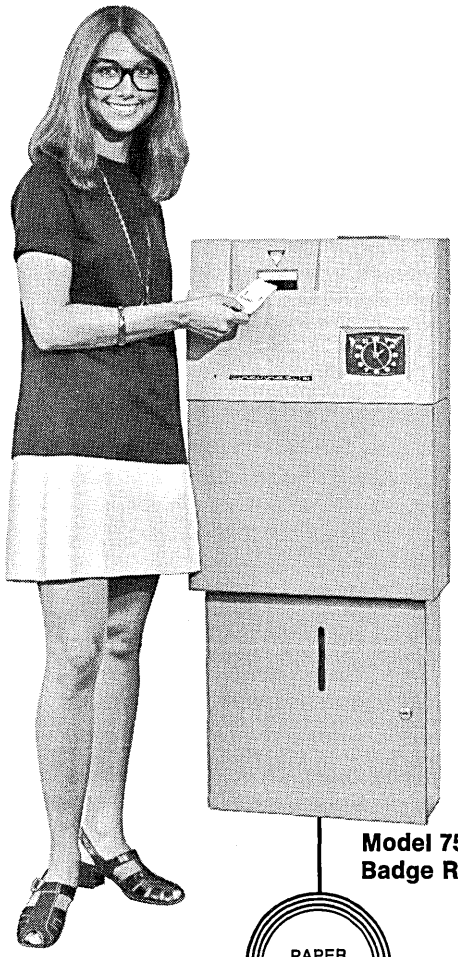
DATAMATION®

71

October 1

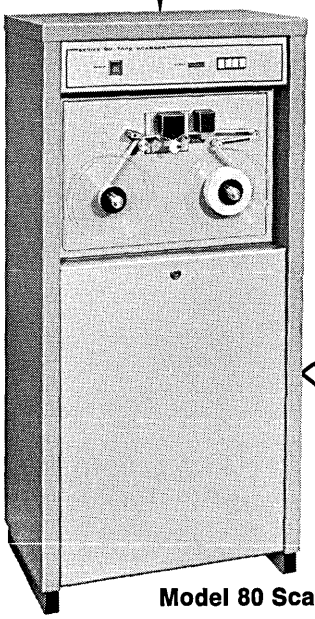
Data Communications in Transition

Is your payroll input obsolete?



Model 75 Badge Recorder

PAPER TAPE



Model 80 Scanner

The conventional time card payroll system remains useful, but now there is a new computer compatible payroll processing system. The Model 75 Badge Recorder from Cincinnati is the payroll input of tomorrow.

The Model 75 saves real time and real money — there are no time cards to buy — no time spent delivering and picking up time cards — no sorting or auditing of time cards — no posting to payroll sheets. Team the Model 75 Attendance Time Data Collection System with your computer to cut clerical time and costs to a minimum.

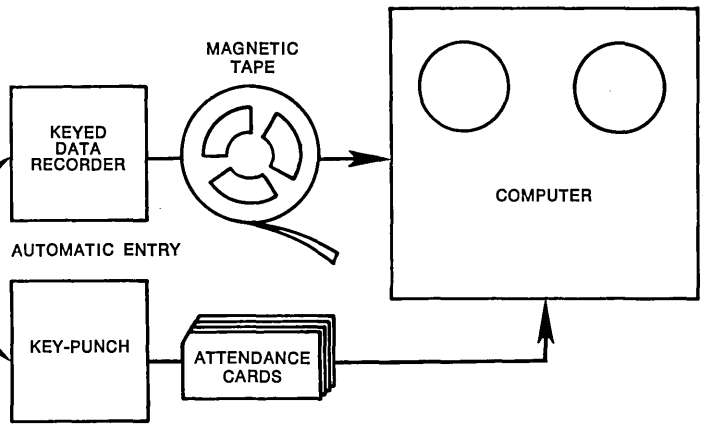
Each employee is provided with a credit card size plastic badge embossed with a modified bar code employee number. The badge is inserted in the recorder registering the time, date and identification number on carbon backed dual paper tape. The registration is man-sensible and can be visually checked by the employee through a window on the unit. It is also machine-sensible and can be converted to magnetic tape or punch cards at up to 120 registrations per minute via the Cincinnati Model 80 Scanner.

Take up reels hold tape for 2400 registrations per pay period. This means 100 employees per recorder can clock as many as four times each day for a normal work week with space for 400 registrations left over for overtime or extra employees. The master tape supply reel holds 10,000 registrations or about a one month supply.

When the time card system came in to being almost a century ago, it was a great innovation. The Model 75 is one-hundred years better. If it's time to cut costs, call the Cincinnati Sales Engineer listed under "TIME RECORDERS" in the Yellow Pages, or write for free literature on the Model 75 — our 75th anniversary — just in time.

cincinnati®
TIME RECORDER CO.

1828 Central Avenue, Cincinnati, Ohio 45214
A Unit of General Signal Corporation



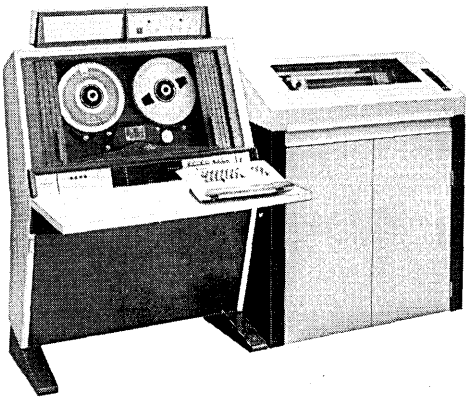
CIRCLE 25 ON READER CARD

Datascribe uses data compression to cut your phone bills to size.

A unique feature of Tally's remote batch Datascribe terminal is the capability of compressing data during transmission. Data compression eliminates transmittal of redundant information. The receiving Datascribe reconstructs the data to its original image.

In most of your applications, data compression reduces actual line time by two-thirds with obvious and significant cost savings.

Now your business information can be recorded remotely, transmitted at an effective rate of 3600 Baud over the dial-up network to the central computer facility, and, after processing, returned at the same efficient, cost saving rate for off-line report generation at 600 lines per minute.



Datascribe . . . the total data entry, communication, and print-out system . . . can help you cut data input and output costs to the bone. For complete information on Datascribe systems and options, we invite your inquiry. Attractive rental, lease or purchase plans are offered.

TALLY

8301 South 180th Street, Kent, Washington 98031. Phone (206) 251-5500 · Regional offices in Chicago (312) 298-6710 · Dallas (214) 358-3135 · Los Angeles (714) 542-1196 New York (516) 678-4220 · Richmond (703) 231-0259 · San Francisco (415) 989-5375 · Abroad in London and Frankfurt.

AT&T's new tariff which went into effect on July 25, 1971 permits the multiplexing of interstate wideband circuits.

That means you can get highly reliable, low-cost data communications right now — today, no waiting.

We've been waiting for this day. Because we've designed a networking system which utilizes these error-free wideband circuits to provide online service of unprecedented quality for every one of your terminal end-users.

TRAN networks can intermix asynchronous and synchronous terminals of low, medium and high data rates over a single, high speed wideband circuit. (Incidentally, we can also multiplex low and medium speed devices — both asynchronous and synchronous — over voice grade lines, too.)

If you have management responsibility for a data communications network with a combination of remote job entry and online data communications terminals — or are planning a new one — you ought to tell us about it.

We'll be glad to tell you how our TRAN network configurations — wideband, voice-grade or private cable — can increase your data communications capabilities and save you money. So send us your system diagram today.

tran

computer transmission corporation

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volume 17 number 19

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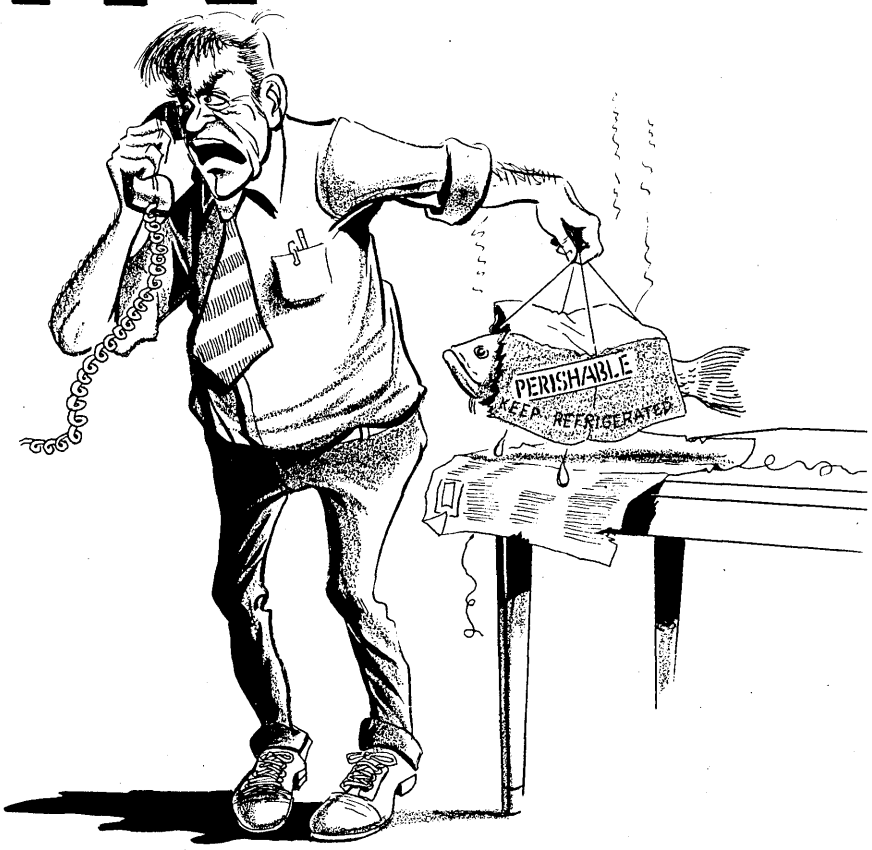
a thought about you...

ANGRY



Do minicomputer failures make you fume? Are disgruntled customers raising your blood pressure? OEM users, take heart! Cincinnati Milacron has a soothing solution for you — the CIP/2100 general purpose minicomputer.

We can't say that a CIP/2100 never fails, but it is built for reliability. For instance, it's rugged enough to take a temperature variation of 0° - 50°C. And it's simple enough that we can teach you to maintain or program it in only one week!

Tell us your application. We'll show you how the CIP/2100 can help you keep your cool — and your customers.

minicomputers

CINCINNATI MILACRON

Cincinnati Milacron Company | Cincinnati, Ohio 45209

Machine Tools
Process Controls
Chemicals
Plastics
Plastics Processing Machinery
Abrasives

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WHY ISN'T YOUR COMPUTER WORKING FULL TIME?

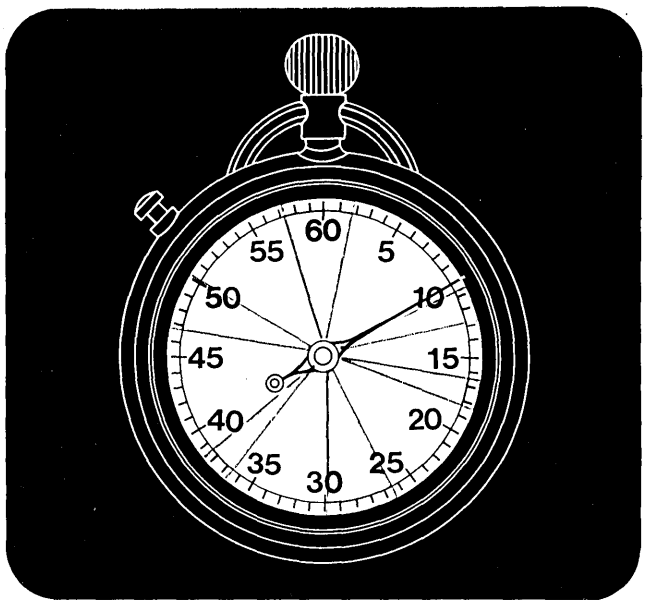
Your system may be loaded to capacity. But chances are the central processor is idle most of the time. Why? Because it's waiting for an I/O channel. Or a peripheral. Or because main memory won't hold more than one job at a time.

Burroughs makes low- and medium-priced systems that work smarter, systems that keep all their resources busy so that a dozen or more independent jobs can be flowing through at the same time. That way, you can do more work with less machine.

How? By a technique called *dynamic multiprograming.* It's the industry's most significant development in terms of total systems productivity.

Burroughs B 2500, B 3500 and B 4500 systems are the only low- to medium-priced computers that offer it.

Dynamic Multiprograming is explained in our new brochure. Ask your Burroughs representative for a copy. Or write to us in Detroit, 48232.



Burroughs

CIRCLE 9 ON READER CARD

RCA AND UNIVAC

Although it was not widely reported at the time, RCA six years ago actively sought to acquire Univac as part of a major expansion of the RCA Computer Systems operation. But last month, as rumors flew that Univac would be the one doing the acquiring, expansion was the last thing on anyone's mind at the RCA computer operation. Several projects were cut off, we learned, and salesmen were reeling from a lousy July when sales were down to about 10% of quota. A continuing problem was the return of Spectra 35s and 45s from customers upgrading to the single-digit series. We hear RCA is readying a Spectra 45 modification to be offered as the RCA 1. Or will it be Univac 1?

SUPERMART CHECK-OUT COMPETITION STIFFENS

Automated check-out systems for food supermarts, a projected $2 billion market by 1980, are already generating intense competition among IBM, NCR, Litton, RCA, TI, and several other systems suppliers, major and minor. RCA reportedly is on the verge of signing with Kroger for a demo of an optical scan system; Charecogn, another pioneer in the field, expects to have a similar deal wrapped up in the next few months, we're told by a knowledgeable outsider. Zellwager A.G., a Swiss firm which already has a demo system operating in a Zurich supermart, is said to be dickering with a large Boston area food store chain for a U.S. test site. NCR apparently hasn't signed up with anyone yet, but is experimenting with optically-scan type, and optically scanned bar code, fixed and movable scanning devices, and a combination of automatic scanning with automatic grocery bagging. Litton reportedly is relying on magnetic encoding, while Friden has dropped out of the race, we hear, because of the big investment and relatively slow payoff.

LOOK FOR PROPOSAL FOR 30K-LPM PRINTER

Does anyone have a 30,000-lpm printer? About to issue an rfp for a high-speed unit is the Lawrence Radiation Lab in Livermore, Calif., which wants to replace its 8-year old Radiation Inc. model that requires special paper. The new one must work with standard paper, have about 132 columns, and maybe have a buffer so they can plot vectors. Some small advanced-technology firms with this capability are expected to surface with bids. At Livermore, they still don't have the Star supercomputer, which officially was to have arrived on Aug. 1. We hear delivery could be in November or December.

DISC DRIVE TO HAVE GLASS AND LASERS

A Los Angeles company is promising it will have the prototype next March of a 3330-like disc drive that provides ten times the storage capacity of the IBM product and with the same average access time of 30 milliseconds. John Aseltine, president of seven-month old Ovonic Memories, Inc., says his product--called the 4440--will have all the characteristics of the 3330, except that the spinning discs will be coated with an amorphous glass-like "Ovonic" material on which

data would be recorded, read or erased through laser beams applied at pulse rates of 100 nsec. An eight-spindle configuration would store eight billion bytes, compared with the 3330's 800 million.

The Ovonic matter comes from Energy Conversion Devices, Troy, Mich., which owns 80% of the Los Angeles firm and is headed by Stanford R. Ovshinsky who several years ago reported discovery of unique switching action in amorphous materials.

A paper tiger? Yes--but Aseltine is promising a date for a prototype and in two months will take delivery on an IBM 370/145 to study compatibility problems. His firm has 37 men working on the system in a small plant in southwest Los Angeles where Hughes Aircraft once had its laser operation. Aseltine admits ovonic materials still have to be proven, but he says his plans don't violate any laws of physics. "People had a hard time explaining magnetics some time ago," he observes.

THANKS BUT NO THANKS--
WE ALREADY HAVE ONE

Selling software by mail can hold surprises for both buyer and seller. Dylakor Computer Systems, Inc., Van Nuys, which went into the mail-order software business last spring with its Dyl-250 general purpose package which goes for $1 per day, permits customers to return the package within 30 days if they're not satisfied. Against some 170 who've kept the package about a dozen have returned it including Singer-Friden which, when it started to use Dyl-250, uncovered an "almost identical" package which had been developed in-house but never used because of lack of documentation. Dyl-250 was returned with thanks.

THE SALESMAN
IS A CUSTOMER

Adpac Computing Languages Corp., San Francisco software house, is turning customers into salesmen and the idea came from a customer. It all started when an insurance company using the Adpac programming language wanted to sell packages in Adpac to other insurance companies. Adpac liked the idea so well it developed a "limited usage license agreement" for customers' customers, which allows them to use not only the Adpac package they buy but also the language itself in simple routines at a fraction of the normal cost for unlimited use.

RUMORS AND
RAW RANDOM DATA

Storage Technology Corp., Boulder, Colo., said it soon will introduce software to diagnose troubles on its IBM 3400-like tape subsystems. The move follows rumbles that IBM's software won't read non-IBM tape drives in the 3400 series...In Europe, we hear, IBM is applying greater pressure on users to avoid independent peripherals than they did in the U.S. Most receptive to non-IBM gear is the German user, least receptive is the British...Clasco Systems, Inc. (formerly Computer Learning and Systems, Inc.) once charged $30K per year for a system performance measuring Case Simulator, but now has introduced a better model priced at only $10K. The target: a widely used package from Comress, a competitor...

PERTEC. WE HAVE IBM SURROUNDED.

Pertec supplies the peripheral systems and components that IBM doesn't. Many different types of them. For data entry and data output. For end user and OEM applications. In many different markets. And they're all computer compatible.

We're an aggressive company with field-proven products. We have the computer literally surrounded with high-performance peripheral systems. We've accomplished more than you've probably heard about. We're bigger than we seem. And we're growing a lot faster than our competition cares to admit.

If you have anything to do with computers you need to know more about us.

We're the largest independent supplier of low-cost digital magnetic tape transports in the world. We've already delivered over 10,000 units and we offer more models than our two largest competitors combined.

We're becoming very big in the field of low-cost disc memory drives in order to meet the mass storage requirements of small computer systems.

We manufacture complete key-to-tape data entry systems for one of the giant data processing firms. In fact, right now we're the second largest manufacturer of key-to-tape systems in the world.

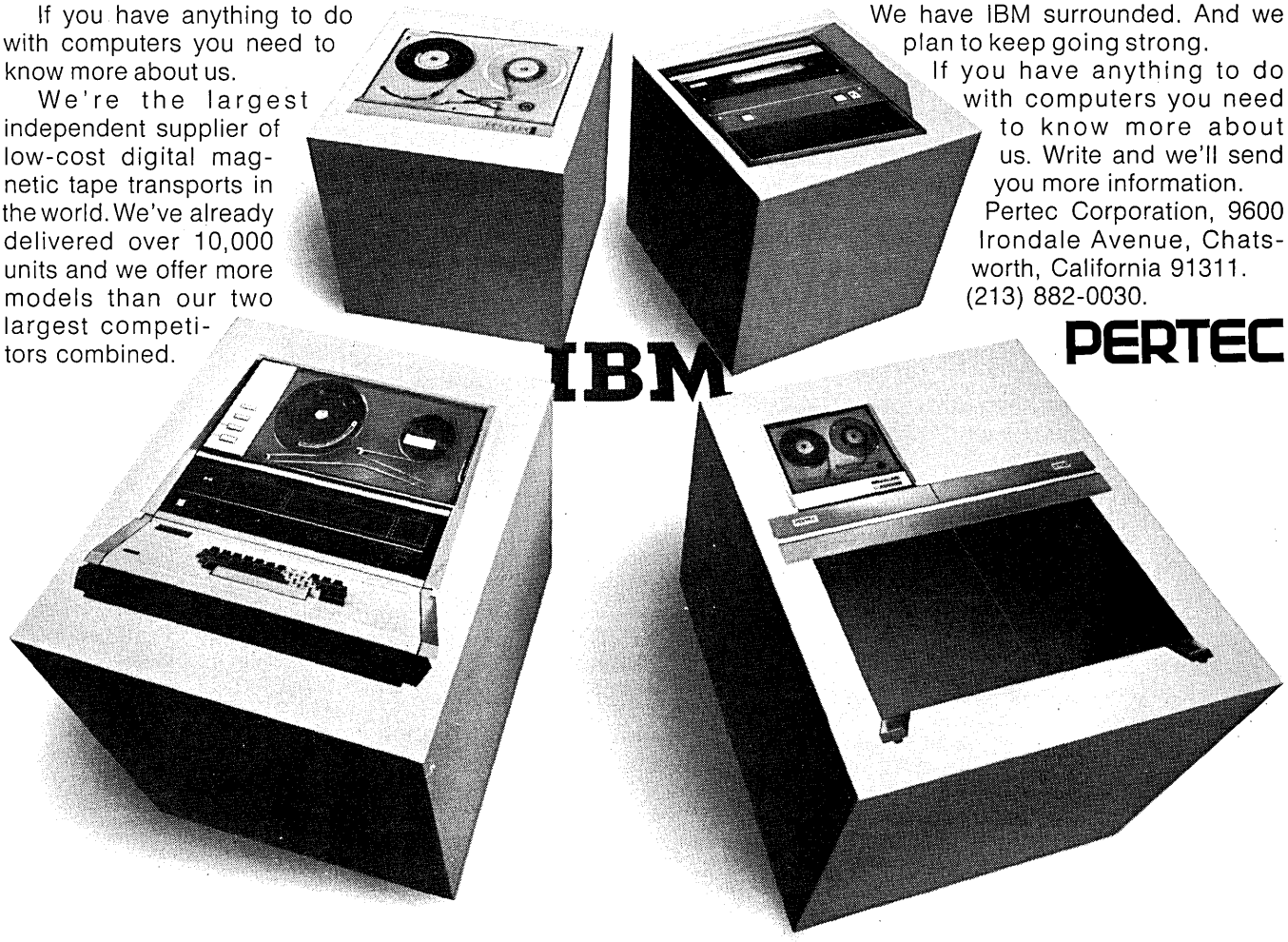
We're coming on strong in Computer Output Microfilm. We've just introduced the impressive new Pertec 3700 COM and we've set up a worldwide network of experienced distributors to handle it.

We have IBM surrounded. And we plan to keep going strong.

If you have anything to do with computers you need to know more about us. Write and we'll send you more information.

Pertec Corporation, 9600 Irondale Avenue, Chatsworth, California 91311. (213) 882-0030.

PERTEC



TDM or FDM?

An impartial viewpoint from a company that makes both.

Frequency Division Multiplexers carry a smaller price tag than Time Division Multiplexers. But that isn't what counts.

Because what you're really buying is *channels*.

For instance, it might cost you about $5000 for the first channel of a TDM, including the cost of a data set. Thereafter, the cost per channel steadily drops. In contrast, you can figure on about $600 per channel for FDMs no matter how many channels you need.

In other words, FDMs cost less where you need fewer channels, and TDMs cost less where you need more. The crossover price is at around 16 channels.

Let's get one worry out of your mind.

It's possible to have both FDMs and TDMs in the same system. So you can start with a few channels and work up to a larger system that includes one or more TDMs.

In general, you use TDMs if you have high concentrations of terminals in one remote location. You use FDMs where you have widely distributed communications, such as a small number of terminals in each of many cities.

And now—the biased viewpoint...

No other company selling both TDMs and FDMs can offer you a nationwide service organization. (We're based in 56 major cities.)

Is this important? Well, just consider—the breakdown of a TDM could kill 52 channels of data transmission. In practical terms, it could tie up the whole ticket operation of an airline.

We have 250 service representatives all over the country. They keep Ultronic's stock quotation system running from border to border. And they'll get to you fast if you should ever need them.

So, you can get excellent service from us.

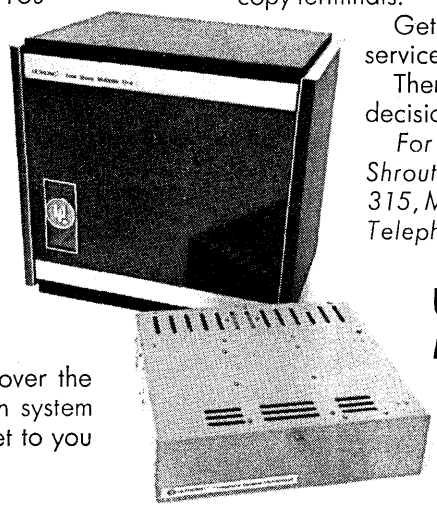
You can get excellent equipment from us, too.

We can ship FDMs and data sets off-the-shelf. In 30 days or less, we can install an FDM system that will handle up to 23 channels on voice-grade line and 25 channels on a conditioned line.

We can give you a 20-channel or a 52-channel TDM. These have a single plug-in board that interfaces with all data terminals, so you don't need any intermediary equipment.

You can buy or rent TDMs or FDMs from us at a very reasonable cost. (One of our customers replaced his old FDM system with ours at a saving of $3000 per month.)

We have everything you need in data communications systems, including data sets and video and hard-copy terminals.



Get to know our equipment and services.

Then make your own impartial decision.

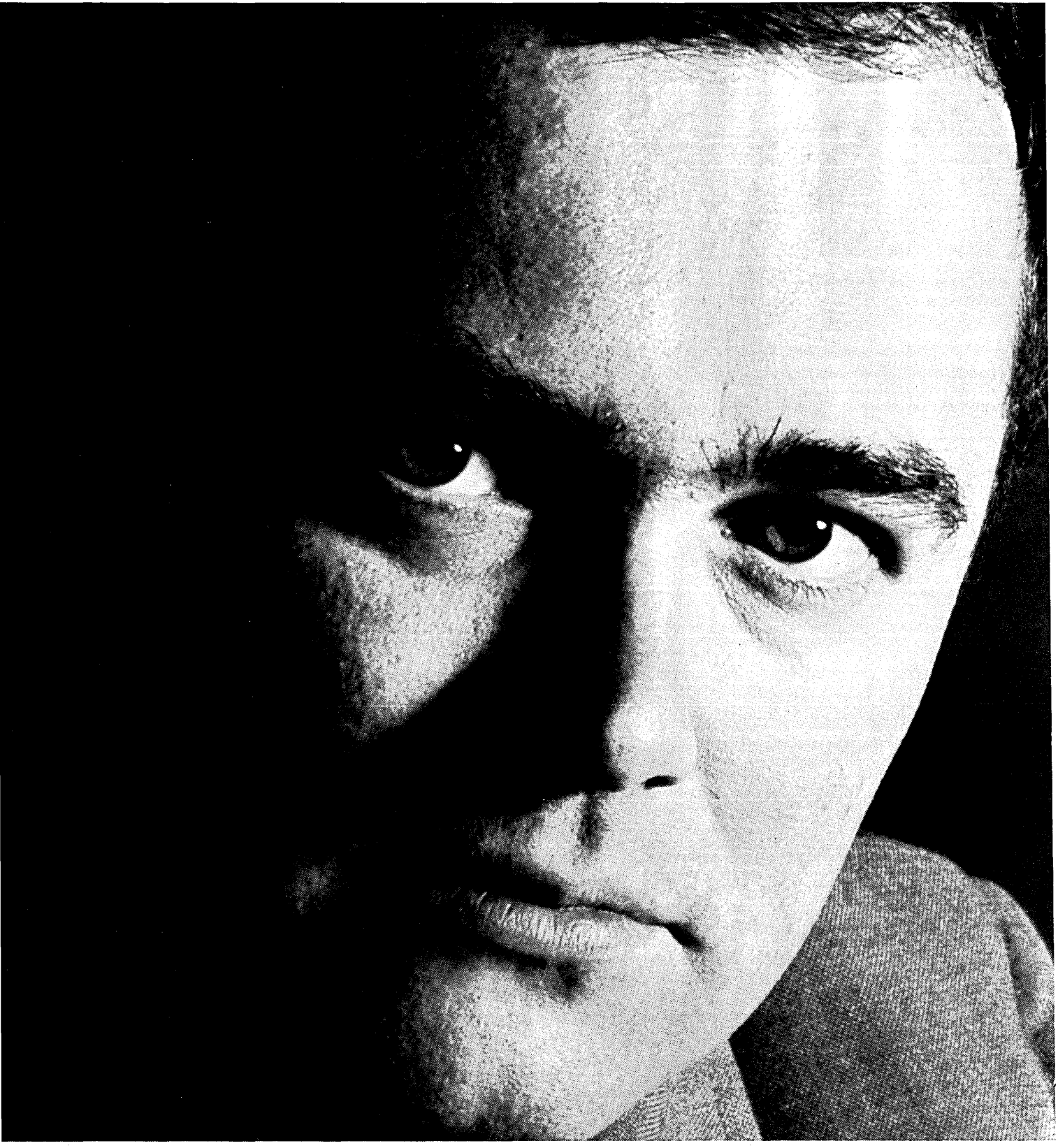
For details, write or call: Lee Shrout, Ultronic Systems Corp., Box 315, Moorestown, N.J. 08057. Telephone: 609-235-7300.

