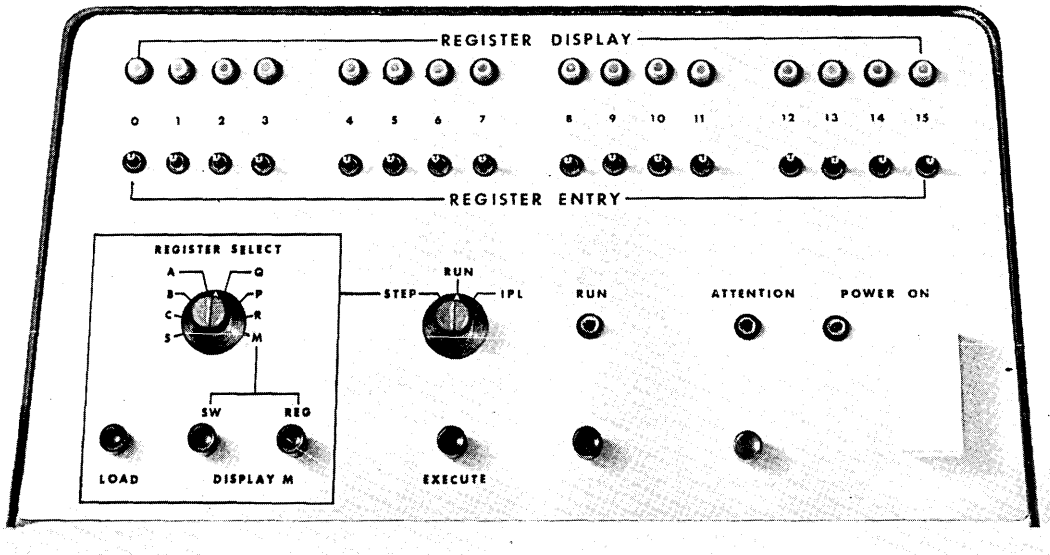


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