Ultronic Multiplexers

GTE INFORMATION SYSTEMS

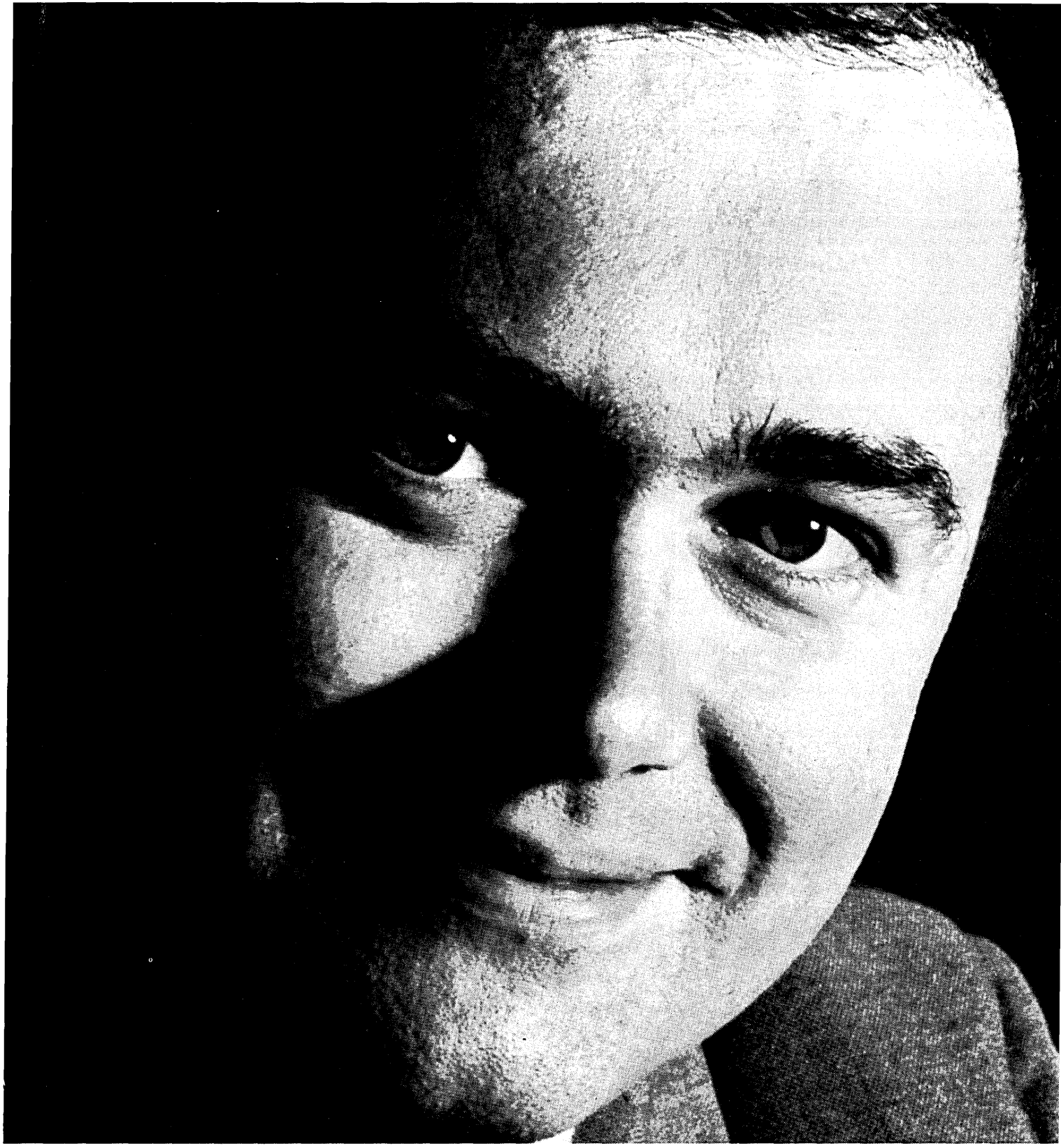
CALENDAR

DATE	EVENT/SPONSOR	LOCATION	CONTACT	COST
Oct. 12-14	Input/Output Systems Seminar 71	Chicago	C. A. Greathouse DP Supplies Assn. P.O. Box 1333 Stamford, CT 06904	$150
Oct. 18-20	IEEE Fall Electronics Conference (NEC/71 technical program)	Chicago	James E. Ricker, FEC/71 Illinois Bell Telephone 225 W. Randolph, HQ11B Chicago, IL 60606	$20, members $30, others $3, students
Oct. 25-29	BEMA 1971 Business Equipment Exposition	New York City	Prestige Expositions Inc. 60 E. 42nd St. New York, NY 10007	$2.50
Nov. 7-11	American Society for Information Science 34th Annual Meeting	Denver	ASIS 1140 Conn. Ave. NW, 804 Washington, DC 20036	$45, members $60, others $3, students
Nov. 16-18	Fall Joint Computer Conference	Las Vegas	AFIPS 210 Summit Ave. Montvale, NJ 07645	$20, members $50, others $5, students
Dec. 5-8	International Business Forms Industries 4th International Forum	Hollywood Beach, Fla.	Program Director Graphic Comm. Center 1730 N. Lynn St. Arlington, VA 22209	$195
Jan. 6-7	ACM 4th Annual Microprogramming Workshop	Las Cruces, NM	J. Mack Adams Computer Science Dept. New Mexico St. Univ. Las Cruces, NM 88001	$70, members $80, others $50, students



OCTOBER 12, 1968. EDSON D. DECASTRO ANNOUNCED ANOTHER NEW MINICOMPUTER COMPANY.

CIRCLE 37 ON READER CARD



TODAY, DATA GENERAL IS THE NO. 2 MINICOMPUTER COMPANY IN THE WORLD. AND GAINING.

Three years ago, Edson deCastro, President of Data General Corporation, announced a well financed new company with the best minicomputer in the world—the Nova.

Today, Data General is selling and delivering more minicomputers every month than any other manufacturer except one.

We got to be Number 2 by offering the most advanced technology in the field, the most reliable products, the right peripherals and software, and the best price/performance.

Now we have what it takes to be Number 1—the broadest line of 16-bit minicomputers available from any manufacturer, nationwide and international sales and service, a full complement of peripherals, a whole list of powerful, systems-oriented software. And of course, the attitude that helped make us a winner.

Three years ago we were cocky, aggressive, and just another new minicomputer company with promise.

Today, we're a cocky and aggressive Number 2.

Tomorrow, the inevitable.

But why not call us today?

You'll be able to say you knew us when we were only Number 2.

DATA GENERAL

Data General Corporation/Southboro, Massachusetts 01772/(617) 485-9100

more than "equivalent to"

the CDS•214 dual disk drive

"200 tracks/surface, 20 surfaces/pack, 2.5-megabit transfer rate, 2400-rpm rotational speed . . ." Those are the specifications an independent must meet to be pack interchangeable with the IBM 2314. Meeting them wasn't difficult; several companies did. But only Century Data took the basic function and improved the technology across the board. For example:

The CDS-214 is a two-high unit that stores 466 megabits in half the floor space. It has a unique electromagnetic head-positioning system — without mechanical pawls, detents, or gears — that gives faster access time (65 msec compared to a competitor's 80 msec). All common logic is packaged on a common board, so the end result is one-third as many boards — and MTTR is reduced to a 1-hour maximum (compared to a competitor's 1.5 hours). And, an off-line checkout exerciser quickly isolates problems without tying up the controller.

Other features also make the CDS-214 "more than just equivalent to": a cylinder difference calculator that simplifies OEM controller design, a variety of index and sector generation electronics for variable or fixed formatting, and interface options for virtually any industry standard logic. So that your system can be more than "just equivalent to," we'll be happy to send you full details.

Looking for an "incomparable"? The CDS-215 is a 400-track, two-high disk drive capable of storing up to 116 million 8-bit bytes, twice the capacity of the CDS-214. There's nothing like it . . . anywhere.

Century Data SYSTEMS, INC.

1270 North Kraemer Blvd., Anaheim, California 92806, (714) 632-7111

A subsidiary of CalComp

LETTERS

Jocher is riled

Sir:
In your Aug. 1 Perspective article on the small business computer market (p. 44), you state "the System/3 goes for from $2,000 to $2,400 per month." My arithmetic says a disc System/3 Model 6 starts at $1,215, substantially less than the original comparison.

GEORGE A. JOCHER
IBM Corporation
Washington, D.C.

Specmanship

Sir:
Evelyn Berezin's letter to The Forum, Aug. 1 (p. 63), presents a fair analysis of the shortcomings of the Philips cassette's performance for edp computational applications—it is slow in speed and short in length.

It is misleading to suggest that IBM policy shall dictate the potential for survival for systems and instrumentation using Philips cassettes because IBM does not compete in the minicomputer or communication terminal market, where Philips cassettes are very successfully employed.

While DEC is the voice of the minicomputer manufacturer, their rejection of Philips cassettes is simply support for their own minitapes. Other minicomputer people, such as Varian and Hewlett Packard, offer cassette recorder/reproducers as effective, economical storage devices.

There is little question that the cassette storage business has been undergoing a "shaking out" or that the reasons are more than a poor economy. The fact is that too many suppliers visualized a low-cost product as the answer to the needs of the market instead of questioning the customer's need for reliability and the cost necessary to provide it. Cassette instrumentation has generally earned itself questionable acceptance due to the anxiety of many to "cash in" on a dramatized market.

Today, a dozen instrument suppliers offer a true digital Philips cassette recorder/reproducer which will reliably record and repeatedly, accurately reproduce data for minicomputer systems, data acquisition, and communication terminal applications. It is questionable that they can do so for $300 per tape transport in quantity, as there is little evidence of such quantity demand. If the product mechanics and control electronics are integrated to provide excellence in tape guidance and read/write control, it is unlikely that a $300 transport is a satisfactory instrument . . .

Evelyn Berezin makes her point about the essential economics of computer interface in a computer cassette system. My purpose is not to disagree with her, but to expand upon her intent and suggest that the place for Philips cassette instrumentation is in markets other than computational edp where speed and data volume aren't critical and the price for reliable performance is reasonable.

Digital Philips cassette instrumentation enjoys a market as: 1) a paper tape replacement, 2) economical off-line data storage, 3) a communication cost reduction device, and 4) an efficient device for data preparation cost reduction.

In summary, the justification for cassettes is in economic and practical application rather than specmanship a la IBM.

PAUL H. STONE
President
Mobark Instruments Corporation

Due given

Sir:
Theodore Shapin (Letters, July 15, p. 11) is apparently trying to revive the popular sport of pointing out the consequences of representing decimal numbers in floating point binary or hex format. It should come as no great surprise that the different time-sharing services get different answers because each of them uses a different word size, and thus, rounding during input conversion occurs at different places. If both numbers are rounded down, then their sum will be one bit less than the corresponding integer value Mr. Shapin would like to see.

The prospect of changing the INT function to round up if the value is "close" to an integer raises many other problems. For example, the following theoretical principle would no longer be true: If A is less than FLOAT (I), then INT(A) is less than I. The problems that this sort of change would create for numerical analysis are subtle but vitally important to retaining any kind of analytical understanding of how computers work with numbers.

For those who don't mind losing significance in certain areas with the INT function, Tymshare offers the ROUND function. Non-Tymshare users can merely add 0.5 before using INT.

To give Mr. Shapin his due, however, Tymshare should not have given "wrong" answers to examples B and C. This problem has been found and corrected. Until some enterprising manufacturer builds floating decimal hardware or users decide they wish to pay the price in cpu time for such software, such anomalies will rightly persist.

JAMES HARRISON
DALE JORDAN
Tymshare
Palo Alto, California

The case for inaccuracy

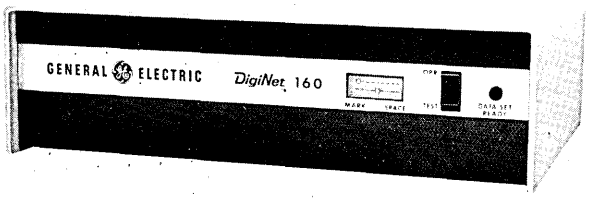
Sir:
I wish it were possible to define my state of mind when reading letters to the editor in which some seemingly profound observation is made. Upon reading Mr. Shapin's letter in the July 15 edition (p. 11), I sprang to my feet and ran to the console of our new Nova 1200 to test the validity of his claims.

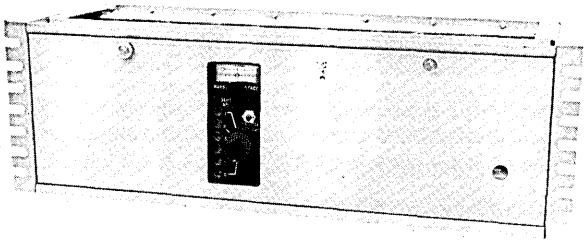
Sure enough! It gave back the results described in his letter. Eureka! I had found a gross misrepresentation! I had to get to our field rep immediately! We would protest the claims of accuracy by Data General!

Fortunately, there are some sane people in my office who succeeded in preventing me from making a complete jackass of myself! Of course computers will give answers such as Mr. Shapin described. When you are dealing with two- and three-digit numbers, what kind of accuracy do you wish? Any fractional value not an exact power of $\frac{N}{2}M$ when N is any digit and M is any other digit will obviously be carried in the computer as 0.XX999 . . . ad infinitum. If this is not accuracy, how does Mr. Shapin define that word? If you want the integral value of any sum, you can't be very interested in extreme accuracy anyhow. If you are working in double precision, you will have lost, at most, one digit in the sixth

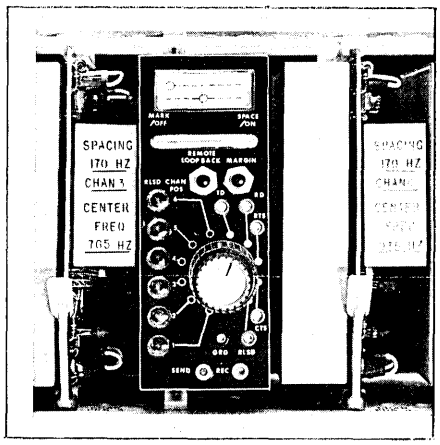
PRIVATE LINE DATA MULTIPLEX

What do you get for the money you spend?





TAKE A LOOK AT DIGINET-160 PRIVATE LINE MULTIPLEX··· THE ONE WITH THE BIG PLUS!



In terms of design, features and performance, DigiNet-160 Private Line Data Multiplex is second to none – – and it's priced right too! Up to 17 terminals can have their own "private line" to the computer––even though they share a single telephone line * speeds to 600 bps * complete channel speed intermix capability * no data set required (interfaces directly with your telephone line) * channels are fully speed and code transparent * fully automatic * flexibility in mounting (rack mounted shelf, multichannel cabinet, single channel cabinet)–––just some of the features you get with a DigiNet-160 system.

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It's called "GEBITS" (General Electric Built-In Testing System) and it represents the end to "Serviceman Roulette" when a computer port goes bad, a telephone circuit goes out, or a terminal acts up! The built-in GEBITS circuitry (patent pending) of the DigiNet-160 lets you pin-point the problem area in short order and call the right serviceman every time–––and it doesn't require a technically trained person to use, GEBITS test procedures are as simple as pushing a button or throwing a switch––and will help you get back on-line in minimum time –––and without running up charges for "false alarm" service calls.

Get the complete DigiNet-160 Private Line Data Multiplex story from any of the following:

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777 14th St., N. W.
Washington, D. C. 20005
(202) 393-3600

F. A. Duran
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Mount Prospect, Ill. 60056
(312) 255-3200

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Houston, Texas 77036
(713) 771-5334

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Suite 110
Portland, Ore. 97232
(503) 228-0281, Ext. 237

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(916) 927-0163

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(714) 297-2911

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(703) 846-7311, Ext. 429

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(416) 789-3281

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1860 Peachtree Road, N.W.
Atlanta, Ga. 30309
(404) 351-4400

DATA COMMUNICATION PRODUCTS DEPARTMENT
GENERAL ELECTRIC COMPANY, LYNCHBURG, VIRGINIA 24502

GENERAL ELECTRIC

CIRCLE 18 ON READER CARD

place (for a six-digit machine such as the Nova) and accuracy to ±1 in the 10^{-6} position, and this is not exactly what I would call a lack of precision!

I dislike starting a controversy, but I am sure Mr. Shapin, like the Nova users in this office, has found a way to program around this seeming defect, or to accept the loss of a single, least significant unit, when dealing with numbers such as he cited.

M. Cook
Houston, Texas

Mr. Shapin replies:
The point of my letter was to describe a simple test to separate good systems programming from bad systems programming. Readers who wish more understanding of the problem should consult "In-and-Out Conversions" by David Matula in Communications of the ACM, Jan. 1968. I did not mention some of the many systems which do perform correct rounding, such as FOCAL (which runs on the 12-bit PDP-8) and IBM's APL system. Allen-Babcock uses special floating decimal instructions in their RUSH system, and of course the results are exact. Evidently as long as manufacturers can find enough customers like M. Cook, they need have little concern for the quality of their software.

IF only . . .

Sir:
We feel that Mr. Chris Larson's article, "The Efficient Use of FORTRAN," in the Aug. 1 issue (p. 24) was quite good and will be of benefit to many of our programmers.

However, we feel the last example under the heading of "Data types and conversions," IF (X.EQ.17.0)K=2 represents a questionable programming practice. If the internal representation of the value for X and 17.0 were "off" by 1 bit, which is extremely likely, the result would be a not equal. We strongly feel that an equal test between real values is certainly questionable and has cost many of our programmers considerable grief. The way we feel such a test should be performed is with an IF statement of the form IF (ABS(X−17.0) .LE. TOL)K = 2, where TOL is a tolerance less than the possible increment value of X.

Gregory S. Jonesku
Battelle Columbus Laboratories
Columbus, Ohio

Optimized

Sir:

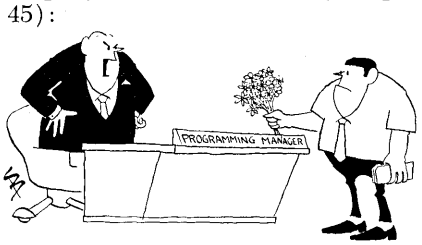
```
DATAMATION /8, 1, 71/
DO 1 LARSON = 1,3
1 PAPER (LARSON) = CHEERS
```

Vincent Marier
Laurel, Maryland

Happy ending

Sir:
We have remained silent for too long. Hoskins is a revered name in data processing (whichever way you spell it).

We developed TESTMASTER for people just like Hoskins (Aug. 1, p. 45):



"Dammit Hoskins, not another request for more debug time."

If he had used it, the story would be very different!

"Well done, Hoskins, finished on time again!"

Nick M. Rowe
Hoskyns Systems Research Inc.
New York, New York

Using users

Sir:
Messrs. Teichroew and Sayani are certainly to be commended for wading into the subject ("Automation of System Building," Aug. 15, pp. 25-30) with such vigor. They are, of course, quite correct in stating that a major problem is encountered at the start, in attempting to determine what the user wants.

But can the gentlemen really mean that the user is "usually not the appropriate person to decide what he should have"? Perhaps I don't understand whom the authors identify as "the user." If they mean the operating management in the areas of the organization who will ultimately be the beneficiaries (or the victims) of the reports, forms, and analyses produced by the system, then I must register a strong protest.

For over 12 years I've been actively involved in training designed to help users to improve their ability to define their needs. That experience leaves me with three conclusions:

1. Users are usually poor at defining their systems needs, but it is absolutely essential that they do so, and they can be equipped to do it effectively.

2. We dp professionals aren't so hot at working with users to be sure we understand and aid them in that vital function, but we also can be equipped to improve that ability.

3. A prerequisite to being able to define user needs successfully is a clearly defined, agreed upon, documented and controlled method of doing so. Most dp managers say they have such a procedure, but admit it is usually honored in the breach. As another DATAMATION author recently stated so well, the dp activity must stand on its own feet by being operated in a much more businesslike fashion. Lack of proper means to identify user needs is a vital, too often missing, link in accomplishing that objective.

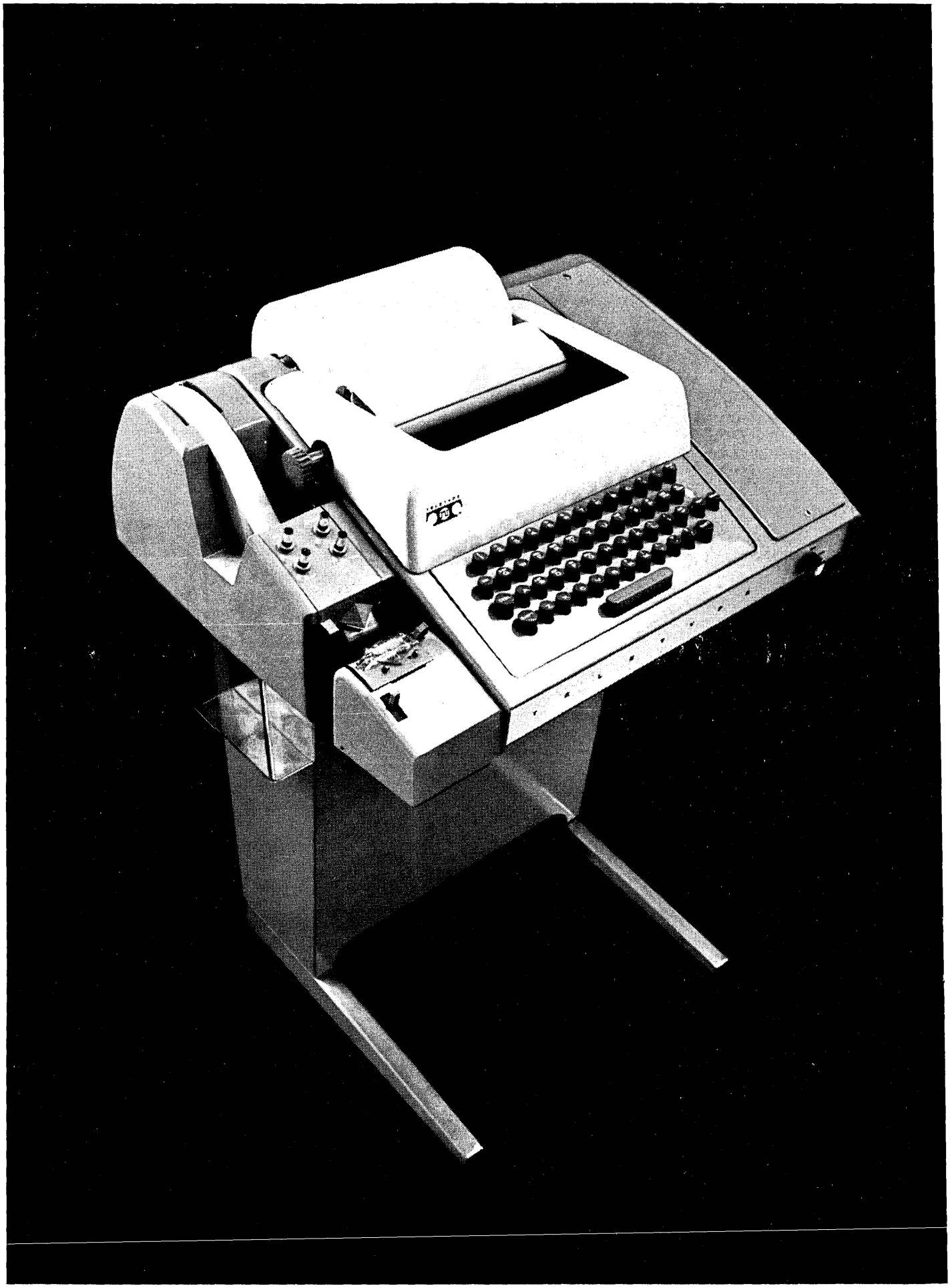
Nate A. Newkirk
Riverside, Connecticut

Laser computer

Sir:
I am attorney for Dr. Frank Marchuk, Newport Beach, California. Dr. Marchuk hereby demands a correction of the article on pages 52 and 53 of the issue of DATAMATION dated July 1, 1971, which is Volume 17 number 13. The numerous untruths in the article include among others the following:

1. On page 53, second column, next to last paragraph, the article states, "No one at Stanford had heard of Frank Marchuk or his proposed talk." The truth is that Dr. Marchuk did speak at Stanford University at 9 a.m. on May 25, 1971, at Polya Hall at the request of T. David Phillips for the University Computer Center, the Stanford Linear Acceleration Center, and the Medical school.

(Continued on pg. 66)



In spite of FCC rulings designed to break AT&T's hold on the market, skeptics remain. But there are signs of progress toward true competition

Data Transmission in

There's much skepticism amongst computer communications users as to whether the specialized common carriers offering data transmission will ever be able to provide the superior and cheaper services they promise, but one thing is clear: the future can only be better. Because even if MCI Communications Corp. and Data Transmission Co. fail to attain their lofty goals, they certainly will have motivated the FCC and AT&T to foster better communications services. As one user put it, "If Datran and MCI didn't exist, we'd have to invent them, because they're needed badly to keep Bell in line."

The data transmission explosion of the past decade apparently took AT&T by surprise. But long before voice-grade lines had become choked with data in places like New York and Los Angeles, MCI had anticipated a new market and applied for a license to become the first new common carrier in decades. That was in 1963. Despite opposition from AT&T, MCI had its initial Chicago to St. Louis microwave route approved, but not until 1969.

The FCC approval of MCI's application was quickly followed by applications of other firms to obtain licenses to provide common carrier services, primarily for data transmission. Among them was Data Transmission Co., the University Computing subsidiary, with the most ambitious plans of all: a switched digital network linking 35 major cities. By March 15, 1971, 33 applicants had filed 36 proposals that amounted to 1,877 microwave stations. The dam had burst. Because of the need for digital communications, Bell was not to remain so much of a monopoly.

But while potential carriers gleefully predicted their new services would undercut AT&T on all sides—with broader bandwidths, lower costs, higher reliability, higher speeds, etc.—another major FCC decision was yet to come: the May 25, 1971, ruling (July 15, p. 49) that, in effect, gave blanket approval to the concept of competition in the data communications sector. Henceforth, even AT&T and Western Union will be allowed to compete in establishing data tariffs, and they will be able to abandon their historic rate-making structure based on average costs when pricing data communications services. This should allow them to exploit the more heavily trafficked routes, such as those already mapped out by MCI and Datran. Just how far AT&T and WU will be permitted to go in rate-making has not been established, however.

The common carriers had previously charged the new independents with "cream skimming," but it will now be possible for everyone to try to skim the cream of the best routes with the best prices where data communications is concerned. For the FCC, this represents a dramatic departure from historical practices which attempted to equalize rates, with more profitable routes in effect subsidizing less profitable operations. But that was intended for voice communications.

The implications of AT&T and WU openly competing for the data communications market can only portend good for the user, but will perhaps become a stumbling block for the new carriers. Although the latter insist they can succeed, and intend to use the latest state-of-the-art technology, many observers are skeptical. Some say we should not underestimate Bell

Transition

by F. Barry Nelson, Eastern Editor

and WU as competitors; others assert any technology advantages of new carriers are likely to be short lived. Once the new carriers become the incumbents, they'll lose this advantage.

And the common carriers themselves have not been sleeping in recent years. AT&T has provided such tariffs as Series 3000 channels and the experimental Series 11000 broadband channels (see July 15, p. 50), while WU offers Datacom, a private-line package said to reduce charges up to 80% from the tariff for the same lines if leased separately. Western Union is also working on a microwave network to carry both digital and analog signals in the eastern third of the nation and is now implementing a stored-program time-division switching network, which will enhance Telex and TWX—plus form the backbone system for switched digital services. And on July 25, AT&T initiated a tariff that permits private users to multiplex wideband lines. AT&T even has a digital network of its own planned for 1974 or 1975. That would almost coincide with Datran's schedule. But AT&T will not provide a *switched* digital network until 1980.

MCI Communications Corp. has already begun its first service, marking the first offering of a specialized common carrier beyond the conjecture stage. At press time, however, no evaluation of the service was possible. Indeed, only 300 users were permitted to use the service at inception in August, because that was the expected capacity of the originally proposed system, and the service was scheduled to be provided free until Oct. 1 pending tariff approvals. It has since been modified to accommodate 1,800 users, however, and authorization for that number will be requested. An MCI spokesman noted that it was best to begin with a limited number of users in order to stamp out the bugs.

MCI's whole plan is predicated upon the theory that slow growth is best, with service being offered incrementally between specific pairs of cities. Facilities for the next route, from New York to Washington, D.C., should be under construction by the time this article is published. Each such regional link is being provided by one of 17 affiliates which are 20 to 51% owned by MCI. Local loops are presently being provided by AT&T, and most users are expected to be within 20 miles of the termination points. Eventually, however, MCI will provide its own local loops. This could present a problem in cities like New York, where final connection for the user is the most hazardous link.

"If Datran and MCI didn't exist, we'd have to invent them, because they're needed badly to keep Bell in line."

MCI's planned network will eventually serve 41 states and charge rates amounting to about 50% less than Bell's, although the two tariff structures are not easily compared.

The MCI plan is in marked contrast to Datran's gran-

diose plan to link 35 cities—all at once—perhaps as early as the end of 1973. And Datran's plan even calls for a switched service providing direct links to the end users, with no end loops provided by Bell or other carriers. These two aspects of Datran give rise to a certain credibility gap. Datran president Sy Joffe calls his firm's undertaking "the largest endeavor in the history of the world."

Primarily, potential users and competitors question whether Datran will be able to raise the $350-400 million needed to complete the network. And, as presently planned, completion is a prerequisite to providing any service. Datran tariffs are expected to be one-fourth to one-half of existing AT&T and WU rates. Datran's financial vp, Harry Bowles, exudes confidence, however, as befits a veteran of 40 years at Burroughs who rose from salesman to senior vp of finance there. Who could be more credible? And Datran's investment bankers are the prestigious firms of Salomon Bros. and Kidder Peabody. At press time, specific financial plans for Datran had not been announced, but it was known that the company would be publicly owned, with UCC retaining a majority interest for a while.

If and when Datran obtains the needed money, it will be "the largest amount of venture capital any company has raised," according to Bowles.

The technology of Datran's network is advanced, but few have doubts it can be implemented, especially considering the high quality personnel Datran has hired. But the idea of a switched network being supplied by an independent carrier is sufficiently radical to evoke doubts. MCI's plans for city to city links are more credible, according to Charles Johnson, president of General DataComm Industries, because they are becoming a "carrier's carrier," just as Comsat is with its transatlantic satellite link which doesn't bring the signals all the way to the user either.

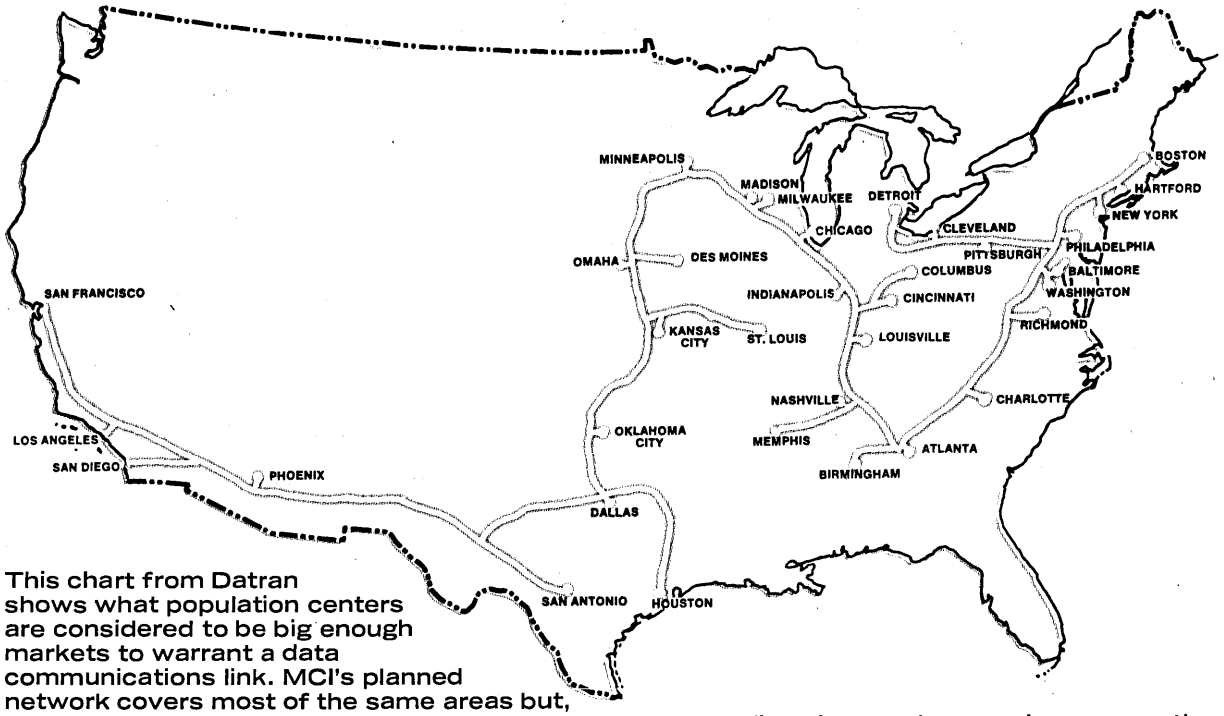
Aside from technology and financing, there's the more basic problem of the market for communications services, and whether it's big enough to support all the suppliers and would-be suppliers. It is perhaps more difficult to gauge than other markets because of the historical monopoly nature of the few carriers. To a large extent the users have had to take what the carriers thought they needed. Today, in contrast, we're seeing the plans for what MCI, Datran, et al., think are needed and this should make user needs more apparent—once more choices are available.

Datran has armed itself with a Booz, Allen & Hamilton market study that predicts cumulative growth in data transmission "transactions" of 1,650% in 1980 over 1970 volume. Dollar values are avoided, supposedly because of the unpredictable influence of future rate changes and the effects of competition in the communications business.

An independent study by the investment banking firm of Coenen & Co. is similarly optimistic. It predicts a $5.8 billion data communications market by 1980, an even 2,000% increase by the firm's calculation. AT&T itself forecasts a $2 billion market by then. For investors, the *Communications Investor* newsletter projects a $10 billion market within ten years, and goes on to recommend AT&T stock on the theory that AT&T will take "a lion's share" of this market.

The present data transmission market is variously estimated to be between $250 and $500 million per year ($450 by Bell's estimate), which is not a significant part of Bell's $15.5 billion revenues (computer industry note: about double IBM's revenue). This works out to be only about 1.5-3%, depending on whose figures are accepted, so it's not hard to see why AT&T may have neglected this market. But, according to Coenen and others, it's the fastest growing segment of Bell's market.

Coenen states that AT&T has reported data communications market growth of 50-60% in each of the five years to 1969, with a drop to 35% during 1970, apparently caused by the recession. The report qualifies Bell's figures with the comment, "Its estimate of



This chart from Datran shows what population centers are considered to be big enough markets to warrant a data communications link. MCI's planned network covers most of the same areas but, in addition, shows a section into the Northwest from California; another running across the Midwest; and various shorter extensions, including a line on the East Coast reaching into Florida.

current market is considered too high, its forecasts too low." Coenen also notes that AT&T made great efforts in recent years to prove the data transmission market wasn't big enough for itself, WU, the independent phone companies, *and* the new specialized carriers.

At the same time, of course, the new carriers worked hard to prove there was a big enough market, as manifested in the Booz, Allen study commissioned by Datran.

So if we are to believe the various market studies, and even Bell's forecast, there should be enough revenue in data communications to make the new services and carriers viable. At the same time, there's no recent precedent for what is happening in the communications industry with the introduction of competition.

The *Communications Investor* went so far as to cite the competition between AT&T and independent phone companies in the 1890s which spurred AT&T to action in providing more exchanges. The parallel today is that AT&T will again react with improved services, and may emerge triumphant. Again, the user will benefit, even if the new carriers don't.

Talking to users, one is struck by their near universal conclusion that data communications will improve. At the same time, few admit they have been seriously stymied by present communications inadequacies. At least, not to the extent that data communications projects were shelved because of poor service. So it remains to be seen whether the advent of new tariffs and new carriers will release the expected flood of new data communications applications.

At the same time, the recession may be having a greater effect than is superficially apparent. Because computer applications that require communications are not mundane, they generally require the sort of developmental work which is postponed indefinitely during poor economic periods. This could cause a severe slowdown in the rate of growth of new data communications applications. But growth has been so rapid that it could decrease a lot without making this a bad market to be in.

There's also the possibility that data transmission costs will not be reduced as promised. Dr. William H. Melody, associate professor of communications and economics at the Univ. of Pennsylvania, notes that Bell's Information Systems Access Line tariffs, first proposed by Illinois Bell over a year ago, would result in substantially increased costs to data communications users.

Dr. Melody states that if AT&T is willing to pursue this sort of tariff in the face of strong opposition from both users and the specialized carriers, then it follows that carrying data really does cost AT&T more than voice. But there's a catch: it may cost AT&T more, but not cost other carriers so much or, indeed, cost AT&T as much once service is improved in the future.

Higher quality transmission would eliminate one problem caused by computer communications: some systems are equipped with line testing capabilities such that the computer dials repeatedly until it finds a line of sufficient quality. Then it may hold the line all day, even when it's not in use, thus tying up switching facilities in a way never envisioned when voice transmission was the only traffic. Dr. Melody suggests this is one of the problems that developed in New York City.

If users are uncertain as to how they would exploit new data communications tariffs, they at least seem to be in general agreement that if rates are lowered, usage will increase. Yet at the same time, they are also sufficiently skeptical—or short-sighted—that they have not altered their plans to take advantage of changing data transmission offerings, at least in the cases of nearly all those interviewed by this reporter.

Suppliers of such hardware as terminals, modems, and multiplexors—firms that will surely benefit from anything that increases data transmission, probably even if the new carriers fail—also seem to be taking little action. Both a major supplier of terminals and an important modem and multiplexor manufacturer said they had not even considered the impact of the new carriers.

One significant observation is that the new carriers have no manufacturing capability of their own, nor

SY JOFFE, president of Datran, is a small, rumpled man who turns hypnotic brown eyes on a visitor and soon has one convinced that he is the only man in the world who can do whatever the thing is that needs to be done. He joined University Computing in 1967, leaving a job as southwest regional manager for Univac. He has been called "the most successful computer salesman in the world," and while with Univac presided over the gradual ouster of IBM from the Manned Spacecraft Center —starting with some small communications processors and escalating to 1108s. At the time, he noted the bookshelves full of proposals and documentation in his office and said that these mounds of paper were the secret ingredient in doing a thorough selling job. Moving on to UCC, where Datran was in the planning stage, he took with him Univac's communications department—including the secretaries. There he unleashed on the FCC even larger stacks of well-considered documentation on the market, the needs, and the means to create a data communications facility. This approach, plus the persuasiveness of Sam Wyly and the legal expertise of David Foster, led to the final FCC approval to allow Datran's entry into the restricted and regulated world of the common carriers. ■

are they as yet linked to any manufacturers, in contrast to Bell's dependence on Western Electric. Charles Johnson of General DataComm sees the new companies as likely customers for independent makers of multiplexors and modems, and comments that he'd be "more than glad to do business with them, as long as they pay cash."

Optimistic market projections for data communications hardware abound. The Booz, Allen study states that there were 185,000 data terminals in use last year, and this figure will grow to 2,500,000 by 1980. The Coenen study indicates there were 280,000 data terminals last year, but comes closer to the Booz, Allen projection with a figure of 2,551,000 by 1978.

More detailed predictions are provided by Creative Strategies Inc. in an investment report on the data communications industry. It asserts there were 28,000 teletypewriters in use last year, along with 17,000 crt terminals, and smaller numbers of point-of-sale, remote batch, and other varieties of terminals. CSI's projections are for 1975, however, which confounds comparison. By then the firm envisions 100,000 teletypewriters and 80,000 crt terminals.

The CSI projections of modem revenues are also bullish. It is estimated that 255,000 modems were in use last year, and that 1,435,000 units will be in by 1975. At present, AT&T has about 70% of the modem market, accounting for 171,000 last year. Although CSI expects AT&T to continue to dominate, it also foresees increased use of modems as a result of MCI, WU, and offerings of independent phone companies, as well as military use.

Modems, of course, would not be needed in the all digital networks, such as that planned by Datran. But such networks are still in the future, and aren't likely to eliminate existing use of analog signals to transmit digital data, so the modem market should remain healthy. Perhaps there is an analogy to the continued proliferation of keypunches, despite the presence of key-to-tape equipment during the last several years.

CSI provides dollar values for the modem and multiplexor markets, with the combined market valued at $70 million in sales in 1970, projected to grow to $390 million by 1975. For 1970, modem sales accounted for 90% of these revenues, but will decline to 75% by 1975. Looking at the situation from a different angle, Coenen's report states the dollar value of multiplexing equipment sales to the specialized common carriers for the years 1972 through 1978, showing fluctuations from $63 million to $105 million per year.

One multiplexor supplier is already exploiting the new AT&T tariff permitting wideband line multiplexing: Computer Transmission Corp., which fought for the new offering, makes a multiplexor called Multitran just for the purpose. The first installation was at Bankers Trust Co. in New York.

So a better future seems assured, even if it is still too uncertain for most data communications users and purveyors of equipment to be altering their plans. Or maybe the industry is being too guarded in its appraisals of the new data communications services and carriers. Perhaps computer management has become jaded by the spector of Viatron's spectacular promise and equally dramatic failure. This time things could turn out better than expected. It's hard to see how data communications could not improve. ■

A consideration of statistics on error-free reception of long blocks of data and the effect of time of day of transmission

Reducing Telephone

The successful implementation of a data communications system is largely determined by its handling of errors. The technical feasibility of such a system, therefore, must be dependent upon its freedom from data errors, the probability of detecting errors that do occur, and its efficiency in overcoming the effects of errors while still fulfilling its basic purposes.

Errors are introduced into data systems by both humans and hardware. Those that are attributable to hardware may result from either equipment malfunctions or random transmission inaccuracies. Of course, all potential sources of errors must be considered in data system design. However, only errors due to transmission inaccuracies will be considered here, particularly those which occur in normal voice band data transmission over the switched telephone network.

Clearly the planning and design of communications systems based on the switched telephone network (DDD network) require a thorough knowledge of anticipated error statistics for telephone data links. However, the immensity of the existing telephone network, the great variation in facilities encountered, and the underlying complexity of the error-generating processes all make the existing literature on telephone error statistics seem inadequate. This paper serves to augment the literature in the consideration of the statistics dealing with error-free reception of long blocks (more than 10,000 bits) of data and of the effect of time of day on these statistics.

Time of day can significantly influence the error rate and yet consideration of its effect has been overlooked in previous studies. In the design of source data collection systems, in particular, where choice of time of collection is possible, time-of-day statistics can be of invaluable assistance.

Network Errors

by Janet L. Norman

The Singer Co. undertook an investigation of the data transmission characteristics of the DDD network as part of the development of a marketing information system called SIMS, the Singer Integrated Marketing System. This system provides for the interconnection of about 1,550 remote points—retail outlets, regional offices, warehouses and distribution centers—by an effective combination of terminals, computers, and communications. The system combines point-of-origin capture of raw data with centralized computer processing. The key element of the system is the MDTS (Modular Data Transaction System) terminal, designed and manufactured by the Friden Div. of Singer.

...the poorest performance was obtained in calls from New York City, only 30 miles from the receiver.

In its remote-batch configuration, the terminal at the point of input records transactions on magnetic tape at the same time as they are entered into the keyboard. At the end of the day, the central computer polls the remote locations via the DDD network, initiates and controls transmissions, processes the data, and prepares summary information for online forwarding to various points the following morning.

Early work in the development of the transmission element of the terminal involved consideration of alternative approaches to transmission control and data formating. One of the approaches considered provided for complete transmission of the contents of the tape without interruption; that is, once the physical movement of the tape was initiated, it would not stop until the end was reached. There would be no ability to control retransmission of portions or blocks of the message on the same call. Thus the computer would either accept the message in its entirety, or else reject it upon detection of a parity error. The only recourse was to drop the line, and recall the location at a later time. Meanwhile, the tape would automatically be rewound so as to prepare the terminal for another call.[1] The viability of SIMS with the adoption of this design approach, therefore, would depend upon being able to complete a large percentage of calls of long length (e.g., 200,000 bits) without parity errors over the DDD network. This led to the launching of the study of the DDD network in its handling of long-block transmissions which is described here.

In order to obtain error statistics for long message formats, data from earlier telephone surveys made by Bell Telephone Labs were studied and, where necessary, reprocessed. In addition, The Singer Co. conducted tests over a pilot network involving five remote locations. The Singer data tend to corroborate relevant portions of the Bell statistics, but the new data also show the influence on the error rate of the time of placement of the call. This factor has not been

1. This approach was eventually rejected but not without gaining invaluable insight into the error-generating characteristics of the DDD network, as well as a complete understanding of the most effective, economic recorder/transmitter for source data collection systems. The resultant ISF (Individual Store and Forward) unit of the Friden MDTS provides for continuous block transmission with parity error detection and control, enabling the retransmission of any blocks containing erroneous data.

considered previously in Bell surveys, and yet appears to be a critical one for a system like SIMS. The statistics given here from the Singer tests should be useful in the planning and evaluation of other DDD-based data networks.

Occasional errors are inherent in any real communication link. In a system as diverse and complex as the telephone network there are many man-made and natural phenomena which introduce spikes or bursts of electrical noise into voice telephone connections. This noise combines with other signal distortions to result in transmission inaccuracies which are occasionally interpreted by the modem as erroneous bits. During particularly bad bursts of noise a very high error rate may persist in the output data for fractions of a second—sometimes amounting to thousands of affected bits.

Most of what is known about telephone error statistics is derived from two major surveys conducted by the Bell Telephone Labs—the Alexander Gryb-Nast (AGN) survey in 1959, and a less comprehensive survey by Townsend and Watts in 1962. The AGN tests[2] used a frequency modulation subset similar to the present Western Electric 202C modem to transmit between various cities at speeds of 600 to 1,200 bits per second and durations of 10 and 30 minutes. In the Townsend-Watts[3] survey a Western Electric 201A (phase modulated) data subset was used at a speed of 2,000 bps. All the calls were short- and long-haul toll calls from various points in the continental U.S. to a New Jersey receiver.

The most obvious feature of the data from each of these surveys is the propensity of errors to occur in clusters. Although the *average* error rate in the AGN survey was about 3 errors per 100,000 bits, these errors are not scattered uniformly throughout the test data, so that there are frequent long intervals which are completely error free. In fact, out of 182 calls in the long-haul, 1,200 bps, 30 minute duration category, 32 contained no errors whatsoever. Each of these messages contained over 2 million bits, much longer than the considered-length SIMS messages, yet still about 18% were transmitted error free.

On the other hand, a few calls contained a great many errors. When things are bad, they can be quite bad indeed, and this fact tends to heavily influence statistical averages. It is often said that about 80% of telephone lines are better than average for data transmission. For systems which depend on transmitting long, error-free messages this extraordinary behavior is a necessity. If the errors were truly independent events, being scattered uniformly throughout messages with an average density of 3 in 100,000, then the probability of being able to complete a call of length 200,000 without errors would be only about .0025. Instead it is found that when the AGN data are segmented into 200,000-bit messages, about 65% of these messages contain no errors.[4]

While the clustering tendency of errors helps by causing long error-free intervals, it also makes the problems of error detection and correction by conventional parity check codes much more difficult. Multiple errors within a single character or code block are quite common and these multiple error patterns will frequently fool a parity check code. For example, if there are an even number of errors within a standard 8-bit USASCII character, the errors are not detected by the single parity check. According to the AGN and TW data, this is a fairly common occurrence. Approximately one third of the time an error occurs it will go undetected because of other errors within the same character.

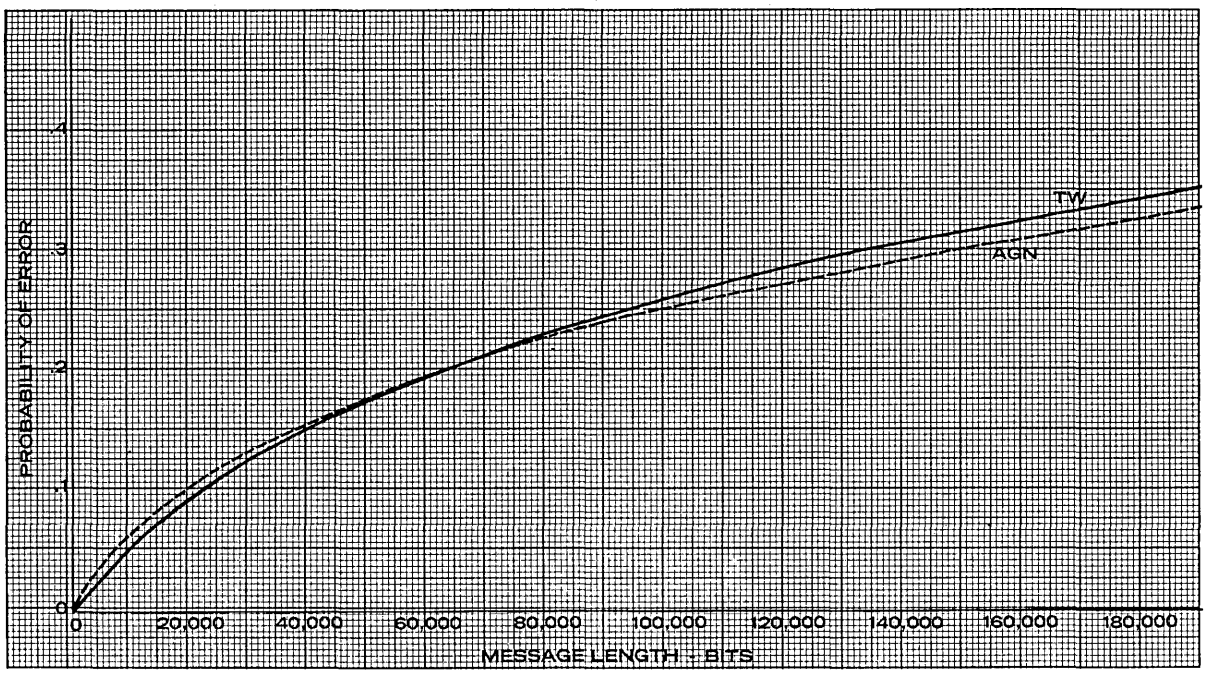


Fig. 1. Probability of a message being received with one or more errors.

2. Alexander, A. A., R. M. Gryb, and D. W. Nast: **Capabilities of the Telephone Network for Data Transmission,** BSTJ, Vol. 39, p. 431, 1960.

3. Townsend, R. L., and R. N. Watts: **Effectiveness of Error Control in Data Communications Over the Switched Telephone Network,** BSTJ, Vol. 43, p. 2611, 1964.

In evaluating a given data communication system, the effects of error clustering must be carefully considered, yet this is often difficult or impossible using published survey data. Unless the exact statistic needed has already been computed from the raw test data, there is little chance of obtaining it from the extrapolation of other published curves. Often in trying to evaluate the performance of error control techniques, other than the simplest of parity checks, nothing short of system simulation using actual test data has been found satisfactory.

The original test data from the AGN and TW tests were segmented into messages of various lengths and the frequencies of different error events were counted. From these analyses are derived the curves of Fig. 1, which show the probability of an n-bit message being received with one or more errors in each of the two surveys. The surveys yield nearly identical results. For example, in the TW data the probability of a 100,000-bit message being received with one or more errors is .261, as compared with .255 in the AGN data.

Sometimes errors go undetected by a parity check because of other, parity-compensating errors within the same character. As indicated earlier, this is a frequent event in telephone transmission so there is no guarantee that a message received without parity failures is actually error free. However, there is a mitigating effect which occurs when dealing with acceptance or rejection of an *entire message*, rather than a single character. Even though an error frequently goes undetected within an individual character, the clustering of errors often causes other surrounding characters to contain errors also. With high probability one or more of these other errors will be detected by a parity failure and the faulty message will be rejected anyway. For this reason data in a long message accepted without parity failures is less likely to contain hidden errors than data obtained by retransmitting individual characters or short blocks until they are free from parity failures.

The incidence of undetected errors in messages which are free from parity failures is shown in Fig. 2 for 5- and 8-bit characters. The SIMS project team originally[5] considered data consisting of 5-bit characters, 4 information and 1 check bit, while in the USASCII format a character has 7 information and 1 check bit. Obviously there is a greater chance of undetected errors occurring in a message of 8-bit characters than in one of 5-bit characters. Also, note that in Fig. 2 there is a significant difference in the undetected error rates in the AGN and TW data. The TW data have about twice the frequency of undetected errors present in the AGN data. This difference can be attributed to the modulation technique (phase modulation) used in the TW tests, which has a greater tendency to produce double errors than does frequency modulation.

As an example of the uses of Figs. 1 and 2, suppose a 200,000-bit message is to be transmitted over the DDD network. According to Fig. 1, the probability of such a message being truly error free is about .65. Now, if the message consists of 25,000 8-bit characters, then the probability of undetected errors existing in a message without parity failures is .02 (AGN data). (This probability slightly enhances the probability of a message actually appearing to be error free, which is .65 + .02 = .67.) If messages are to be repeated until received without parity failures, then each call must be made on the average 1/.66 = 1.5 times. Once all messages are received without parity failures, there is still a residual error probability of .02 associated with

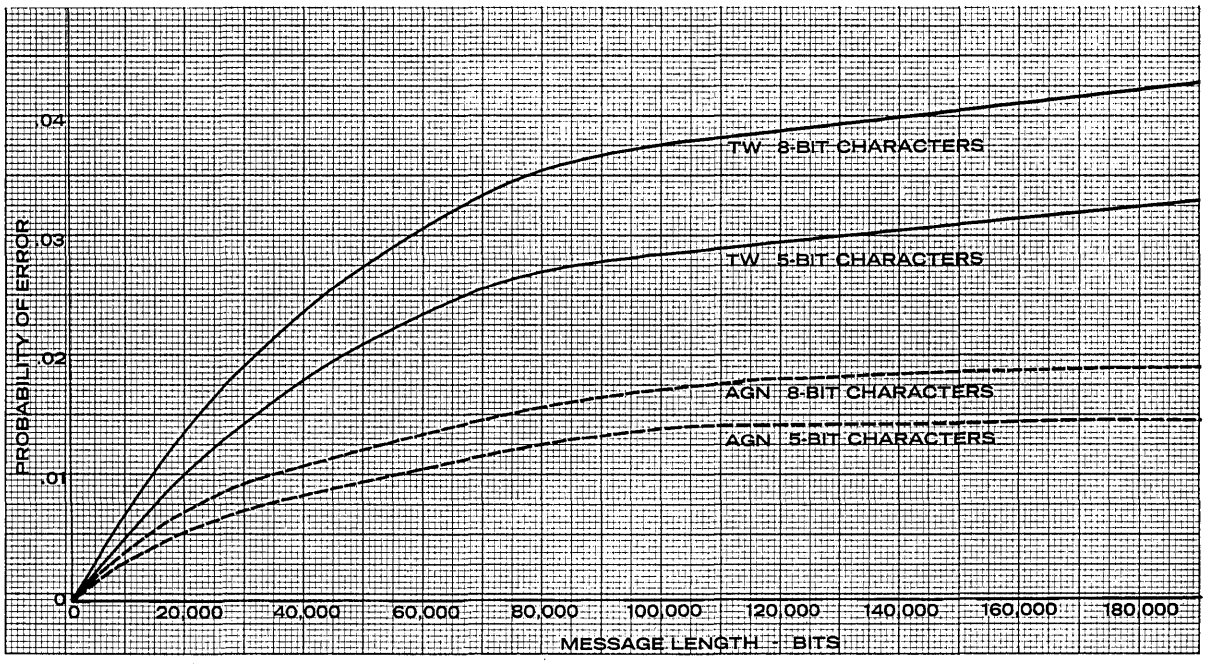


Fig. 2. Probability of undetected errors in a received message without parity failures.

4. The probability of correctly receiving any bit is 1 minus 3×10^{-5}, so the probability of correctly receiving a 200,000-bit message is $(1-3\times10^{-5})2\times10^{5}$, which is approximately .0025.
5. This data formating scheme was subsequently rejected and the Friden ISF records data in standard 8-bit USASCII format.

each message containing undetected errors. The overall *character* error rate in accepted data is .02/25,000 $= 8\times10^{-7}$. This error rate is *two orders of magnitude* smaller than that achieved by retransmitting individual characters until their parity checks are correct. This latter technique would, of course, require considerably less time on the average than entire message retransmission.

The Singer Co. undertook a series of test transmissions during the period July-September 1968. Test data recorded on magnetic tape cartridges were transmitted from five different remote locations to a receiver in Syosset, N.Y. The test sites and their distances from Syosset are given in Table 1.

SITE	DISTANCE FROM SYOSSET, N.Y.
N.Y.C., N.Y.	30 miles
Tacoma, Wash.	2,420
Denver, Colo.	1,640
Tampa, Fla. (GT&E)	1,010
Chicago, Ill.	740

Table 1. Test site locations.

The equipment chosen to perform the tests were a Digitronics 802-2 transmitter at each remote location which accepted the tape cartridges, a Western Electric 202E8 or 202E9 modem at the remote, and a 202C modem at the receiving point to provide the telephone network interfaces, and a Digitronics 504 paper tape receiver to record the calls. The tape cartridges used during the test were of two different lengths—one of approximately 14,000 characters and the other of approximately 25,000 characters.

The test pattern recorded on the tape cartridges was a repetitive sequence of the 16 possible characters. Although each character consisted of 5 bits (including the check bit), the operation of the Digitronics transmitter is such that an extra signal transition is inserted after each data bit. The modem is then required to transmit effectively 10 bits per character. The extra, interleaved transitions (bits) are stripped out by the Digitronics receiver and used for timing. With a modem speed of 1,200 bps, and allowing for inter-character gaps, the effective throughput of the system was 72 cps.

The Digitronics 504 receiver contained a parity error counter. For each call an operator recorded the value of this counter, as well as the time, location, and other identifying information for the call. The punched paper tapes were subsequently computer processed to verify the parity error count and to classify error patterns.

In all, 1,443 calls were placed during the tests; of these, 121 calls were terminated because of operator errors, such as failure to set the transmitter properly, leaving 1,322 valid calls. The number of calls completed was 1,144, which is 86.5% of the total number of valid calls. The distribution of calls among the remote locations and between long (approximately 25,000 character) and short (approximately 14,000 character) messages is summarized in Table 2.

The primary objective of the Singer tests was to determine the percentage of calls which could be completed error free under various conditions of location and time. Overall, in the entire test, 56.8% (Table 3) of the calls were transmitted error free. This might be compared with an AGN prediction of 65% from Fig. 1 using the Singer proportion of long and short calls.

	Long Tape			Short Tape			
	No. of Trans.	Digits Per Trans.	Total	No. of Trans.	Digits Per Trans.	Total	Grand Total
1. New York	—	—	—	47	14,000	658,100	658,100
2. Tampa	186	25,000	4,650,000	96	13,600	1,385,600	6,035,600
3. Chicago	107	28,500	3,049,500	126	15,200	1,915,200	4,964,700
4. Denver	175	21,000	3,675,000	135	13,900	1,876,500	5,551,500
5. Tacoma	180	25,000	4,500,000	92	13,300	1,223,600	5,723,600
TOTAL	648		15,874,500	496		7,059,000	22,933,500
	Average length of long message	24,500		Average length of short message	14,232		

Table 2. Volume of data transmitted.

LOCATION	PERCENT OF COMPLETED CALLS	PERCENT OF COMPLETED CALLS WHICH WERE ERROR FREE
New York City	90.3	23.4
Tampa	90.9	47.5
Chicago	72.2	65.9
Denver	94.2	72.9
Tacoma	88.0	45.9
TOTAL	86.5	56.8

Table 3. Percentage of completed and error-free calls from different locations.

	TIME	NUMBER OF CALLS ALL	COMPLETE	NUMBER ERROR FREE	PERCENT ERROR FREE
Day	8 a.m.-8 p.m. EDT	913	775	344	44.3
Night	8 p.m.-8 a.m. EDT	399	367	306	83.3

Table 4. Error-free calls transmitted at day and night.

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The variation in percent of error-free calls from location to location is shown in Table 3. It can be seen that this variation is quite large and not necessarily dependent upon distance. For example, the poorest performance was obtained in calls from New York City, only 30 miles from the receiver, while Denver, Colo., achieved the best results.

Since in the SIMS system the remote locations are polled at night, variation in error-free percentage as a function of *time of day* is important. In both the AGN and TW tests all calls were conducted during normal working hours. In the AGN tests, particularly, the calls all tended to be made during the mid-morning and mid-afternoon periods so that there is little information available concerning variation in performance with time. However, there is some evidence both abroad[6] and within this country that traffic through a central office, which is quite dependent upon time of day, affects DDD performance strongly. In the Singer tests, the effect of time of day on error performance was dramatic. As shown in Table 4 (p. 28) the percent of error-free calls at night *was nearly twice that* during daytime hours.

A more detailed hour-by-hour analysis of transmission performance is shown in Fig. 3. Here the error performances seem to be worse during the peak telephone traffic hours of 10-11 a.m. and 3-4 p.m., and uniformly good throughout the late night and early morning period.

In addition to error-rate performance as a function of time of day, the *day-to-day* variation in the average performance from all sites was completed and is shown in Fig. 4. Several features of this error-rate listing are worthy of note. During the early weeks of testing, difficulty was encountered in achieving representative error-rate results on the Chicago calls. Subsequently, the New York Telephone Co. traced and corrected some carrier system problems and the Chicago performance was greatly improved. Also, some brief equipment malfunctions affected performance on the initial calls to Tacoma. Problems such as these may not be atypical in the startup of any widespread data communications network.

During the period August 5-August 8, 1968, the Republican Convention took place in Miami. In this period the percent of error-free calls from Tampa, Fla., decreased markedly to an average of only 24%. It is conjectured that the heavy traffic from New York

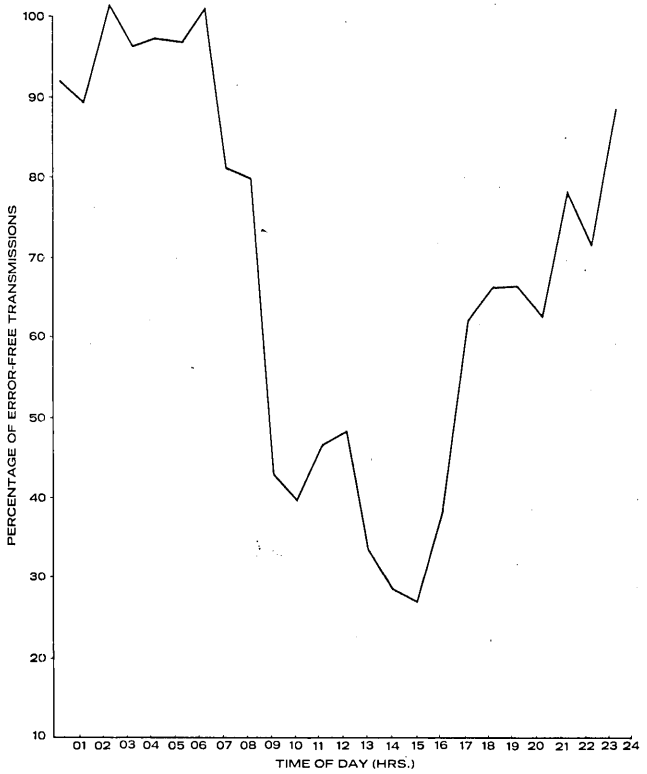

Fig. 3. Hour-to-hour variation in DDD network performance.

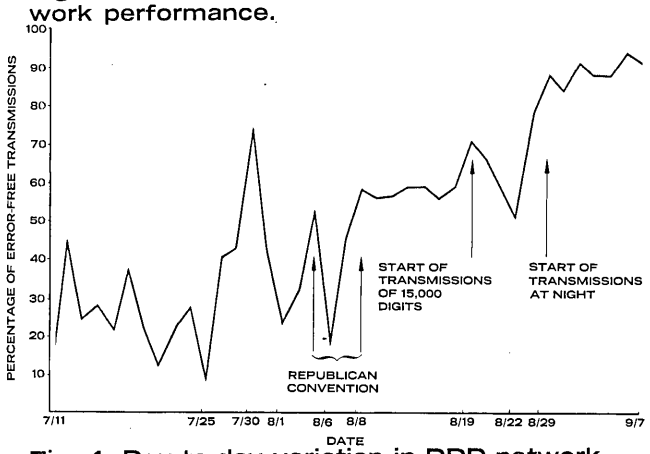

Fig. 4. Day-to-day variation in DDD network performance.

	No. & Percentage of Errors/Transmission										Total	No. Errors	Total # of Transmissions
	1	2	3	4	5	6	7	8	9	10+			
New York	4 11.1	3 8.3	6 16.7	3 8.3		1 2.8	1 2.8			18 50.0	36	11	47
Tacoma	21 14.3	32 21.8	16 10.9	14 9.5	7 4.8	2 1.4	3 2.0	2 1.4	2 1.4	48 32.6	147	125	272
Denver	36 42.8	17 20.2	7 8.3	1 1.2	3 3.6		1 1.2	1 1.2		18 21.4	84	226	310
Tampa	35 23.6	19 12.8	12 8.1	7 4.7	8 5.4	5 3.4	3 2.0		1 .6	58 39.2	148	134	282
Chicago	40 51.9	17 22.1	2 2.6	4 5.2	2 2.6	1 1.3				11 14.3	77	150	227
TOTAL	136	88	43	29	20	9	8	3	3	153	492	646	1138
%	27.6	17.9	8.7	5.9	4.1	1.8	1.6	.6	.6	31.1		56.8	

Table 5. Summary of data transmission errors.

6. See, for example, **Telecommunications and the Computer** by J. Martin, Prentice-Hall, 1969.

to Florida during these days affected data performance adversely. The dip in the Tampa performance causes the average error-rate curve in Fig. 4 to be relatively low at this point in time.

On August 19 the transmission format was switched from long (approximately 25,000 character) messages to short (approximately 14,000 character) messages. The effect on error rate performance is not evident from the history shown in Fig. 4. This is not surprising, since from Fig. 1 the predicted performance difference between these two formats is not great (the probability of a 14,000-character message being received error free is .69 as against .62 for the longer message format). Shortly after the switch to shorter messages, night transmissions were begun and performance of the entire system is seen to be considerably improved.

The number of parity errors contained in erroneous calls is given in Table 5. This information agrees reasonably well with the published AGN statistics. In either case, the evidence points to faulty messages containing a large number of errors on the average. At the other extreme, the incidence of undetected errors in messages free from parity errors is known to be quite low from the AGN and TW data. In the Singer data the expected number of these events was quite small so that they would be difficult to separate with certainty from data-handling errors. Therefore, this statistic is not included in this report.

A study of the error statistics of the switched telephone network is vital in planning data communication systems. In this report the emphasis has been on the performance of the DDD network for systems using message formats of length 10,000-300,000 bits. Analysis of available information showed that the probability of error-free reception is reasonably large, i.e., in the range .6-1.0, and that messages which do have errors tend to contain many errors.

The Singer tests augment the existing tests and agree with them quite well when there is an overlap. In addition, the Singer tests demonstrate convincingly the dramatic effect that time of day has on data performance. Calls placed at night contained twice the percent of error-free messages as those made during daytime. This is a vitally important factor which should be considered in the planning of other DDD-based data communication systems. ■

Miss Norman is manager of Systems Research and Development for The Singer Co., where she is responsible for planning the development of terminal-based systems throughout the corporation, as well as fostering the application of Singer-designed systems outside the company. Previously she was with the American Stock Exchange and with ITT. Her BA in mathematics magna cum laude is from Hunter College.

A Conference Report

ACM '71

The dp hardware market outside the U.S. in 1980 may be as big as the domestic market, said Joseph Horner of Stanford Research Institute, at ACM's 1971 annual meeting. Basing his prediction on a recent, detailed SRI study, Horner concluded that " . . . for growth and sometimes survival, many American companies in the computer industry must become multinational corporations."

Horner added that, in the next 10 years, domestic U.S. sales of computer hardware will grow about 2½ times, from $7 billion (the 1970 figure) to $18 billion annually, while non-U.S. consumption will increase five-fold, from $3.3 billion to $18 billion. He valued the services market within the U.S. at $6 billion in 1970. Non-hardware suppliers accounted for about $3.7 billion of this total.

"The (services) market . . . will grow significantly in the 1970s, and may exceed the . . . hardware market by 1980," Horner added. The need to make software more cost-effective, and easier to use, will condition this growth, along with the development of new services, particularly facilities management and systems integration. Minicomputers will account for much of the increase in hardware sales during the '70s, particularly if they're accompanied by easy-to-use software, said Horner. He added that peripherals will take 70 cents out of the hardware dollar in 1980, versus 55-60% in '70 and 30-40% in 1962; sales of data transmission and I/O terminal equipment will gain even faster.

Back and forward

Horner was one of six consultants who participated in a "look back/look forward" session ACM organized at this year's conclave to mark the 25th anniversary of the computer industry. The other speakers were William Osterman, Auerbach Information Services; Harvey Poppel, Booz, Allen, and Hamilton; Mortimer Rogoff, Diebold; Frederic Withington, A. D. Little; and Harvey Golub, McKinsey & Co.

Withington said that improved microcircuitry will lead to processors "of trivial size" during the next 25 years while, at the same time, machine-independent programs and adaptive executive software for multiprocessors will make big centralized systems more appealing. The likely result: users will be able to combine processors, communications links, and software packages in many new and wondrous ways. Commercial dp services will be provided largely by networks, each tailored to specific user needs; memories will conceivably have storage capacities of 10^{13} or 10^{14} bits, permitting "whole new approaches to system design," and there will be many competitors offering data communication services.

Much of the look back/look forward session involved a fight about whether computer makers and designers have done right by the user. This question has been argued so often at ACM meetings and joint computer shows that it's surprising the participants at ACM '71 found enough to talk about for several hours. Maybe it isn't so surprising, though, since most of what was said has already been said, several times.

The most venomous remarks came from Peter Denning, of Princeton, who said he was "tired of gloomy assessments." Pointing out that these were "consistent with the current national mood," he added that "the consultants (on the platform) are trying to get us (system designers and engineers) to assume collective guilt for failures and misconceptions —perhaps their own—and I refuse to participate in this wrist-slashing activity . . . I disagree that managers, by divine right, are more competent than others . . . computer science is based on abstractions . . . Members of this panel . . . would not understand an abstraction if they saw one."

Just possibly, what irks the computer engineers, system architects, and software artists most is not the criticism about computer performance, but rather the knowledge that control over the state of the art has slipped from their hands. While this shift to managerial control has been going on for a long time, it was particularly apparent at ACM '71. Some of the effects were suggested by William Osterman, one of the look ahead/look back speakers, when he said "abrupt changes in systems are now uneconomic, because of the large investment in already-installed equipment . . . The economic payoff is now primary, rather than exploitation of the latest technological breakthrough."

Metamorphosis

But it isn't just system economics that are changing. The managers have completely different attitudes from the system builders. Contrast Osterman's remarks about "change" with what Grace Hopper, an industry pioneer, had to say on the same subject at a later session:

"We are going to have to change because the problems are getting bigger . . . The worst thing we're up against in moving toward the future is the syndrome of 'we've always done it that way.' "

If the computer industry is becoming more "mature," as ACM president Walter Carlson suggested in his opening remarks, it is going through a rather common metamorphosis, like the auto, steel, and air transport industries. These businesses today are far less innovative and colorful, far more institutionalized and conservative than at their outset. The consequences of such a change in the computer industry—for those inside as well as those outside—may not be entirely beneficial.

For one thing, the pressure to become more "professional" will probably increase. There was a session on professionalization at ACM '71. One of the speakers, Paul Notari, president of the Association of Computer Programmers and Analysts, said "you can't place control of your corporation's most vital business functions in the hands of undisciplined amateurs . . . who have neither business sense, responsibility to their employer, nor dedication to their field."

An estimated 1,100 persons attended ACM '71, which will enable the association either to break even or make a $5K profit, depending on whom you want to believe.

—Phil Hirsch,
Washington Editor

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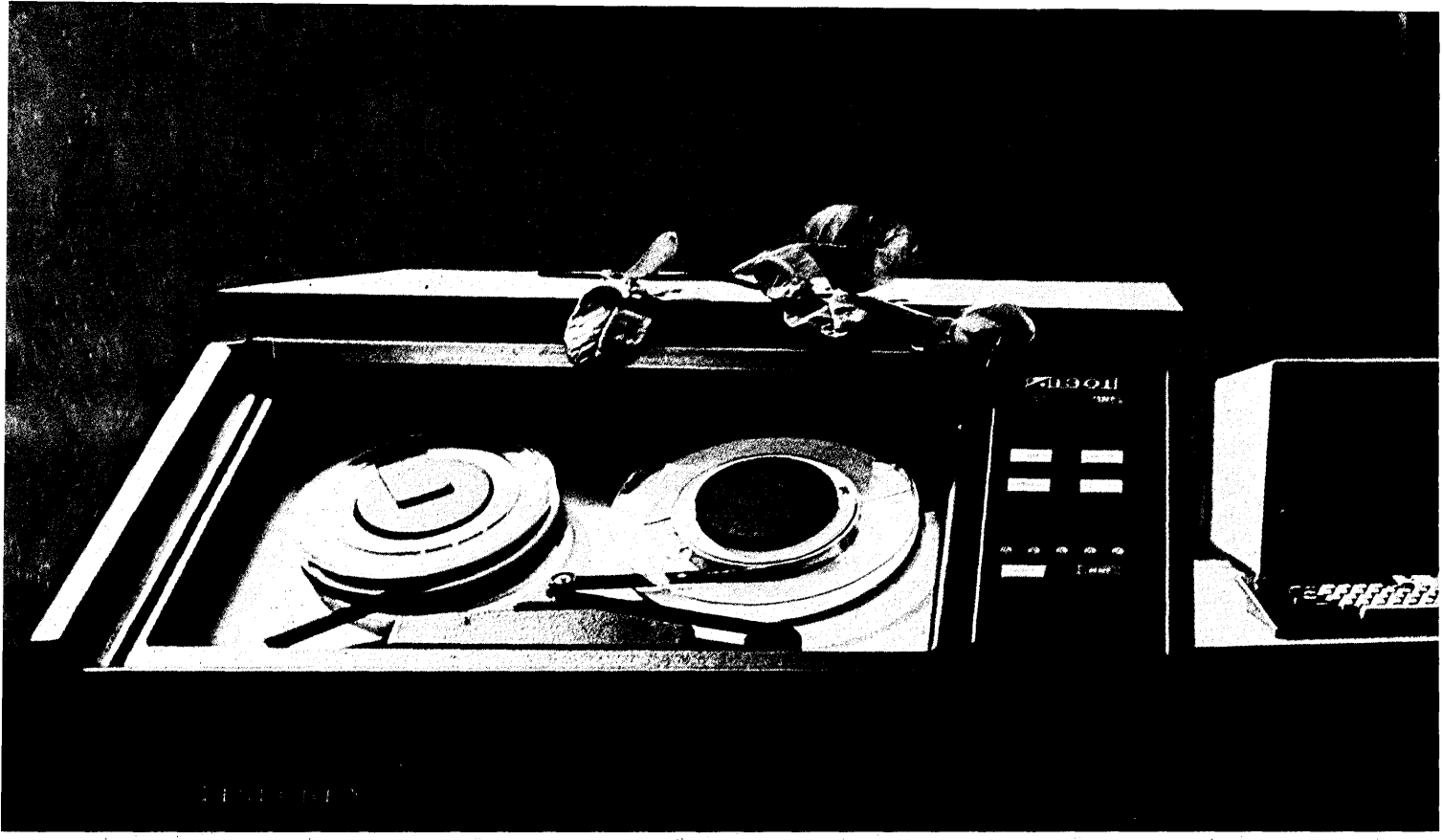

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CONTROL UP TO FOUR SYSTEMS (31 operators) . . . $120/month for the first two Systems, $40/month each additional Using any Keystation of connected Systems, a supervisor can monitor operator activity, initiate data transfers, collect files from multiple Systems into a single output tape. Control Units can intermix tape drive densities for maximum tape processing flexibility.

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PERSPECTIVE

an interpretive review of significant developments

Nixon's New Plan - Some Initial Reactions From Makers and Buyers

We want to make one thing perfectly clear about President Nixon's economic policy announcements: the result, at this writing, is considerable confusion.

In seeking some industry response to the Aug. 15 speech, we tried to make two distinctions. The first is between those actions that the President can take by himself as opposed to those that must be settled by Congress. The second is between those actions that probably won't have much effect on our industry and those that probably will.

In the first case, the President has imposed a 90-day freeze on wages and prices, set a 10% surcharge on imported products, and discontinued the redemption of dollars for gold. However, he has only proposed that Congress remove the excise tax on automobiles, establish a one-year 10% investment-tax credit, and accelerate scheduled income tax reductions by one year.

Now comes the hard part. What will be the effect of these acts and proposals?

The freeze seems straightforward; computer companies should continue to make or lose money at approximately the same rate as during the previous 90 days.

But the surcharge is a furrier proposition. An automobile is a product, all right, but how about a core plane using U.S.-made cores strung in Hong Kong by a subsidiary of a U. S. company that ships it here for final assembly and integration into a computer system destined for shipment to South America at a previously agreed price? Who pays 10% of what?

The end of gold redemptions, and the resulting floating dollar rate in relation to the currencies of other countries, creates even more questions. The guesses about the value of the dollar, when converted to other countries' money, ranged (in late August) from about 3% less in Britain to maybe 16% less in Japan. When these rates are settled, presumably by the International Monetary Fund, the results may well influence a manufacturer's marketing plans and a user's selection of equipment. Until then, there will probably be a lot of people doing nothing much but waiting and sighing.

Tax Credit: "Buy Today"

As for the tax credit, it seems to offer considerable hope for an injection of capital spending into the economy — and computer makers could be a major beneficiary. What's more, setting it at 10% for just one year introduces a note of "buy one today." But it's instructive to recall that the 7% tax credit introduced in 1962 took 18 months to wend its way through the House and Senate, with the businessmen it was designed to benefit fighting its passage like tigers all the way. According to Business Week, April 29, 1961, not a single corporate spokesman testifying before the House Ways and Means Committee was in favor of it. (They were, however, equally adamant against its proposed repeal a few years later.) Whether or not subsequent events suggest a cause-and-effect relationship is debatable, but the years following the tax credit were undeniably fat and happy ones for the computer industry.

The last item from the President's message that could affect the industry indirectly is the income tax reduction. If consumers get more money and they spend it, suppliers eventually need more computers to keep track of more things and that's good. But it's good sometime in the future, not now.

What Were They Saying?

So, with these shaky assumptions in mind, we set out to learn something about how manufacturers and users are reacting to the administration's all-new game plan.

To the extent that U. S. currency floats downward against foreign currencies, oem manufacturers selling equipment in those countries will, in effect, be marketing their products at lower prices. Those queried were uniformly happy about that prospect. Whether this will mean an upsurge in orders is another thing, however; for as James Pyle, assistant to the president at CalComp, notes: "Other countries often have no alternative but to obtain products from us, so those who were buying American products will just be getting a price break. I don't see that there will be much change one way or the other."

For manufacturers that build or assemble products in foreign countries and ship them into this country, the downward floating dollar ups their costs.

Ampex Corp., which assembles memories in Hong Kong and Taiwan, sees a 20% rise in costs. "If we assume the dollar drops 10% in comparison with the currencies in those countries, what took $1 in those countries two months ago now takes $1.10," a spokesman says. He adds, "and when the $1.10 worth of product gets to these shores, it is hit again by the 10% surcharge. The effect is a 21% increase in our costs."

But many other manufacturers in the same boat are not concerned. Stuart Lotwin, president of Data Recall Corp. of El Segundo, Calif., which will open a core assembly plant this fall in Hong Kong, says: "The labor rates are so low in those countries the 10% surcharge won't mean much. And the cost of building the stuff over there is still nothing compared to what it costs here." Dilip Parikh, peripheral marketing manager at Standard Memories, which has an offshore core facility in Barbados, says: "It just wouldn't pay to move the plant back to the U.S. We would lose time, and time is more valuable to us than the small rise in production costs we'll have to pay."

Software Outlook

Informatics, which sells its Mark IV file management system worldwide for the same price (plus local taxes, if any), echoed what most software firms were saying: Little change, with foreign buyers getting a price break due to the devaluation; but if they needed Mark IV, they probably al-

ready had it, since there is, in effect, no competition for the product.

The consensus among some 20 firms contacted seems to be that life will go on as usual, with little, if any, change resulting from the President's actions. Industries that have gone abroad to effect cheaper manufacturing costs will still be saving money, though not as much. So much for the effects of the devaluation and surcharge upon the small but growing segment of our industry either marketing or building products abroad.

"What Bargains?"

Among users and potential buyers of dp equipment (buyers in this context including leasing companies) on these shores, there was, once again, a surprisingly consistent response. The 10% investment-tax credit impacts this group more than anything else in Nixon's new plans, but not one user or buyer could be found who was giving serious thought to accelerating the purchase of either hardware or software items to get in on the "bargains." A definite wait-and-see attitude prevailed among the majority of firms contacted regarding whether the 10% tax would even pass Congress.

"I think there is a very real possibility it won't pass because many Congressmen feel it favors business too much," says W. H. Wieland, senior vice president of United California Bank in Los Angeles. At another large user, Security Pacific Bank, E. C. Treapgold said: "We buy equipment when we need it, regardless of price. The President's policies could only affect our decision of whether to lease or to buy, and that decision would be made when the equipment is signed for."

Transamerica Corp., a large Los Angeles user, said it is not "in a favorable position with respect to our purchased equipment." Vice president John Bennett had more to say. "Lease prices of 360/65s are fluctuating daily more than the 10% credit offered by the President, and a low-lease-rate 65 is an alternative to a 370."

"I don't think we'll necessarily like anything at 90% that we didn't like at 100%," the chairman of Boothe Computer, D. P. Boothe, Jr., said in San Francisco. Boothe was in the middle of a study to find out how much it likes the 370 series. "I also don't think there will be any fundamental change in the number of users buying and leasing equipment simply as a result of the 10% credit, so it won't put lessors out of business." DPF&G in New York is waiting to see whether the tax-credit bill passes before it thinks about ordering anything. Many user budgets have been finalized, were tight to begin with, and probably will not be revised to obtain equipment, because it isn't needed.

Thus users are not trampling each other in the rush to order new equipment. As one user put it, "Why should we buy something just because it's 10% cheaper — it's still 90% more than we want to spend unless it were absolutely essential."

We'll venture a conclusion as to what effects the "new" Nixon policies will have on our industry. The impetus for a substantial increase in computers and related edp product purchases has to come from outside the computing sector of the economy — since computers are tools used to solve other problems. The only way this might happen is through the proposed (and perhaps additional) accelerated personal income tax cuts — firing the economy up to the point that additional computing power is required to keep pace. The tax cut won't take effect until next year at the earliest (providing it passes Congress), and it would be several more months before most of us started finding extra bucks in our pockets that we *might* spend on something, which *might* make someone's computer gasp, which *might* cause the dp manager to consider a newer machine, additional peripherals, or another programmer or two. After several months of study, of course.

But Mr. Nixon and influential Congressmen would doubtless like to return to Washington next year, and it seems certain that they will (and can) bring some pretty powerful tools to bear against our lethargic economy, with the steps taken in mid August just the beginning. At the very least, there is a little more hope that 1972 will be a better year for all of us than the last two have been.

—William Rolph and Michael W. Cashman

"Attention everybody! It is time to stop work for today and put away our papers, pens, files, office supplies and thinking caps. Neaten up your desks in preparation for going home and when you have finished, fold your hands and wait for the final bell. Please do not talk to your neighbor."

The new TELEX 5600 Disk Storage System doubles the storage capacity of present IBM 2314-type systems. The 58 million bytes per drive capacity is provided by doubling the number of cylinders, while maintaining track and format compatability. The TELEX 5600 Controller accepts one to eight active drives plus a spare, for a total subsystem capacity of 466 million bytes.

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As *The* Peripheral Company, TELEX brought you the 5311 Disk Drive in August, 1969 . . . the 5314 Disk Subsystem in April, 1970 . . . and now the 5600 Disk Subsystem with its greatly improved access time and double density storage capacity for all System 370 and 360-25 and above users.

And, TELEX, *The* Peripheral Company, has thousands of drives and hundreds of systems in use today with an unmatched reputation for performance and reliability. Check the comparison chart, then call your TELEX representative for complete specifications. Customer deliveries begin this October, so place your order now!

The Peripheral Decision for your company is a major decision. As you carefully weigh each possible company against basic requirements, we believe you'll join many other firms in putting your confidence in *The* Peripheral Company . . . TELEX!

COMPARISON

IBM 2314 vs. TELEX 5600 Disk Storage System:

	IBM 2314	TELEX 5314	TELEX 5600
Access Time			
Minimum	25 ms	10 ms	7 ms
Average	60 ms	32 ms	29 ms
Maximum	130 ms	60 ms	55 ms
Start-up Time	60 sec.	20 sec.	20 sec.
Storage Capacity (per drive)	29 million bytes	29 million bytes	58 million bytes
Disk Speed	2400 RPM	2400 RPM	2400 RPM
Data Transfer Rate	312,000 Byte/Sec.	312,000 Byte/Sec.	312,000 Byte/Sec.
Tracks	200	200	400
Storage Medium	IBM 2316	IBM 2316	IBM 2316

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Amazing. That anybody listens, that is. Because this little gem exists only in the dreams of the optimists in somebody's marketing department. Designing it and building it are details they'll worry about later.

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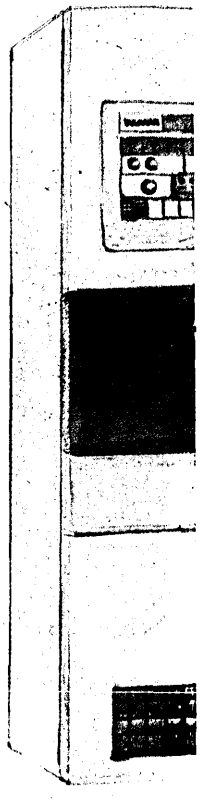

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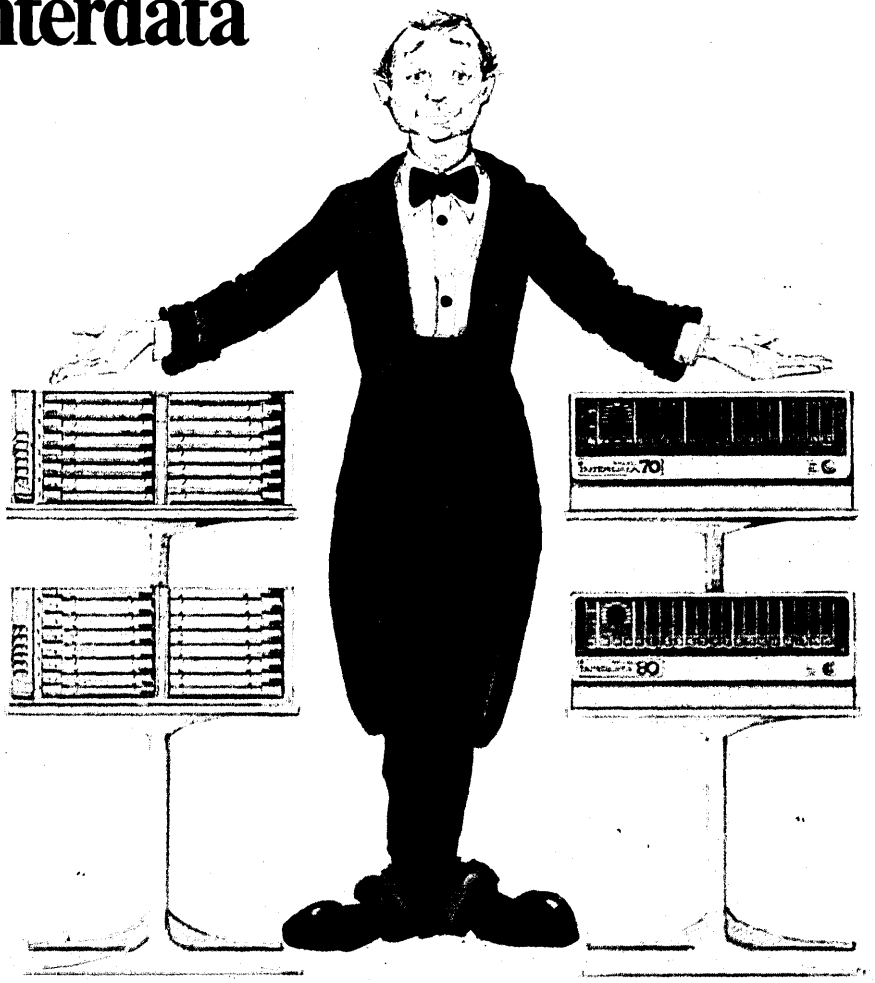

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It has 113 instructions and automatic I/O and 16 g-p registers and built-in interfaces. So it's extra easy to configure and use.

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CIRCLE 22 ON READER CARD

NEWS SCENE

Int'l Standards Plan May Cut U. S. Business

Western Europe seems to be implementing the Multipartite Accord rapidly, so rapidly in fact that many U. S. dp exporters may lose business in the near future.

The accord is a plan for "harmonizing" the national standards now used by buyers of electric/electronic components in each of the 13 Western European countries. The ultimate aim is to come up with a common set of standards that buyers in all of these countries can rely on implicitly. This would simplify things greatly for suppliers, and hopefully expand their markets. Buyers would be able to dispense with incoming inspections.

Components that meet the Multipartite Accord standards will receive a "mark of certification." Elaborate procedures have been set up to keep this mark from being applied to inferior merchandise. There are standard quality assurance tests, for example, and a common scheme for making sure that the tests are properly conducted.

The United States isn't a member of the Multipartite club, although we have hopes of joining. Enabling legislation is now pending in the House and Senate. The big question at the moment is whether our effort will get rolling in time.

Spokesmen for U. S. component manufacturers say there is no immediate danger. They point out that no certified components have hit the European market yet, although they freely admit that certified resistors and capacitors are expected to do so shortly. But it is generally agreed that the Multipartite nations will need another year at least to standardize the next item on their list, which is believed to be transistors.

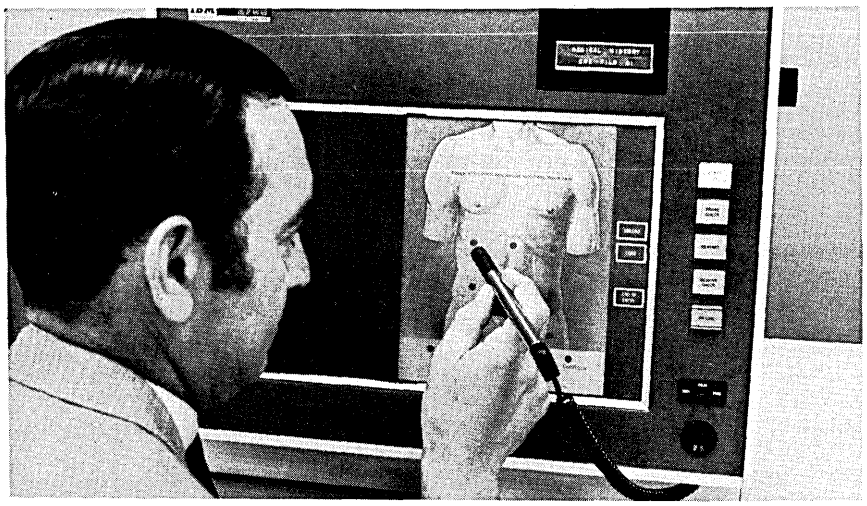
What bothers other sources is that the Europeans have already agreed upon standard test procedures for a wide variety of components. Britain, France, and Germany have issued directives requiring their government procurement agencies to purchase components and equipment conforming to Multipartite standards whenever possible.

Another indication of this general trend is a brochure picked up in France last July. Obtained from French standards officials, it claims that "France is the first country in the world to supply high-performance electronic components with quality assessment as stipulated by the European harmonized system of CECC (CENEL Electronic Components Committee)."

According to a knowledgeable U.S. source, the key words in this statement are "quality assessment." He believes that, pending development of a full range of harmonized component standards, European manufacturers are trying to gain competitive leverage by stressing that their testing procedures have been blessed by CENEL.

The fact that the largest buyers of electronic components and electronic equipment in Europe are government agencies makes this job much easier. For the governments apparently have begun to implement the Multipartite Accord.

Legislation that would enable the U. S. to join the Multipartite club is likely to be enacted before the end of this calendar year. About a million dollars is needed to finance the first year of activity. If the legislation is enacted this year, the Commerce Dept. — which would manage the program — plans to ask for a supplemental FY'72 appropriation early next year. But we can't expect to become members of Multipartite until 1973 at the earliest, and that is an extremely optimistic estimate.



IT HURTS HERE: Patients taking their own medical exam use light pen to help computer, and later the doctor, analyze what ails them.

Computers to the Aid Of Medical Examiners

Two computer firms have proposed services to save doctors time in examining patients.

IBM said it will license to doctors, hospitals, and others a computer-assisted medical examination program called CME with which up to 15 patients can be examined within an hour. Questions flashed on the screen of an optical image device are answered by the patient with a light pen. In one case, the patient is shown the drawing of a human torso and asked to show where it hurts. He also is given a test booklet of tear-out mark-sense coded cards on which the results of both off-line and on-line tests are recorded. Off-line tests include chest X-rays. An 1800 computer with at least 32K words of memory is used in the system, which IBM said it will license for $2400 a month for a year, after which it is free.

McDonnell Douglas Automation, meanwhile, is preparing to offer remote computer analysis of electrocardiograms this month. A patient's electrocardiogram is transmitted over telephone lines from a terminal at his bedside to a computer in St. Louis where it is analyzed and transmitted back to the hospital "within minutes."

22 Million More Voters: A Computer Problem?

The nation's election officials face having to count 22 million additional votes during the 1972 election when more than half of the newly enfranchised 18-20 year-olds will go to the polls.

Not surprisingly, the source for this figure is a company in the business of helping election officials count votes with computers — Systems Research, Inc., of Los Angeles. It has polled some 100 election officials in eight western U.S. states who expect a 28% increase in turnout in 1972 over 1970, as nearly 55% of the newly eligible young voters turn out to vote. It arrives at the 22 million figure by projecting this estimate nationally.

Michael J. Strumwasser, an associate at Systems Research, said the study is part of an investigation by his firm of the security and economic implications of the introduction of computers to vote counting. Strumwasser is co-author of the article, "Cheating the Vote-Count Systems," (*Datamation,* May 1970, p. 76). He said the study will be extended to take in the opinions of 3,000 election officials throughout the nation. The findings will be published soon.

Their study in the West also disclosed that punched card election systems have been saving lots of money. The average county, he said, spends $3.24 per registered voter in each election. But counties using punched cards for ballots and computers to tabulate the results spend only $1.87. Counties using lever voting machines, Strumwasser learned, spend a high average $6.31 per voter.

The nation's largest user of punch card voting, Los Angeles County, plans to use some 50,000 punch card recorders at polling booths in 1972. It now is evaluating bids for 42,000 of them from five suppliers. IBM did not submit a bid for the devices, and the county said that by using equipment from other sources — all, however, licensed by IBM — it will save from $1 to $1.6 million.

IBM remains in the running, however, — to supply the card-to-tape conversion and the support services for the vast 13-program vote counting system. At the last major election there in June 1970, Los Angeles used 26 360/20 computers to convert information on 3.2 million punched cards to tape. On tape, the ballots were then counted on the county's 360/50 computers.

(At this writing early in September, IBM would not comment on the extent of its planned involvement in the Los Angeles system. It said its policy is not to disclose the nature of its dealings with a client.)

John Greiner, of Economic Research Associates of Los Angeles, which is evaluating the bids for the county, said the punched card recorders will be a little smaller than those provided by IBM and the color may be different from the medium tone blue provided by the big computer company. Five companies who bid on the order: Compuvote, a division of Data Media Co., of Dallas; Diamond National Corp. and Western Molded Fibre Products, both of Los Angeles; Computer Election Systems, Berkeley; and Voting Instrument & Products, Northbrook, Ill.

Successful or not in the Los Angeles bidding, these suppliers will find consolation in another discovery made by Strumwasser's company: Nearly a fourth of all counties using paper ballot systems have recommended a change to punched cards.

WESCON '71, Good Thing, Small Package

President Nixon's new economic policies were announced too late to affect the size of the Western Electronic Show and Convention (WESCON) held in August in San Francisco, but there was an effect on the mood.

And organizers of the next big trade show to be held in the West, the Fall Joint Computer Conference scheduled for November in Las Vegas, are anticipating effects on both size and mood. Exhibits director Don Cruzen said booth sales jumped by 20% in the week following the Nixon announcement, a period in which a normal increase would have been about 5%. As of Aug. 27, 161 exhibitors had signed up for FJCC and nine had canceled out. Normally, says Cruzen, cancellations are much higher.

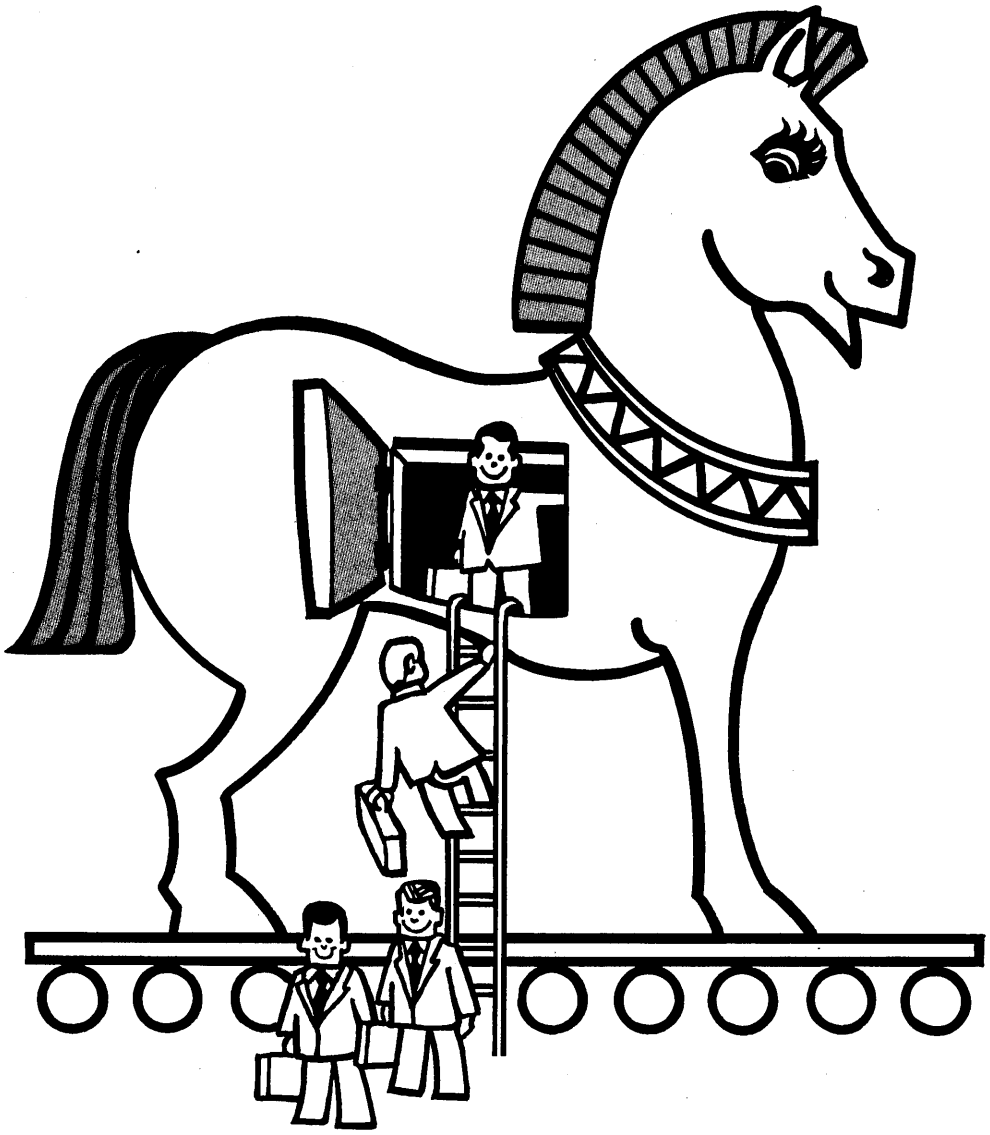
At WESCON, where booth spaces were up around 1,200 and attendance at 50,000 in peak years, exhibitors at this year's 540-booth show attended by some 25,000 found the buying mood of the crowds more than offset their lack of numbers.

This was particularly true in the computers and data processing area, where many exhibitors were reporting receipt of more concrete-seeming sales leads than from any earlier WESCON. In fact, in this area, a down attendance (from 37,000 last year) was hardly evident. It was by far the most crowded part of the exhibit areas in the Civic Auditorium and adjacent Brooks Hall, while aisles in the component section, WESCON's old standby, had a lonely feel.

At the end of the show's first day, Dave Methvin, president of Computer Automation, Inc., Newport Beach, Calif., which was displaying its "naked mini" (May 1, p. 76) for the first time, said they had "virtually closed" one quantity order on the floor and had received leads for several more. He was anticipating better results from this year's WESCON than from last year's. He said his firm's sales activity had been on the increase for the preceeding three months and he expected the new economic policies would greatly accelerate this increase.

A spokesman for Digital Equipment Corp., which had the largest booth in the computers and data processing section, said he expected this year's show to be at least as good for DEC as last year's. As a measure of traffic, he noted that DEC distributed some 10,000 handbooks during the four days of the show, which was about on a par with last year, despite the 10,000 plus drop in overall attendance.

That WESCON is wooing the data processing industry was evidenced by the increased number of papers on computer-related topics. Six were directly related and another eight had an indirect connection. Traffic in the dp booths would indicate they had



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If so, there's still time to include your product and services—free of charge.

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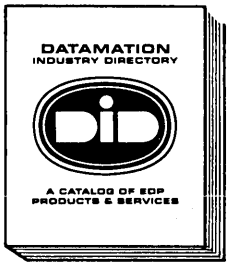

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some success on a percentage basis, anyway. Last year's WESCON drew 18% of its attendance from the computer industry. When the final analysis of attendance is in this year, this should be up.

And WESCON isn't alone in its wooing attempts. Representatives of IEEE were there interviewing dp exhibitors in an attempt to "get a fix" on the kind of people they want to reach to help in planning the program for their big show next spring in New York.

WESCON's computer-mindedness was reflected on another level in an apparently successful trial run of a computerized registration system. The system, developed by Jacquard Systems of Manhattan Beach, Calif., attracted as much attention as many of the exhibits.

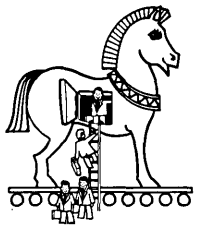
"We had a few minutes of downtime the first day," said Edgar A. Bolten of Jacquard, but the rest of the time the system, capable of producing 350 five-line embossed cards per hour, was up and running smoothly. It was used for only a portion of WESCON registrations this year, but at closing time organizers indicated they would seriously consider using it for the whole show in '72. And Jacquard hopes other trade show planners will take a close and serious look at the system following its successful maiden run.

Another computer industry lure was WESCON's keynoter, William F. Glavin, president of Xerox Data Systems, who played with the word "challenge" and challenged his audience to "look to the market place before looking to the drawing board . . . to design for the user."

He stressed that the user he meant where the data processing industry is concerned is not "the data processing manager, or his analyst, or his programmer . . . but the man whose job is at stake . . . whose business or whose livelihood is affected by what comes out of the computer."

This concern for the user was echoed in many of the technical sessions. In a session on Peripherals for Minicomputers, Arnold L. Mende of The Genesis Venture Capital Group urged minicomputer systems builders to provide more user support. In the same session, Grant Saviers of Digital Equipment Corp. accused the mini-

(Continued on page 50)



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- ☐ software services: analysis/design, installation/maintenance, evaluation/audit, vendor selection/evaluation, marketing, government contracting, legal/patent applications, proposal writing, rfq preparation, documentation, etc. of software
- ☐ computing service bureaus, special purpose service bureaus, time brokers
- ☐ information services and data banks, reports
- ☐ leasing and used equipment sales
- ☐ education
- ☐ recruitment
- ☐ temporary help

Computers
- ☐ digital computers
- ☐ analog computers
- ☐ hybrid computers
- ☐ military and ruggedized computers

Peripherals
- ☐ peripheral controllers
- ☐ magnetic tape transports, ½-inch
- ☐ magnetic tape transports, cassette
- ☐ fixed media rotating memories
- ☐ removable media rotating memories
- ☐ core memories
- ☐ other memory systems
- ☐ card equipment
- ☐ line printers
- ☐ x-y plotters
- ☐ printer/plotters
- ☐ paper tape readers
- ☐ paper tape punches
- ☐ paper tape reader/punches
- ☐ special purpose output devices (display-only crts, ticket printers, etc.)

I/O Subsystems
- ☐ computer output microfilmers
- ☐ photocomposers and typesetters
- ☐ microfilm to tape systems (film scanners)
- ☐ optical readers
- ☐ micr readers
- ☐ keyboard data entry systems
- ☐ source data collection systems
- ☐ digitizers

Terminals
- ☐ interactive hardcopy terminals
- ☐ interactive alphanumeric display terminals
- ☐ interactive graphic display terminals
- ☐ batch terminals (remote job entry terminals)
- ☐ source data collection terminals, special purpose input devices (badge readers, etc.)
- ☐ data transmission stations
- ☐ facsimile transmission terminals
- ☐ point of sale terminals

Communications Gear
- ☐ communications processors
- ☐ multiplexers
- ☐ audio response units
- ☐ modems
- ☐ couplers (acoustic or inductive)
- ☐ error detection and correction devices

Special Purpose Systems
- ☐ media conversion systems
- ☐ information storage and retrieval systems
- ☐ image storage and retrieval systems
- ☐ data acquisition and control systems
- ☐ graphics display and computer aided design systems
- ☐ point of sale systems

Auxiliary Equipment
- ☐ keypunches and verifiers
- ☐ ocr encoders
- ☐ micr encoders
- ☐ plastic card/badge encoders
- ☐ unit record equipment
- ☐ hardware performance monitors
- ☐ security equipment (alarms, passkeys, etc.)
- ☐ environmental equipment (air conditioners, flooring, etc.)
- ☐ other: timekeeping equipment (on-line clocks, interval timers, etc.) paper tape equipment (spoolers, splicers, etc.) magnetic tape equipment (testers, deguassers, etc.) forms handling equipment (bursters, decollators, etc.) microfilm/microfiche equipment (readers, etc.) mechanical document storage and retrieval systems keyboards

Supplies and Accessories
- ☐ furniture
- ☐ carts
- ☐ media (mag tape, forms, etc.)
- ☐ media storage
- ☐ aids (templates, code converters, etc.)
- ☐ supplies (ribbons, labels, etc.)

Name _____ Title _____

Company _____

Address _____

City _____ State _____ Zip _____

Area Code _____ Phone _____

New Math by KEY-EDIT™

3000
100
99
90
27
11
2
1 = Total

3000. Over 3000 KEY-EDIT keystations have been ordered since Consolidated Computer first introduced this most advanced data input system to the market.

100. A KEY-EDIT system can work for you for less than $100-per-keystation-per-month.

99. Uptime on KEY-EDIT systems installed is averaging in excess of 99%. (Even the lowest uptime performance for a KEY-EDIT system this year was 98.5%!)

90. KEY-EDIT systems can be installed and working for you in 90 days from the date of order.

27. KEY-EDIT users are serviced by marketing representatives and field technical support personnel in 27 Consolidated Computer offices throughout North America and Europe.

11. KEY-EDIT systems are alive and well and working in eleven countries: Australia, Canada, France, Netherlands, South Africa, Sweden, U.K., U.S.A., U.S.S.R., West Germany and Yugoslavia.

2. All this has happened in little more than 2 years since the first KEY-EDIT system was installed.

1. This all adds up to one inescapable conclusion: KEY-EDIT is Number One—World Leader in Data Input Systems.

Here are some more numbers to think about: 100/85,100/100,100/145

KEY-EDIT is a multiple keystation shared-processor data input system. It is available in a family of three models that give users a wide range of data handling capabilities to meet the demanding requirements of today's computer operations. The three models are KEY-EDIT 100/85, 100/100, and 100/145. All KEY-EDIT models can be interfaced with any existing data processing system. And each KEY-EDIT model is growth-compatible with other members of the family, thus allowing you to expand or modify your system quickly and easily with no operating change.

KEY-EDIT systems consist of a powerful central processor, a high-speed fixed head storage device, magnetic tape drives, supervisory console, and from 4-to-32 keystations. Individual models are available with a full range of powerful editing and data control features including standard check digit, alphanumeric check, range check, batch totalling, operating statistics, variable record length and output editor.

KEY-EDIT Models 100/100 and 100/145 are available with a wide range of peripherals to provide data communications and remote editing capabilities, including free-standing keystations, line printers, card readers, paper-tape readers and CRT.

Now think about one last number. Our telephone number. Then call us. Boston (617) 891-7100 Toronto (416) 449-1120 London (01) 965-9211

KEY-EDIT by CONSOLIDATED COMPUTER INTERNATIONAL INC

World leader in data input systems.

CIRCLE 34 ON READER CARD

Who's got the best solution to your inpu

Everybody.

problem?

ke a look at all the promises of input utopia advertised in this magazine.
'hat do the ads say?
ıat input is probably the major problem in data processing today?
kay. We'll buy that.
ıat keypunching is an obsolete, costly way to process data?
'e'll throw in with them there, too.
ıat there's only one "best" way to end the input problem?
ıat's where we get off the bandwagon.

No input system is going to solve everybody's problem every time.)P Departments may all look the same to management, but the people who ave to run them know better.

So do we.

As you might suspect, we make input systems. Three, to be exact. MC 5, 7 and 9. The size of the system depends on the size of the processing epartment.

The 5, 7 and 9 are KeyProcessing™ Systems. KeyProcessing is our name ır keyboard data entry systems.

We admit that some mammoth corporations might just need one of ose million-dollar electronic marvels of the input industry. ıthers would do better to keep punching along with what they've got.

What we'd like to do for you is what we did for Blue Cross of outhern California, Union Carbide, Continental Airlines, First National City ank, Pacific Gas & Electric, the City of Los Angeles, the Pacific Coast ock Exchange and others.

We showed them how our KeyProcessing System works. How it's faster nd cheaper than key-to-tape.

How it can be phased-in overnight.

How keypunch operators can learn to use it in less than two days and ecome up to 50% more efficient.

How quiet it is.

How all the equipment we have in the field has averaged an up-time f 99.5% and reduced personnel turnover significantly.

How about it?

We don't promise to have the best solution to your input problem.

But, we just might.

Give us a call or write for more information.

CMC Computer Machinery Corporation, 2231 Barrington Avenue
Los Angeles, California 90064. (213) 477-1585.

KeyProcessing
ı trademark of Computer Machinery Corporation

computer industry of "smorgasboard engineering" which was the result of a technological zeal not user-directed.

And it was the users conducting the sessions on hospital information systems and medical electronics. The sum of what came out of these sessions was that there's still a long way to go. Dr. Jerome H. Grossman, associate director, medical clinics, and assistant director, laboratory of computer science, Massachusetts General Hospital, said the most telling measures of success in these fields in the future will be "the ability to transfer what are now mostly government grant-supported systems to a wide range of other hospitals and medical environments."

As for what the hospital user wants from the computer industry, he noted that "because the experience of using a computer is so new to the medical team, and the learning curve so steep, programming flexibility and easy change are of key importance."

And easy change, it would seem, is important to trade shows too. For WESCON '71 was a far cry from the component-oriented show it was when it started 20 years ago, and the changes continue.

1976: Target Date for 1,000-Word Speech System

ARPA, the Advanced Research Projects Agency of the Dept. of Defense, is suddenly very interested in getting a speech understanding system running.

Interested enough, in fact, to propose funding the project at $3-4 million levels over the next several years. Research on the many and complex problems that have blocked such a system has been conducted for years in separate laboratories across the country; but Dr. Larry Roberts, director of the Information Processing Technology branch of ARPA, got them all together for several meetings during the last few months to talk things over. An initial set of specifications was supplied the study group, which includes many of the Who's Who in the speech understanding and artificial intelligence fields — Dr. J.C.R. Licklider of MIT; Dr. John Munson of Stanford Research Institute; Dr. William A. Woods of the Artificial Intelligence Dept. of Bolt, Beranek and Newman; and about a half-dozen others.

The initial specifications had to be modified somewhat during the study, and the final specs read in part: "The system should accept continuous speech from many cooperative speakers of the general American dialect, in a quiet room over a good quality microphone, allowing slight tuning of the system per speaker, but requiring only natural adaptation by the user, permitting a slightly selected vocabulary of 1,000 words, with a highly artificial syntax, and a task like the data management or computer status tasks ... tolerating less than 10% semantic error, in a few times real-time, and be demonstrable in 1976 with a moderate chance of success."

The vocabulary of 1,000 words was scaled down from 10,000 words, but one of the attendees stated, "If we can get to the 1,000-word level, we can probably buy our way to 10,000." We take this to mean that the problem switches from research intensive to capital intensive at this point. Also substituted in the final specifications was the phrase "over a good quality microphone" for "over a telephone," since telephone capability would make the project much tougher. The original specs also targeted 1973 for the first prototype to be running.

Consensus within the study group is the project will be realized if it is funded adequately. There is still a lot of research to be done on every facet of such a system; and though there have been lots of disappointments in the past, the group feels the final specifications and the 1976 date are reasonable. "If we can get this capability to within 10 times real-time by 1976, we ought to be right in the ballpark for real-time operation on the next generation of computers," says Dr. John Munson of SRI. To aid researchers in getting there, ARPA is letting them use its communication network which links computers at sites across the country doing ARPA work. This network will someday include the Illiac IV, though it is not yet clear whether that much computing power is needed to help build the speech understanding system.

Why does DOD want such a system? Well, obviously, with a 10% error rate tolerated it won't be used to

launch rockets. "We'll use it for the same applications that everyone else will," says an ARPA source. "A lot more people could use an information retrieval system like that. So we called the leading researchers together and asked them, in effect, 'is now the time to start the big push for a workable system?' and the answer came back 'Yes.' "

NEWS BRIEFS

Reports of Its Death ...

Just a little more than a year ago when minicomputers were like rabbits, one about to be introduced that had already been well received by the technical community was the Computer Development Corp. CD 200.

The introduction was never made. Computer Development Corp., headquartered in Santa Ana, Calif. pulled the kind of disappearing act popular at that time, and, to all intents and purposes its machine disappeared too ... but not quite. About six months ago the rights to build the CD 200 and to market it in systems were purchased from Computer Development president Bill Roessl by Eldorado Electrodata Corp. of Concord, Calif. Eldorado, among other uses, is incorporating the CD 200 in a small business computer system it markets. In this application, the 200 replaces a Microdata mini.

Eldorado likes the 16-bit 200 well enough to have hired Richard Pasternak, who was Computer Development's vice president, engineering, and to keep Roessl on the payroll on a consulting basis. And there's a slim possibility Eldorado will get involved in the resurrection of Computer Development Corp. to fulfill that firm's original oem selling goals. Leigh Brite, Eldorado president, says such thoughts have been discussed on "a very preliminary basis."

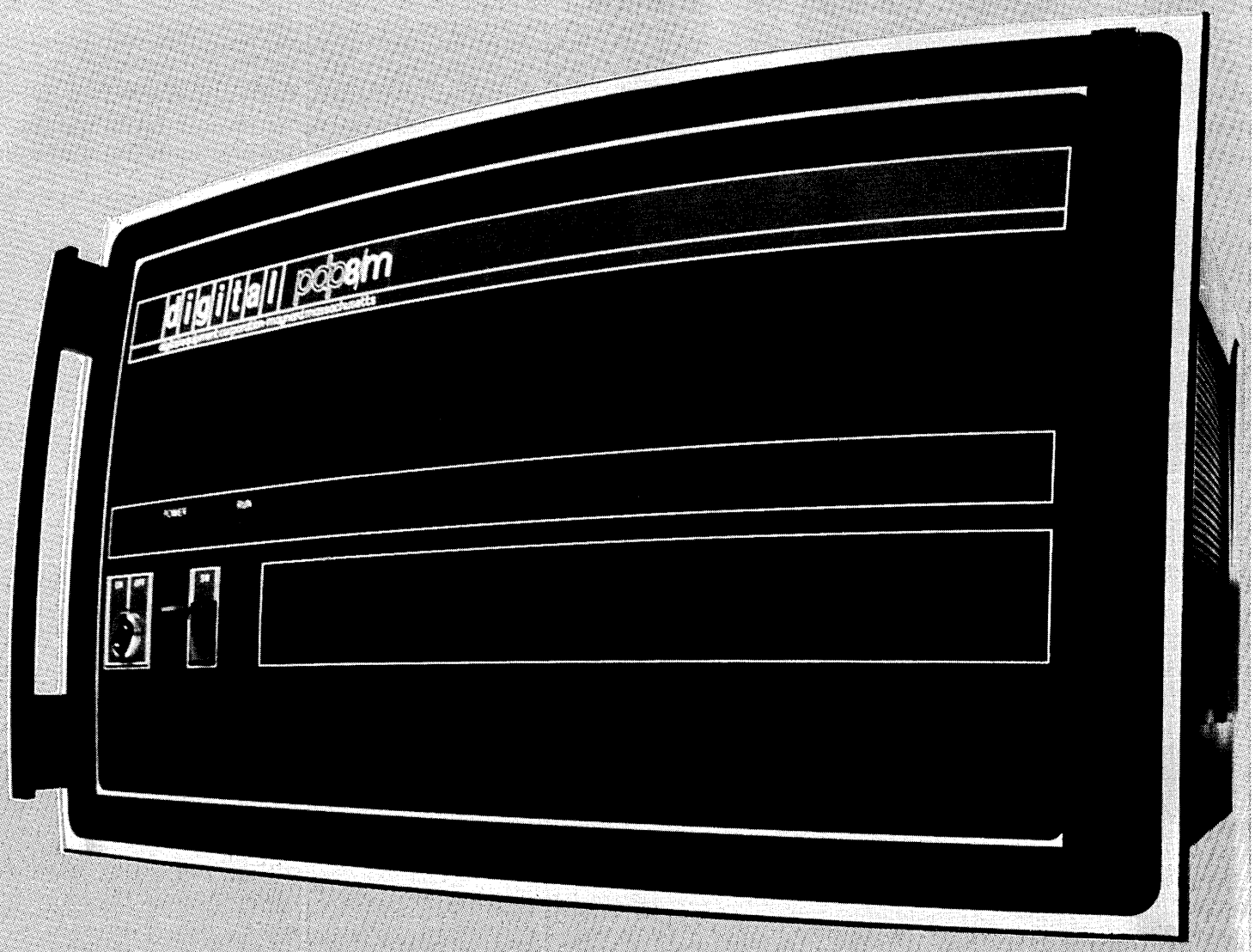
Denny's Minicomputer Ordered, to Go

Few small firms attempting to bring their first product to the market place have survived the economic famine of the last two years, but Omnus Computer Corp. of Santa Ana, Calif., not only has survived it, it has moved into larger production facilities as well. Originally Omnicomp Computer, the firm's unique minicomputer (July 70, p. 140) has its first customer, the Univ. of Calif. at Irvine, where software development will be done for using the Omnus-1 as a front-end processor for 64 terminals talking to the school's Sigma 7. "We've found that while the budgets of many potential customers dried up during the last two years, their applications haven't, and now they're coming back to us," says president Allen Shapiro. Of course, with lettuce from some of the Denny's restaurant chain principals behind him, Shapiro could afford to be bullish.

SHORTLINES

Though the freeze is on for price raising, price cuts aren't restricted; and Hazeltine Corp. is in there with a cut in the rental price of its 2000 crt terminal from $108 to $88 per month effective in August ... Telex Corp. followed up a temporary injunction issued by a district court in Tulsa prohibiting Information Storage Systems, Inc., and its new parent, Telex Corp., from marketing its double-density disc storage subsystems with announcement it would actively market ISS 5625s and 5650s in the North American IBM end-user market ... Randolph Computer Corp., Greenwich, Conn., formed a computer equipment financing division to handle special financing programs for independent peripheral producers and other independent manufacturers in the industry ... Diebold Computer Leasing, Inc., acquired Rathmines Midland Finance Ltd. through its wholly owned subsidiary, Diebold Computer Leasing Ltd.... Livermore Data Systems, Inc., Livermore, Calif., has acquired the mobile telephone product line of SCM Corp., formerly marketed and manufactured by Melabs Inc., an SCM subsidiary in Palo Alto, Calif. ... Computer Sciences Corp.'s European organization, Computer Sciences International, provided the software for what it describes as "the world's first real-time automated air cargo handling system," which began operations in August at Heathrow Airport. ■

Introducing the



On your left, the 12-bit PDP-8/M. On your right, the 16-bit PDP-11/05. Our brand new additions to the world's most popular families of minicomputers.

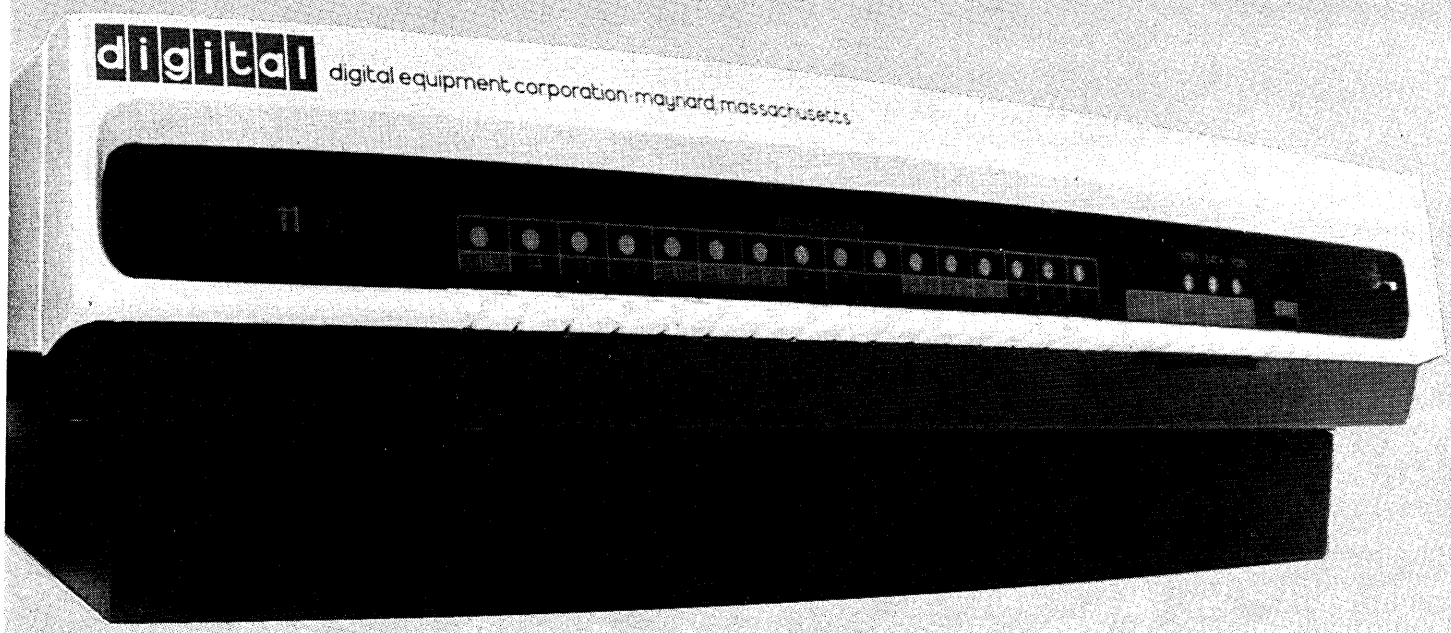
Complete computers — at incredibly low prices. Like $3,069.00 for the 11/05, and $2,362.00 for the 8/M in quantities of 100. Even the discount schedule is new. Very attractive.

In addition, they're compatible with the rest of the family members. Their options. Their peripherals.

They have the features of their bigger brothers. And, a full instruction set. OEM-oriented architecture. Both the UNIBUS™ architecture of the 11/05 and the OMNIBUS™ architecture of the 8/M permit easy, flexible configuring and interfacing. Real pluses for the OEM.

They're built with the kind of reliability that comes easy after delivering over 11,000 minicomputers.

OEM Yardsticks



And, they're supported with more field backup than you can get anywhere else. Worldwide.

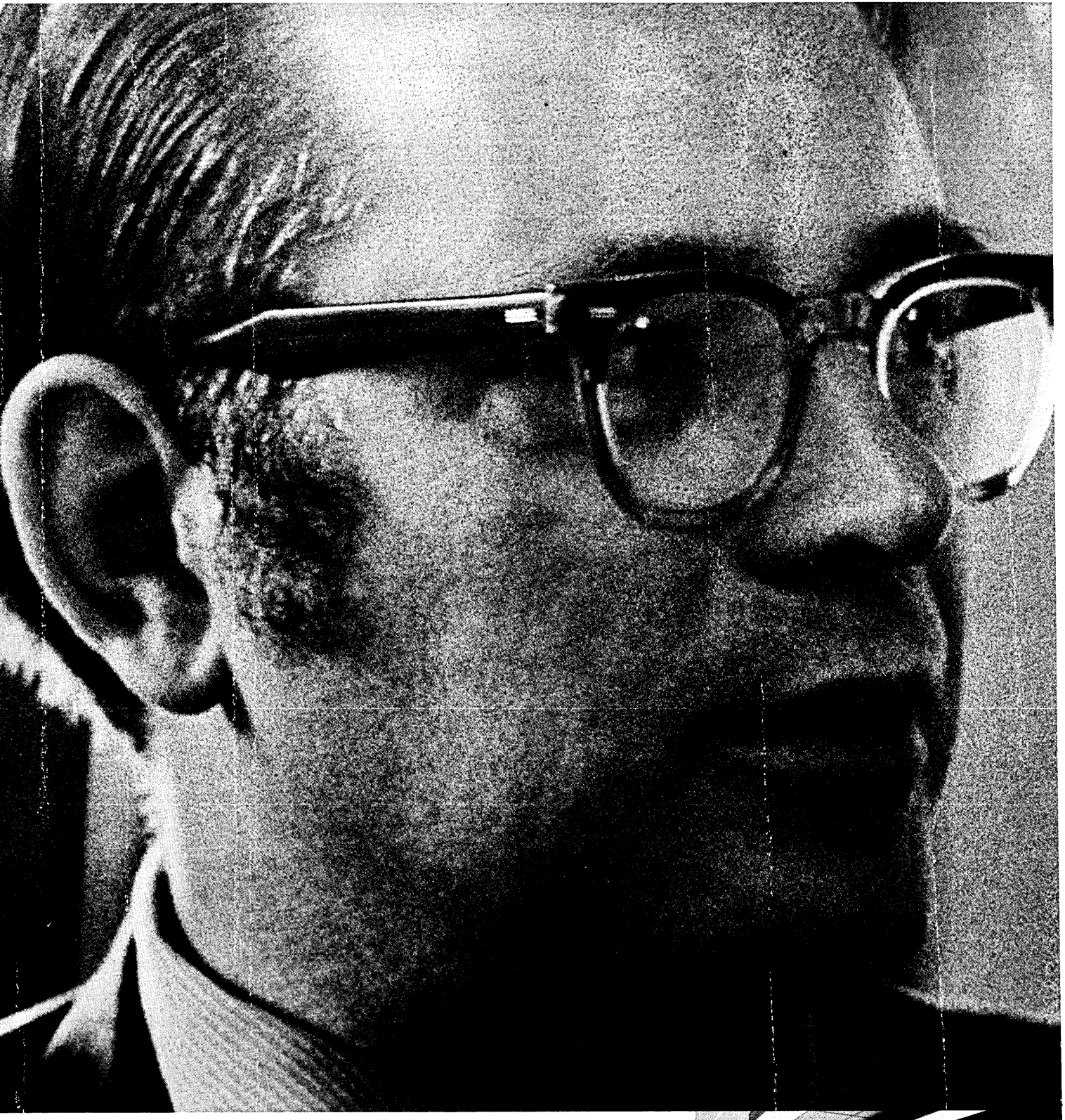
PDP-11/05. PDP-8/M. Designed for the OEM. Priced for the OEM. Choice for the OEM. From the leader in OEM computer applications.

Now there's a whole new set of standards to measure up to.

Write for more information. Digital Equipment Corporation, Main Street, Maynard, Massachusetts 01754, (617) 897-5111.

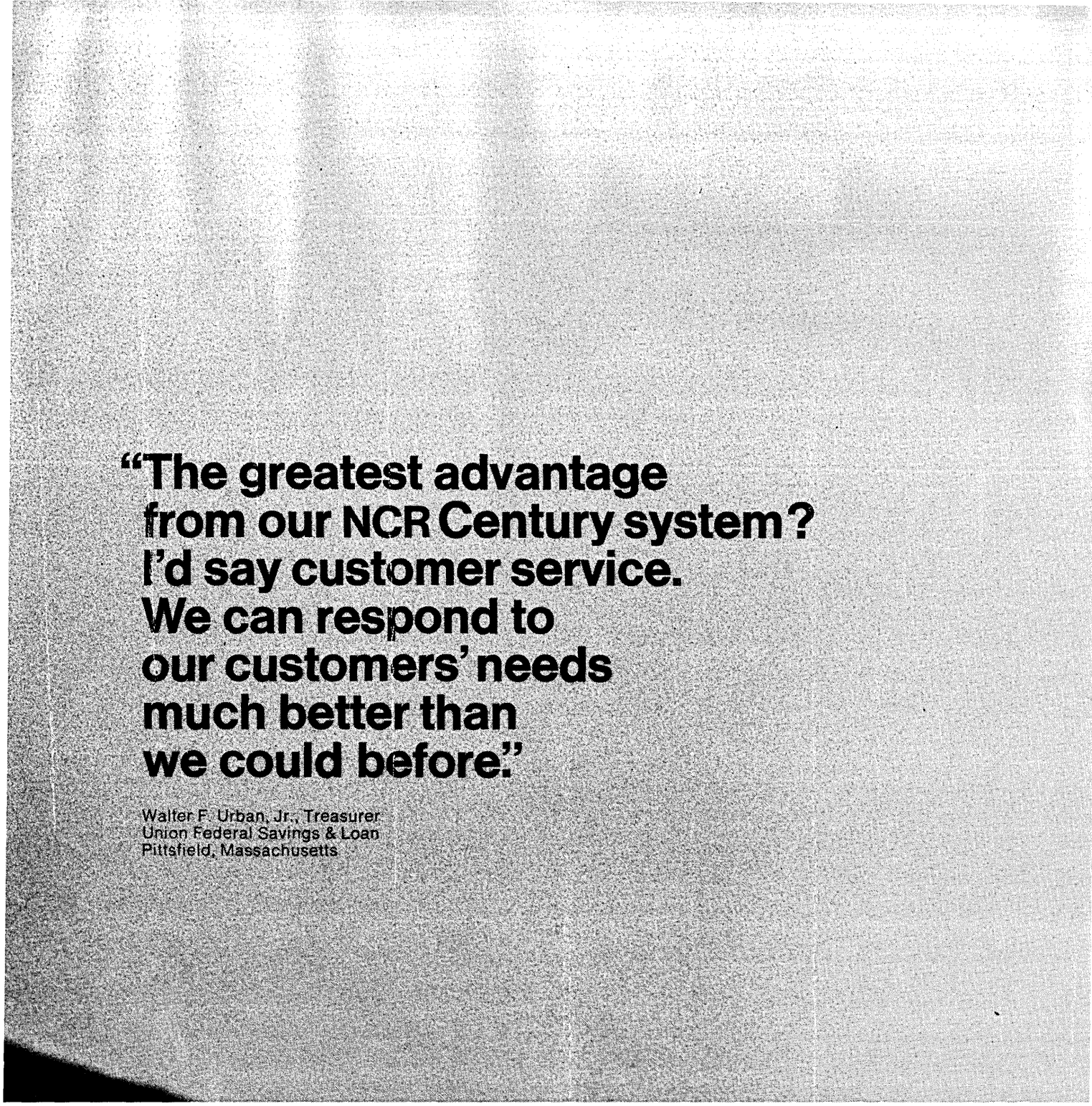
digital

CIRCLE 20 ON READER CARD



Anticipating the future needs of Union Federal Savings & Loan, Treasurer Walter Urban began studying on-line computer systems back in 1968. With five offices and assets of $170,000,000, Union Federal, headquartered in Pittsfield, Mass., is now the second largest savings & loan in Massachusetts. "We couldn't have survived with our old system, not with over 50,000 accounts and four of our branches fifty miles away," says Mr. Urban. "We looked at the systems available and selected NCR because NCR had what we liked. The NCR Century had the performance we wanted at the best price, and, from past experience we knew NCR gave excellent support."

Union Federal's ten different types of sav-



ings accounts are all on-line. Mortgages will soon be next, followed by the rest of their loan programs. And their NCR Century 200 is getting out the quarterly and year-end reports in a fraction of the time it used to take.

The system also helps make Walt Urban's job easier by providing him with more up-to-date information than ever before. "I now get all the information I need to immediately evaluate problems and make the necessary recommendations."

The NCR Century system is helping to keep Union Federal's customers better informed about the state of their accounts. "We now send out monthly account statements, something we couldn't do before because of the time and manpower it would have taken. And the system automatically sends out dividend notices, quarterly checks to customers who withdraw their earnings, quarterly statements to certificate accounts and automatically makes transfers from one account to another.

"If a customer has any questions about his account, we have all the information immediately available to quickly straighten out any problems. In short, we're able to give our customers much better service."

Want to know how your customers and your business can benefit from an NCR Century system? Call us today. You'll find out why now, more than ever, NCR means computers. And terminals.

NCR
Computers
& Terminals

CIRCLE 30 ON READER CARD

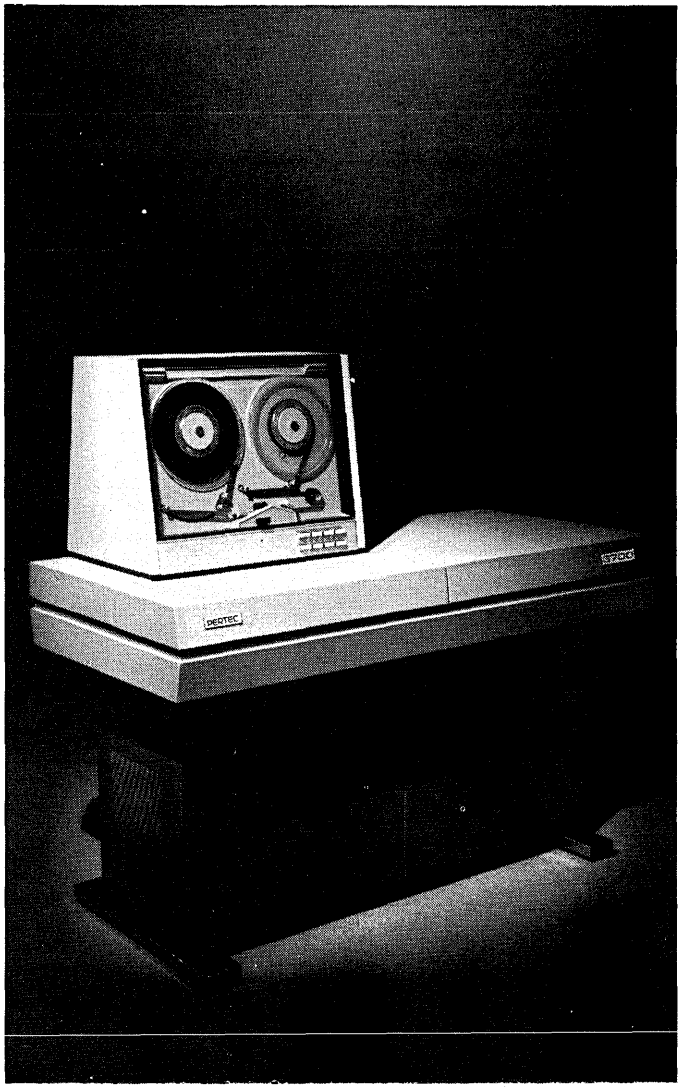
PERTEC GETS BEHIND PTI AND A GREAT NEW COM IS BORN. THE PERTEC 3700.

Pertec is one of the big guys in computer peripherals.

And now we've added our strength to the COM experience of Peripheral Technology, Incorporated. The result is the new Pertec 3700 Computer Output Microfilmer.

The new Pertec 3700 will take IBM 360/370 and many other print tapes and output on to 16mm microfilm or 105mm microfiche. It does it faster, cheaper and more reliably than any other COM available. And Pertec makes it easy for you with a variety of leasing plans. Some as low as $850 per month.

The Pertec 3700 microfilm output is 20 times faster and 500 times more compact than paper printouts. You'll get faster



turnaround, easier data handling, automatic retrieval capability, forms printing and total microfiche management. The system has a throughput of 150 to 500 pages per minute.

Pertec has set up a worldwide network of customer service and applications support. We'll get your system operating faster. And keep it operating longer. In one customer's installation, the system has operated over 4 million frames without hardware downtime.

Find out more about the new Pertec 3700 COM and the company behind it. Write today. Pertec Business Systems, 17112 Armstrong Avenue, Santa Ana, California 92705. (714) 540-8890.

PERTEC

CIRCLE 27 ON READER CARD

PRODUCT SPOTLIGHT

Computer Series

The mention of Digital Equipment Corp. or its PDP product line makes most people think "minicomputer." One forgets—or never knew about—the PDP-10, a machine with roughly the punch of a 360/50 and termed by one customer as the best-kept secret in the computer industry. Apparently its builders agreed, for a name change accompanies the announcement of five medium- to large-scale machines based on the PDP-10, but now called DECsystems. Pricing, availability, and marketing strategies were covered last issue (p. 42), so here are some technical details.

All systems have the following in common: A 1-usec memory that has four-way interleaving at and above the 64K level, yielding performance that makes the memory look like it runs at 250-300 nsec, it is claimed. Also, the user can define what he wants the "byte" or word to look like, so the 36-bit word length can also be defined as five 7-bit bytes, or two 18-bit words, or any other length one wants. The cpu operates asynchronously with the memory and performs 2's-complement and binary arithmetic. All the math is done with hardware, including floating-point and double-precision calculations.

The three smaller systems, 1040, 1050, and 1055, use the PDP-10 processor—the 1055 has two of them—and up to 256K of memory. There are 16 general-purpose IC registers available to the user, and 366 instructions, including interregister instructions. Up to 128 devices can hook up to the I/O channel which has a bandwidth of 1.2 megawords.

The hardware really starts to get interesting with the upper two systems. The 1070 and 1077 both make use of a new processor, with the 1077 getting two of them. Other characteristics of these models are similar, with virtual memory, instruction look ahead, 4 megawords of on-line core, and 11 million words on the swapping drums. Available to the user here are 48 registers and 375 instructions. A complete selection of peripherals is available for attachment to the I/O bus—and this one has a rate of 4 megawords.

Software includes a monitor for controlling simultaneous batch, remote batch, t-s, and r-t modes in FORTRAN IV, ANSI COBOL, BASIC, ALGOL, and SNOBOL. There's a large application program library, and sorts and RPG programs are offered, too. All in all, interesting entries into a very competitive market place. DIGITAL EQUIPMENT CORP., Maynard, Mass. For information:

CIRCLE 521 ON READER CARD

PDP-11 Memory Expansion

Any computer model with a significant population is fair game for the plug-to-plug equipment builders, and this manufacturer apparently found the growing number of PDP-11 users too much to resist. Offered to them is a plug-to-plug compatible memory expansion up to 64K. An added benefit to hooking up the 8000 system is the claim that the cycle time of the mini will drop to around 500 nsec when the 8000 is used as a replacement for all of the PDP-11 memory. Increments of 4, 8, or 32K words are available, with 64K offered at a low $24K for two 32K modules. NEMONIC DATA SYSTEMS, INC., Denver, Colo. For information:

CIRCLE 513 ON READER CARD

Commo Controller

It seems unfair to call some products multiplexors when they can replace other communications gear, too. That's certainly true of the CM16 multiplexor, which has already been used as a 2701 replacement in a service bureau. The unit accepts asynchronous data transmission in seven switch-selectable speeds ranging from 74.2 to 1200 baud and presents it to the host computer in parallel form. Up to 16 terminals with RS-232C-compatible interface specs running in half- or full-duplex modes are accommodated by the CM16. The unit is primarily offered to oem's, with prices ranging from $2980 (a one-port unit) up to $5K for 16-line capability, but the vendor offers to develop the supporting software for an end-user installation. Delivery for the CM16 is 60-90 days ARO. OCTAL SYSTEMS, INC., Fort Worth, Texas. For information:

CIRCLE 518 ON READER CARD

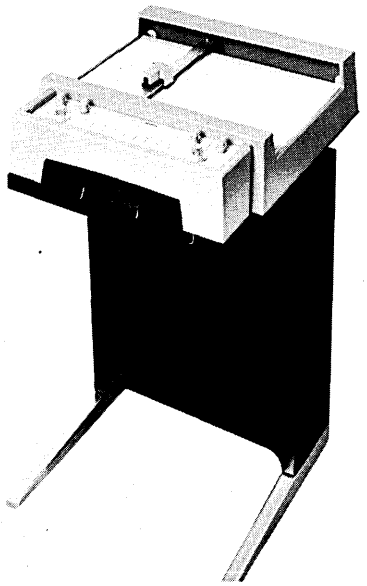
Ruggedized Tape Unit

"Quasi-Milspec" probably best describes the model 90 buffered mtu. It doesn't pass military specifications across the board, but the vendor claims that a lot of the techniques learned in building equipment for the armed services is used on the 90. The tape unit records 7- or 9-track tape at 200, 556, or 800 bpi at 10 ips. The oem-oriented product has an MOS buffer memory expandable to 1K characters to aid record editing and checking. Units with 160-character buffers, a keyboard, and the drive itself are priced at approximately $8K based on an order of 100 or more. The model 90 will be available early next year. DATA SCIENCE CORP., San Diego, Calif. For information:

CIRCLE 510 ON READER CARD

Graphics Plotter

The 511 graphics plotter is intended primarily for time-sharing applications. It plots at 2½ strokes per second, with strokes up to 3 inches in length, on a 10 x 15-inch plotting area. Input is 8-level ASCII, selectable at 10 or 30 cps, with both RS-232C



and tty interfaces accommodated. Available software includes eight basic subroutines in FORTRAN IV. Prices start at about $3200 with first deliveries in November. GOULD INC., Cleveland, Ohio. For information:

CIRCLE 515 ON READER CARD

Medium-scale Computers

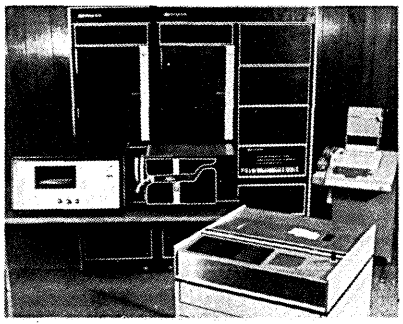
The B 6711 and B 6721 computers constitute a downward extension of the 700 series but include most features of the line and are program compatible. The 6711 is intended as a beginning system for scientific or commercial use, with data management and communications capabilities. Both machines can also operate as satellite computers, and the 6721 is optionally available in a dual-processor configuration. Main memory of both machines cycles at 1.5 usec and is expandable from the basic 384-kilobyte complement to over 1.5 megabytes in 384-kilobyte increments. The cpus operate at 2.5 MHZ. Rental is $13,600 for the 6711 and $13,800 for the 6721; purchase prices are $652,800 and $662,400, respectively. Deliveries begin next June. BURROUGHS CORP., Detroit, Mich. For information:

CIRCLE 519 ON READER CARD

Point-of-sale System

With almost every major manufacturer, and some of the smaller ones as well, eyeing the point-of-sale market potential, one can safely say it'll be a buyer's market for awhile. And here is a young firm that would seem to have a good approach: a complete POS system from the tag maker to the computer support system. The tag maker actually is two units, one for reading tag data from punch cards, and one for encoding the tags both magnetically and in readable form. That should help inhibit tag swappers, and also ease matching the right tag to the correct product.

Research on equipment needed at the actual point of sale concluded that too often there are not enough registers available at peak sales periods, while other times the equipment is little used. The vendor's answer to this problem is a Mini-Register, a portable register with a wand (both for $600, significantly) that can store about 50 transactions before it must be purged, which involves placing it on a full-scale register and pressing a button for data transfer. A two-to-one mix of Mini-Registers to the



standard transaction registers is recommended by the manufacturer, but a user can experiment with that ratio at a relatively low cost to get the mix that works for him. The standard register has a wand, too, plus a locked-in, hard-copy journal. Registers are on-line to the processor for credit authorization checks and data transmission.

The processor does everything from polling the registers and dynamically giving priority to the more active stations to furnishing sales and inventory reports by department, division, and store, plus historical activity profiles for staff planning. Additionally, the computer prepares an 800-bpi 7- or 9-channel history tape for incorporation into the user's other dp programs. The computer portion of the system can range in price from $17-32K. Registers are priced at $3975, and the tag makers go for $4500. First deliveries of the systems are scheduled for February. TRANSACTION SYSTEMS, INC., Palo Alto, Calif. For information:

CIRCLE 520 ON READER CARD

Oem Keyboard

It seems that terminal builders are never satisfied with the keyboards they're using and are constantly in the market for a more reliable technology. Maybe the Citation 600 series is what they're looking for. It uses a light bulb and fiber optics to encode seven-level parallel ASCII code. And though the keyboard is quite a bit different from others, the manufacturer claims that it feels just like a regular keyboard to the user. The DTL/TTL-compatible device requires a 5-volt power supply. The light bulb has an estimated lifetime of 10,000 hours. Pricing is based on 47-key, 65-character models, suggesting that it's cheaper to build a keyboard this way. The price per unit for an order of 100 is $90, dropping to $79 for an order of 1,000. TEC, INC., Tucson, Ariz. For information:

CIRCLE 522 ON READER CARD

Commo Controller

The 732 communications controller is a plug-compatible replacement for IBM's 2701/2/3 data adapter and transmission control units. It operates in systems using BTAM, TCAM, and QTAM, as well as user-developed access methods, without requiring software or hardware modifications. The 732 configuration ranges from a single line adapter to a maximum of 64 adapters, each operating at up to 9600 baud. Prices start at $9618 and $360/month rental for the controller; line adapter prices range from $656-1744 and $35-75/month rental. Deliveries begin early next year. SANDERS DATA SYSTEMS, INC., Nashua, N.H. For information:

CIRCLE 514 ON READER CARD

Synchronous Tape Unit

The model 8700 mtu is a synchronous unit offered in speeds of 10 or 18.75 ips, providing data transfer rates up to 30 KHZ. Information is written and read in NRZI (7-track 200, 556, or 800 bpi, and 9-track 800) and 1600 bpi phase-encoded form. Available as options are gap, check character, and parity electronics. The oem-oriented 8700 can operate without formatters, allowing customers to design their own formatting electronics if desired. Prices drop under $1900 per unit with an order of 100 or more. KENNEDY CO., Altadena, Calif. For information:

CIRCLE 517 ON READER CARD

Oem Minicomputers

Two PDP minicomputers are now specifically aimed at oems and priced accordingly. Called the PDP-8/M and the PDP-11/05, they are priced at $2362 and $3069, respectively, in quantities of 100. A new price schedule permits customers to combine purchases of the new computers for purposes of computing quantity discounts. Single-unit prices are $3690 and $4795. Each machine includes 4K core, plus an operator's console for the PDP-8/M and a programmer's console for the 11/05. Deliveries of the 8/M begin in December, while the 11/05 will appear in the spring. DIGITAL EQUIPMENT CORP., Maynard, Mass. For information:

CIRCLE 502 ON READER CARD

Improved 2770

Improved transmission capabilities have been announced for the IBM 2770 communications system (Sept. '69, p. 197): An additional buffer expansion feature that doubles the capacity of each buffer block to 512 characters is available for $55/month rental or $2420 on purchase. A space compression/expansion feature removes consecutive spaces in transmitted data and reinserts them in received data. This rents for $40/month and sells for $1760. Both will be available in January. IBM CORP., White Plains, N.Y. For information:

CIRCLE 516 ON READER CARD ■

1971 FJCC

COMPUTERS AND THE QUALITY OF LIFE

PRE-REGISTER NOW!

1971 FALL JOINT COMPUTER CONFERENCE

The 71 FJCC, November 16-18, Las Vegas, is one conference you can't aford to miss.

25,000 of your colleagues, customers and suppliers will be there to exchange ideas, discuss problems and renew acquaintances. Approximately 200 exhibitors will display the latest innovations in computer products and services to keep you abreast of new technology and applications. An extensive technical program has been tailored to fill your needs and to appeal to your areas of specialization.

Act now to save $10 on the full conference registration fee and to ensure the housing accommodations of your choice. Your registration material and conference information kit will be waiting for you at the conference. Special booths will expedite admission for all pre-registrants.

COMPREHENSIVE TECHNICAL PROGRAM

The Technical Program will feature 30 sessions grouped into five basic areas: Simulation Systems and Applications, Life and Earth Science Applications, Managerial and Social Science Applications, Programming Systems and Concepts, and Computer Systems and Technology. Sixty-nine in-depth presentations, supplemented by panel sessions, will give you the opportunity to acquire new insights and exchange ideas with leading experts in computing.

EXTENSIVE EXHIBIT PROGRAM

The 71 FJCC will continue the tradition of the Joint Computer Conferences as the world's largest and most diverse exhibitions of computer technology. Approximately 700 exhibit booths in the Convention Center will provide general information, detailed specifications and demonstrations covering the latest developments in products and services.

25,000 Of Your Colleagues And Customers Will Be There . . . Act Now To Join Them

$10 SAVINGS FOR PRE-REGISTRATION

Pre-registrants will save $10 on the full conference registration fee. To pre-register, your registration forms and accompanying check *must* be received by October 29. Registrations received after this date will be returned to the sender.

KEYNOTE ADDRESS AND LUNCHEON SPEAKER

The conference will open with a Keynote Address by Dr. Arthur G. Anderson. Dr. Anderson recently completed a year as a Visiting Fellow at the Center for the Study of Democratic Institutions, and is currently Vice President and Director of Technical Assessment for IBM Corp.

The Conference Luncheon will be highlighted by the presentation of the Harry Goode Memorial Award and a featured address by Dr. Frank Ryan, Director of Information Services for the United States House of Representatives and former professional football celebrity.

EXHIBITS - ONLY REGISTRATION

A $10 exhibits-only fee will be available all three days of the conference. Although such registration cannot be made in advance, you can ensure accommodations of your choice by mailing the housing form with your accompanying deposit.

NOVEMBER 16-18 * CONVENTION CENTER * LAS VEGAS, NEVADA

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ADDRESS

CITY-STATE

Number of days attending the conference

☐ One ☐ Two ☐ Three

ADVANCE REGISTRATION FORM (Please enclose check payable to 71 FJCC)

Occupation (Check one only)

1 ☐ Engineering
2 ☐ Research & Dev.
3 ☐ Management/ Administration
4 ☐ Consulting
5 ☐ Teaching
6 ☐ Sales/Application Engineering
7 ☐ Systems & Procedures
8 ☐ Programming Applications
9 ☐ Student
10 ☐ Other

Areas of Interest (Check all applicable)

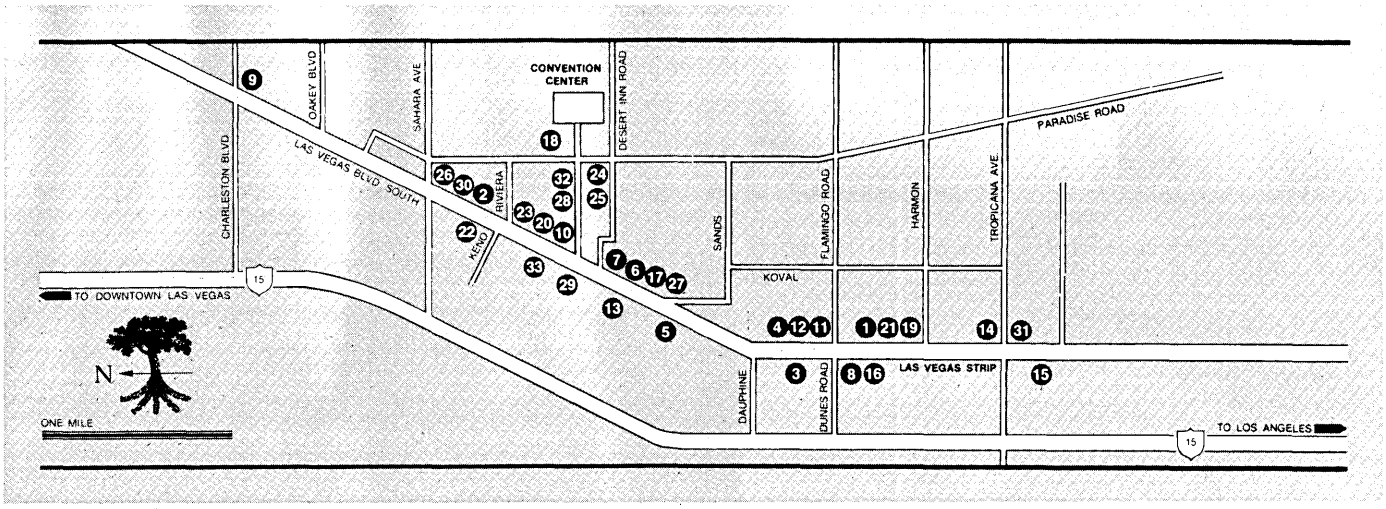
1 ☐ DP Management
2 ☐ Software
3 ☐ Scientific Applications
4 ☐ Business Applications
5 ☐ Information Retrieval
6 ☐ New Computer Systems
7 ☐ Time Sharing Systems
8 ☐ Data Communications
9 ☐ I/O & Display Devices
10 ☐ Memories & Circuits
11 ☐ Social Implications
12 ☐ Education & Training

Fees

Member 20.00

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 50.00
☐ Full-time Student/ Military in uniform 5.00
☐ Luncheon 7.00
Total



FOR FURTHER INFORMATION...

For additional information on the 71 FJCC, including details on the Conference Technical Program write: AFIPS, 210 Summit Avenue, Montvale, New Jersey 07645.

HOUSING ACCOMMODATIONS

Select your hotel from the list below and mail your request early to ensure the accommodation of your choice. Please list six hotels in order of preference. A deposit of $20 per room must accompany the housing form.

MAP NO.		ROOMS SINGLE	ROOMS TWIN/ DOUBLE	PARLOR SUITES 1 BEDROOM	PARLOR SUITES 2 BEDROOMS
	STRIP HOTELS				
1	Aladdin		18		
3	Caesars Palace		20-24		
4	Caravan Travelodge	15	17-19		
5	Castaways	16	18		
6	Colonial House		19		
7	Desert Inn		15-29		
8	Dunes	18-28	20-30		
11	Flamingo	18-26	18-28	30-53	70-80
13	Frontier	16-24	16-26	45-95	
15	Hacienda		17		
16	Holiday Inn of Las Vegas		21		
18	International	18-30	18-30	48-79	66-109
23	Riviera	16-24	22-32	50-95	
24	Royal Inn of Las Vegas	20	22-26	50	75
25	Royal Las Vegas	15-16	17-21	45	66
26	Sahara	16-26	18-29	40-75	
27	Sands	16-20	19-23		
29	Stardust	12-28	12-30	35-65	75-90
30	Thunderbird	20	20	40	75
31	Tropicana	18	20	41-137	
	DOWNTOWN LAS VEGAS HOTELS				
34	Mint	16	18		
35	Orbit Inn Motel	14	16-20		
36	Showboat	12-15	13-22		
	STRIP MOTELS				
2	Algiers	14-16	16-18		
9	Eastward Ho		14-22	18-22	
10	El Morocco Motel	16-20	16-20	50-65	
12	Flamingo Capri	14	16-18	25-28	
14	Golf Club	12	14-16		
17	Imperial '400'	14-15	18-19		
19	Jamaica	16	18		
20	La Concha	16-20	16-20	35-50	
21	Las Vegas South Travelodge	17	17-19		
22	Las Vegas Strip Travelodge	17	17-19		
28	Somerset	16	16		
32	Villa Roma	15	15-17		
33	Westward Ho No. 8	13	15-17	31	

NOTE: The above hotels/motels will not accept Saturday arrivals and departures. Hotels subject to 5% occupancy tax. Motels subject to 4% occupancy tax.

MAIL THIS FORM TO:
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1971 FALL JOINT COMPUTER CONFERENCE
P.O. BOX 14006
LAS VEGAS, NEVADA 89116

Please make reservations listed below. I understand that reservations for bedrooms or multi-room suites must be accompanied by deposits of $20.00 per room. A check made payable to AFIPS Housing Bureau is enclosed.

Confirm reservations to:
(Please Print or Type)

Name _____ Telephone No. _____

Company _____

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HOTEL/MOTEL PREFERENCE	NAMES OF OCCUPANTS
1st	1
2nd	2
3rd	3
4th	4
5th	5
6th	6

TYPE OF ACCOMMODATIONS:

Single occupancy, rate to range from $____to $____per day.

*Double bed, double occupancy, rate range from $____to $____per day.

*Twin beds, double occupancy, rates to range from $____to $____per day.

Suite (with Parlor) of ___bedrooms, rate range from $____to $____per day.

* 2 Names must be listed above

ARRIVAL AND DEPARTURE DATES:

Arrival Date November _____, 1971 at_____a.m./p.m.

Departure Date November _____, 1971 at_____a.m./p.m.

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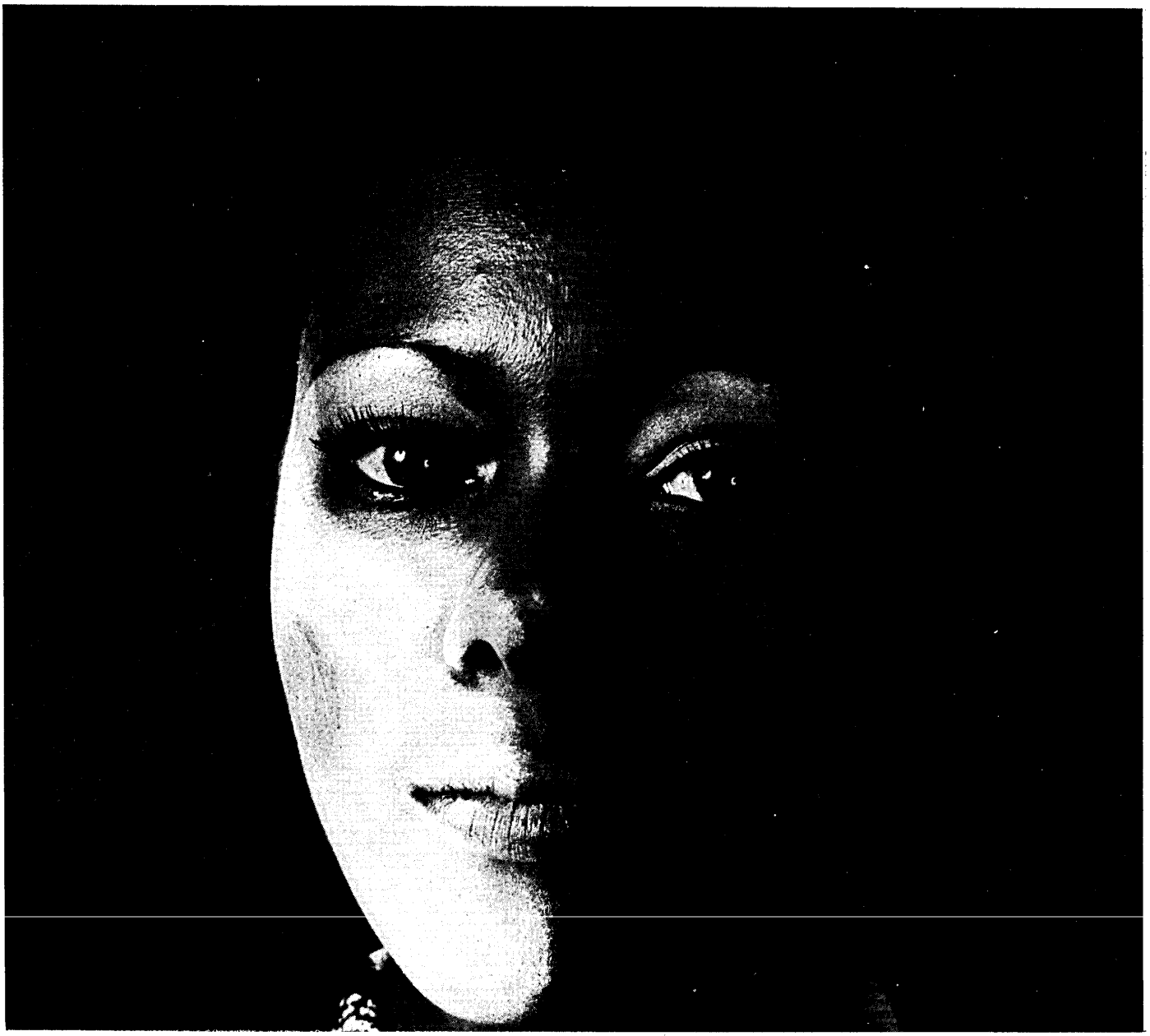
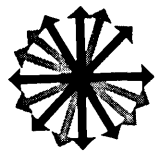




SOFTWARE

Program Analysis

Analysis of the coding efficiency of programs running on CDC 3300 and 3500 series computers under the MASTER operating system is now being offered with the CPPE package. The first part of the package is a program that runs alongside the user program being evaluated, requiring no changes to the program. This COMPASS program requires four quarter pages of memory for "taking notes" on what the subject program is doing.

The second part of CPPE is a COBOL program requiring 86 quarter pages to analyze parts of the subject program in an attempt to pinpoint whether run time was due to instruction execution, waiting for resources, or waiting for event completion. The user then can possibly recode those program parts that take a disproportionate amount of time. The price is $8800, including installation, technical support, documentation, and the object deck. Several leasing plans are also available. BOOLE & BABBAGE, INC., Cupertino, Calif. For information:

CIRCLE 504 ON READER CARD

Fortran Compiler

A FORTRAN compiler that is claimed to be 10 times faster than E level FORTRAN IV is available for System/360 DOS Version 3 users. It runs on models 25, 30, or 40, and requires 48K of memory. The compiler is said to output full text diagnostic messages, eliminating cross-referencing. The package includes an object deck and user manual and is available on a 30-day trial basis. The rental is $85/month with 30-day cancellation privileges. NANODATA CORP., Williamsville, N.Y. For information:

CIRCLE 501 ON READER CARD

DOS Printer Spooler

Mini-GRASP is related to the GRASP spooling package recently introduced to this country (Aug. 15, p. 57), but it is optimized to control only 360-compatible printers. Features such as back spacing of printout and wrap-around disc storage have been retained, but the core requirement and pricing structure came in for some scaling down: 4K bytes and $216/month on a month-to-month basis. The rental includes an object deck, documentation, and support. SOFTWARE DESIGN, INC., El Segundo, Calif. For information:

CIRCLE 506 ON READER CARD

DEC Faster Fortran

Speed doesn't necessarily kill. At least not in the case of this improved version of FORTRAN IV, which, the vendor says, executes some programs 11 times faster than the PDP-15's existing FORTRAN language. In many cases, the improved capability takes advantage of the machine's new floating-point hardware. A user must have a PDP-15, of course, and he must also have a minimum of 16K memory and a disc for the new FORTRAN IV. DIGITAL EQUIPMENT CORP., Maynard, Mass. For information:

CIRCLE 525 ON READER CARD

Analysis and Planning

Management Analysis and Planning is a parameter-generated system that permits the user to generate reports tailored to his own needs. In an effort to simplify use and reduce costs, it does not include interrelated network reports such as PERT; instead, most reports are on a call basis. Features include project status reporting to pinpoint trouble spots; analysis of planned, actual, and forecasted status of projects; and management summaries of projects. The program is written in COBOL and runs in a 40-50K partition under 360 OS or DOS. The price is $6K. VITAL COMPUTER SERVICES INTERNATIONAL, INC., New York, N.Y. For information:

CIRCLE 509 ON READER CARD

Library Maintenance

The Pryor Random Indexed Service Module maintains a library on a monthly, weekly, or daily basis with only one pass required. Any type of record can be read, stored, or reworked, including line data, source and object decks, with or without job control statements. PRISM runs at I/O on any System/360 model 30 or up under DOS. Using a 2311, 19K core is required, and 4,338 index entries can be stored. For a 2314, 8,256 may be stored and 22K core is required. The price is $1600 for three years. PRYOR COMPUTER SOFTWARE CORP., Chicago, Ill. For information:

CIRCLE 507 ON READER CARD

Teleprocessing Monitor

The Teleprocessing Master Control Program is a telecommunications monitor designed to meet all t-p front-end requirements. It is written in BAL, utilizes BTAM, and requires at least a 360/30 with 64K of memory, though core requirements vary depending on individual requirements. The monitor allows up to seven applications' subtasks to run asynchronously. It supports serially reusable, nonreusable, reentrant, and/or self-relocating application programs written in BAL, COBOL, or PL/I. All IBM-compatible terminals are supported. The price is $18,500. AUTOMATED FINANCIAL SYSTEMS, INC., Bala Cynwyd, Pa. For information:

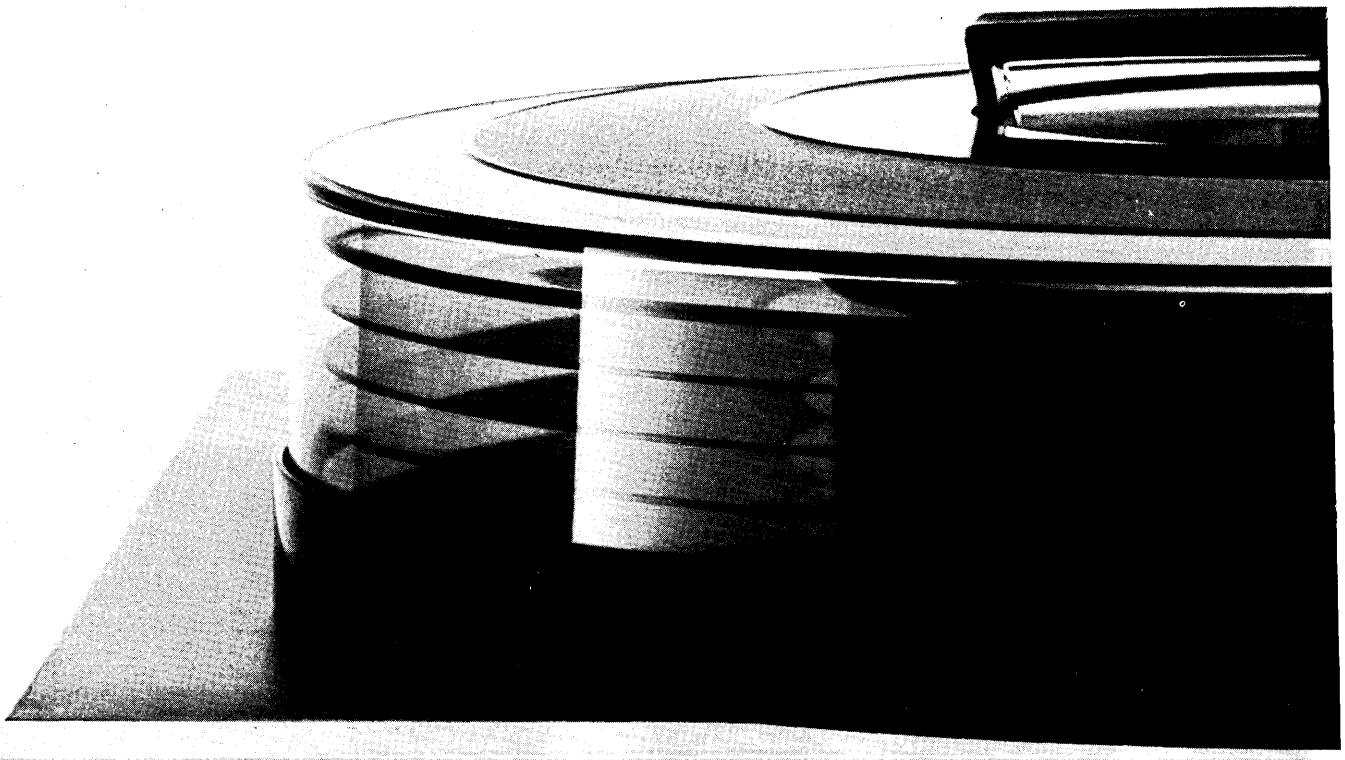
CIRCLE 508 ON READER CARD

General Ledger

Large-scale doesn't apply to the size of this COBOL general ledger and forecasting program, but it certainly does apply to its capabilities. More than 2,500 separate companies, with multiple levels of management responsibility reporting, are said to be handled by the program; and each company can determine its own chart of accounts without range of sequence restrictions. With such capacity, the program in this form is probably more suitable for banks and service bureaus than smaller businesses, but smaller versions of the program were previously announced. Input parameters allow the bank or service bureau to selectively charge customers different rates on a price-per-report/price-per-unit transaction, charge-per-detail line, or minimum charge basis. Thirteen accounting reports are produced, including P/L forecasting for the current month and to end of year. The price of $12,500 includes the 32K program, 40 hours of on-site assistance, and supporting documentation. ANCOM SYSTEMS, Los Angeles, Calif. For information: ■

CIRCLE 503 ON READER CARD

Varian launches the software revolution



varian data machines

VORTEX: a real-time operating system built to match and enhance the speed capabilities of the 620f. Hands down, it is the most powerful minicomputer package you can buy. The 620f is the minicomputer definition of "fast"; not just memory cycle time, but in total speed, the combination of memory cycle time, address modes and instruction set. And VORTEX takes it from there.

It's a perfect balance of foreground and background, real-time and batch. A rich implementation of a real-time system with a major enhancement of file management system and program preparation in background. Overlay capabilities provide background and foreground program with virtual memories in excess of 32,000 words. And VORTEX incorporates every salient feature of MOS, our powerful Master Operating System.

VORTEX partitioning of core and disc memories provides a floating balance between foreground and background according to need. Even in its minimum configuration, the 620f/VORTEX system is tremendously powerful and has strong competitive advantages over much more expensive computers; systems such as IBM 1800, CDC 1700 and XDS Sigma 3. In minicomputers, no one else even comes close.

Look into VORTEX. It is the most important development in minicomputer operating systems since programs moved out of hard wiring. Our literature packet will show you how and why. Send for it. And stay ahead of the revolution. Varian Data Machines, 2722 Michelson Drive, Irvine, California 92664. (714) 833-2400

CIRCLE 1 ON READER CARD

620/f

2. On page 53, third column, next to last paragraph, the article states, "He has claimed to be a member of IEEE, but no record of his membership exists. He said he was a longtime director of the Los Angeles Chamber of Commerce, and that group hasn't heard of him either." The truth is that Dr. Marchuk has never stated that he has been a member of IEEE, but he has stated that he has been a guest speaker at IEEE conferences; and Dr. Marchuk has never stated that he has been a director of the Los Angeles Chamber of Commerce, but he has stated that he was a member of that organization.

3. On page 53, first column, second paragraph, the article states, "Marchuk for some six months (one visit every other week according to PI president Konrad Schoebel) has been interested in buying a quantity of PI's Unicorns(sic)." The truth is that Dr. Marchuk has made only one visit to Precision Instrument Co., and no visits were ever made by his agents or representatives, and Dr. Marchuk was not interested in Precision Instrument's products after his first and only visit and a review of their specifications.

4. On page 53, first column, next to last paragraph, the article states, "IBM, he says, was not one of the firms talking licensing but was one of those interested and has submitted rfq's for three systems. An IBM spokesman was unable to confirm or deny this but noted it is against IBM policy to issue such rfq's." The truth is that Dr. Marchuk received RFQ No. 06653 dated September 3, 1970, for three laser computers from IBM, Poughkeepsie, New York, signed by C. Daniels.

Your article uses every trick and device to libel and destroy Dr. Marchuk. You have stated untruths, as pointed out above. You have used false information, as pointed out above. You have included derogatory remarks of others but have not had the decency or fairness to identify the other person. For example, on page 53, third column, third paragraph, the article states, "Someone who did in a company he approached but which didn't hire him described him as 'capable in details below the general knowledge but without the depth of knowledge which would enable him to contribute anything to us'." What a brave way to attack a man! How can Dr. Marchuk be expected to meet the remarks of a nameless and faceless person, perhaps one who never existed. You have attacked Dr. Marchuk by the device of guilt by association, or I should say, guilt by far fetched resemblance. On page 53, second column, second and third paragraphs, the article states, "This is somewhat reminiscent of Viatron Computer Systems Corp., which in launching its ill-fated venture, etc." This tactic seems to me to be journalism of the lowest order. In the case of a new company of any type, computer or otherwise, there can always be found similarities with a company somewhere that was not able to make a go of it. All in all, the article was replete with innuendos and implications attacking Dr. Marchuk's competence, scientific ability, integrity, honesty, and credibility.

It appears that the entire article was presented for the sole purpose of destroying Dr. Marchuk and the Laser Computer Corporation at its inception. The article contains twenty-four paragraphs, and twenty of them contain untruths or derogatory statements. We can rightfully wonder why you are so intent on destroying this new company which could become serious competition for the present large computer firms. Why are you afraid to allow this new computer to be developed and to compete? It appears there are ulterior motives which should be investigated.

An interesting note is that prior to the release of the article your Article Editor contacted Mr. Alex Darsen of Laser Computer's advertising agency, and warned him that unless Dr. Marchuk gave DATAMATION more information on the Laser Computer and on himself that the Editor would run an article about Dr. Marchuk that he would not like and implied that it would be damaging to him. The threat was carried out, and the article has severely damaged Dr. Marchuk's reputation and has threatened his ability to proceed to the final marketing of the Laser Computer.

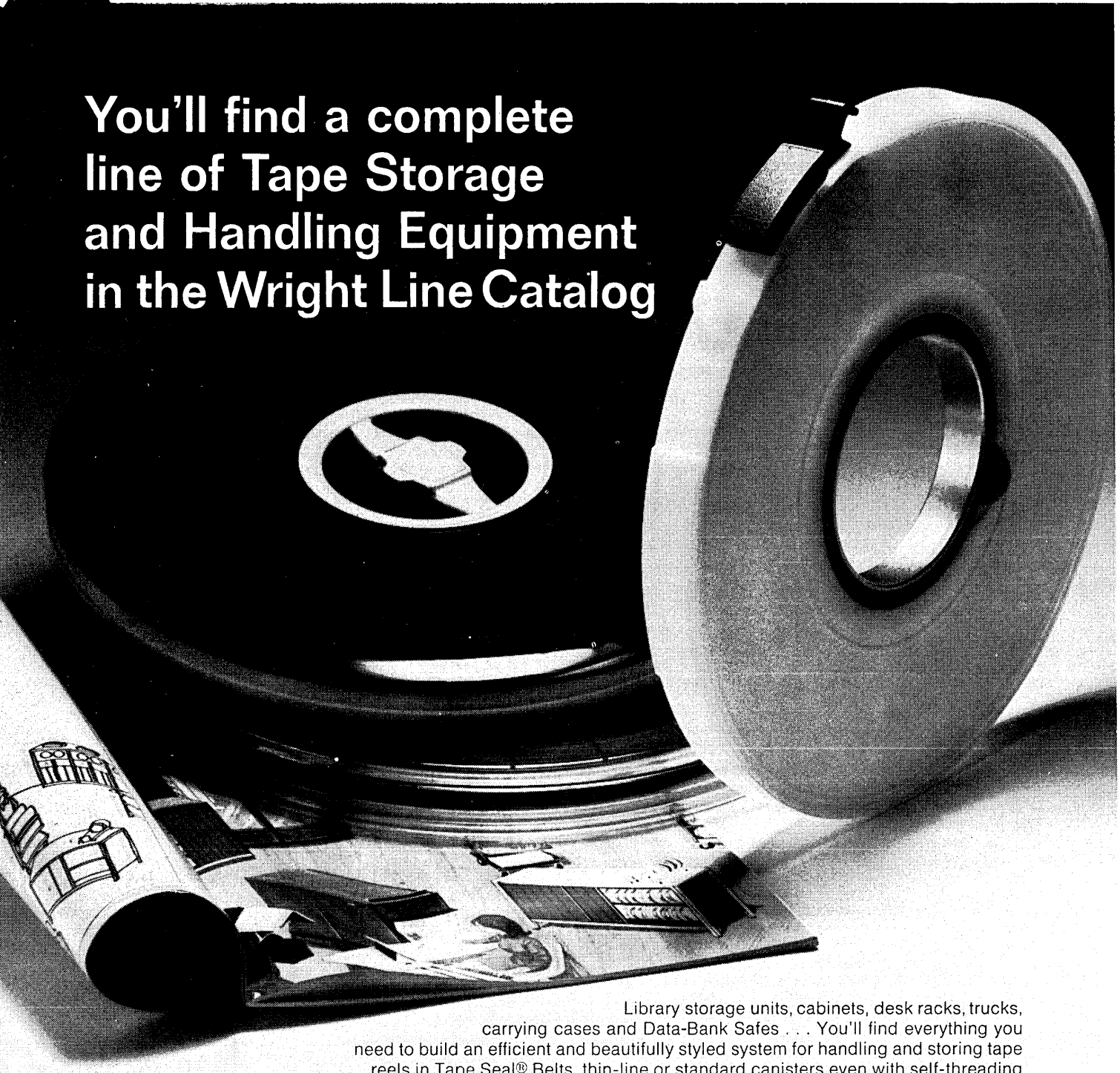
HARRY R. CARLTON
Newport Beach, California ■

DATAMATION welcomes correspondence about the computer industry. We reserve the right to edit letters submitted.

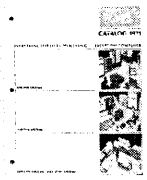
PEOPLE

John C. Young has been named president of Computer Sciences Corp.'s Custom Systems Div., Silver Spring, Md., which is engaged in the design and development of automated off-track wagering systems. Prior to joining CSC, Young was president and chairman of Time Sharing Terminals, Washington, D.C. . . . Recent promotions at Burroughs Detroit HQ: **Donald E. Wagner,** formerly director of accounting systems, is now director of general products and systems, responsible for program management of the firm's commercial minicomputers, accounting systems, calculators, adding machines, and cash registers. **Robert F. Werling,** who had been product manager of edp systems in the company's International Group, has been appointed director of electronic data processing systems with responsibility for program management of all computer systems, as well as memories, special systems, and advanced systems planning. **James G. Searls,** most recently product manager for data preparation and data collection devices, has been named manager, edp business planning and peripheral products, in the Business Machines Group. And on-line revenue team manager **Robert S. Scheidemantel** is now manager, on-line financial market development, for BGM . . . Following the resignation of **George O. Harmon,** one of the founders of Comma Corp., New York-based independent computer maintenance company, **Richard K. Puder,** another founder, was elected president . . . **Martyn A. Lewis,** former president of Advanced Peripherals, Inc., Van Nuys, Calif., is the new vp of engineering at Ovonic Memories, Inc., recently formed in Los Angeles to manufacture a multibillion-byte disc memory system using ovonic materials. For those not yet into ovonic materials, they are "amorphous semiconductors upon which a laser can be used to write/read/and erase, thus allowing greater storage density than conventional magnetic storage systems." . . . **Dr. Eugene M. Grabbe,** former manager of technology planning and director of international computer operations at TRW Systems Group, has been named to head the new Hawaii State Center for Science Policy and Technology Assessment. The center, funded by an NSF grant and matching state funds, will support a pilot program to survey Hawaii's scientific and technological resources in an effort to establish priorities for state science policy. It also will be supportive to the Governor's Advisory Committee on Science and Technology and the Office of Environmental Quality Control . . . **Robert E. Carroll** has been elected executive vp of Raytheon Data Systems Co., Norwood, Mass., where he will be responsible for administration, control, and general supervision of company operations. He joins RDS from North American Rockwell Corp., where he had served as vp-administration for the Space Div., Downey, Calif. . . . The two new vice presidents at Lear Siegler's Applied Computer Time Share, Inc., subsidiary in suburban Detroit—**Philip Glazier,** vp of operations, and **J. David Frantz,** vp of marketing—both come from Dialog Computing, Inc. . . . On-Line Decisions, Inc., New York, has elected **Jackson S. Gouraud** as president to succeed **Dr. James B. Boulden,** a company founder, now chairman of the board . . . Vp **Richard D. Boucher** has been appointed general manager of the Memorex Information Media Group. He has been with the company since 1963 and replaces **John P. Del Favero,** who resigned to assume a position in a non(less?)competitive industry . . . **James E. Starnes** has joined RCA's Data Processing Div., as vp, eastern region and government marketing. Starnes comes from Burroughs, where he was director of marketing; prior to that he was president of Computer Usage Co. . . . **William C. Scott** has been appointed a corporate vice president at **Computing and Software,** Los Angeles, with primary responsibility for expansion of the firm's financial services . . . **Frederic J. Creamer III** has been appointed vp in charge of the Los Angeles division of Computer Payroll Co. . . . **Tom Chellew,** formerly systems and programming manager for Philips Electrologica, has taken over managerial control of Asiadata, the Hong Kong-based service bureau that is claimed to have the most powerful computing facility in South East Asia. Major partners in Asiadata include Cable and Wireless, International Computers Ltd., and Barclays Bank DCO . . . Promoted to vp's shortly after their arrival at Microdata, Santa Ana, Calif.-based minicomputer manufacturer, are **George Olenik,** operations, and **Ham Hawkins,** marketing. ■

You'll find a complete line of Tape Storage and Handling Equipment in the Wright Line Catalog



Library storage units, cabinets, desk racks, trucks, carrying cases and Data-Bank Safes . . . You'll find everything you need to build an efficient and beautifully styled system for handling and storing tape reels in Tape Seal® Belts, thin-line or standard canisters even with self-threading drives, Tape Seal® Belts are your best buy. Your Wright Line Catalog is the one complete source for information on Tape Storage and accessories for use in disk, eighty column and the new ninety-six column card systems.



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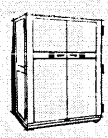
1. Select from the catalog and mail or phone your orders directly to your local Wright Line branch office or main plant in Worcester. Wright Line's more than 60 offices are listed in the yellow pages.

2. If additional information is needed when ordering or planning installations, call your local branch office and ask to have one of Wright Line's more than 125 field specialists call on you.

If you don't have a Wright Line Catalog, we'll be glad to send you one. Write or phone any of our offices or circle the readers' service number below.

Everything for data-processing except the computer.

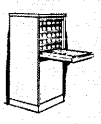


DATA BANK SAFES

DISK PACK STORAGE

GOLD STAR FILES

TAPE STORAGE



SYSTEM/3 ACCESSORIES

Wright LINE

DATA PROCESSING ACCESSORIES

CIRCLE 39 ON READER CARD

WRIGHT LINE • A DIVISION OF BARRY WRIGHT CORPORATION, 160 GOLD STAR BLVD., WORCESTER, MASS. 01606

WORLD ROUNDUP

GERMAN MERGER CAPER CONTINUES

Negotiations for a merger of the computer divisions of the two West German electrical giants, Siemens and AEG-Telefunken, have finally collapsed. The talks had been so protracted that even civil servants from the Bonn Ministry of Science and Technology, who were promoting such a combine two years ago, lost interest. During this time, Siemens' interest had waned almost in direct proportion to its increasing success, while AEG-Telefunken's problems grew. Product ranges of the two companies are incompatible.

The Siemens line, spawned from a license with RCA, is doing well against IBM gear, but lacks the large scientific processor that Telefunken has been struggling with. The latter might interest Nixdorf Computer AG, but only on terms dictated by the formidable Heinz Nixdorf.

An entrepreneur who entered the ranks through minicomputers, Nixdorf brought his first processor to the market just over six years ago. Last year, the firm had revenues of some $26 million, nearly double the previous year's figure. Nixdorf believes the future lies in a regrouping of manufacturers with different expertise in order to compete with existing international corporations. And he's understood to be interested in linking his specialty in small computers and terminals with Telefunken's foothold in the larger mainframe end of the scientific and defense market.

COMMUNICATIONS GAP CLOSING IN EUROPE

Communications tariffs, standards, and quality of service vary among countries in Europe, a product of political and technical pressures. In general, the large user willing to pay through the nose for private links can get service anywhere; and then there are the unfortunates. Now, a serious effort to hack out a comprehensive policy for data communications in Europe is being made by CEPT, the Conference Europenne des Postes et Telecommunications. All the major telecommunications authorities belong to CEPT, which has tentatively earmarked $2.5 million for a survey of future demand.

AIR CARGO BIDDERS BATTLE IN PARIS

A late bid for the $20-million-plus Sofia project for air cargo handling in Paris has been placed by Computer Sciences International. Plans call for a t-s system available to customs, airlines, and agents involved in all the import-export activities of the port. Apart from streamlining the expanding air freight business, there is a secondary aspect: a battle among the airports to become the prime staging post for transatlantic traffic. Other bidders include European manufacturers CII, ICL, and Philips, in unison with French software houses Sema and Sesa. The twist to the CSI bid lies in a system spec involving twin 370/155s, which is rumored to undercut the dual 165s bid originally by IBM.

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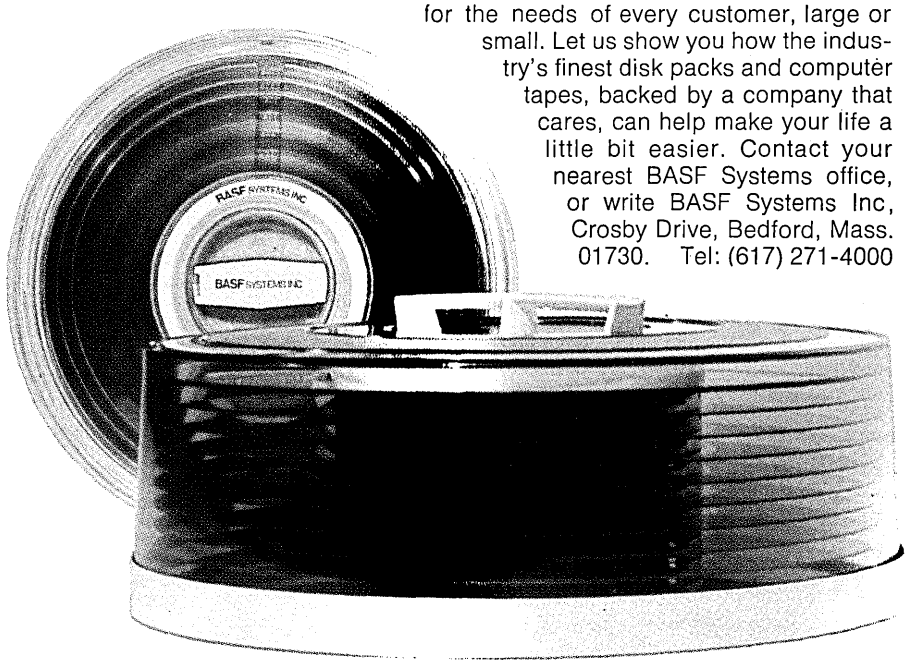

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CIRCLE 2 ON READER CARD

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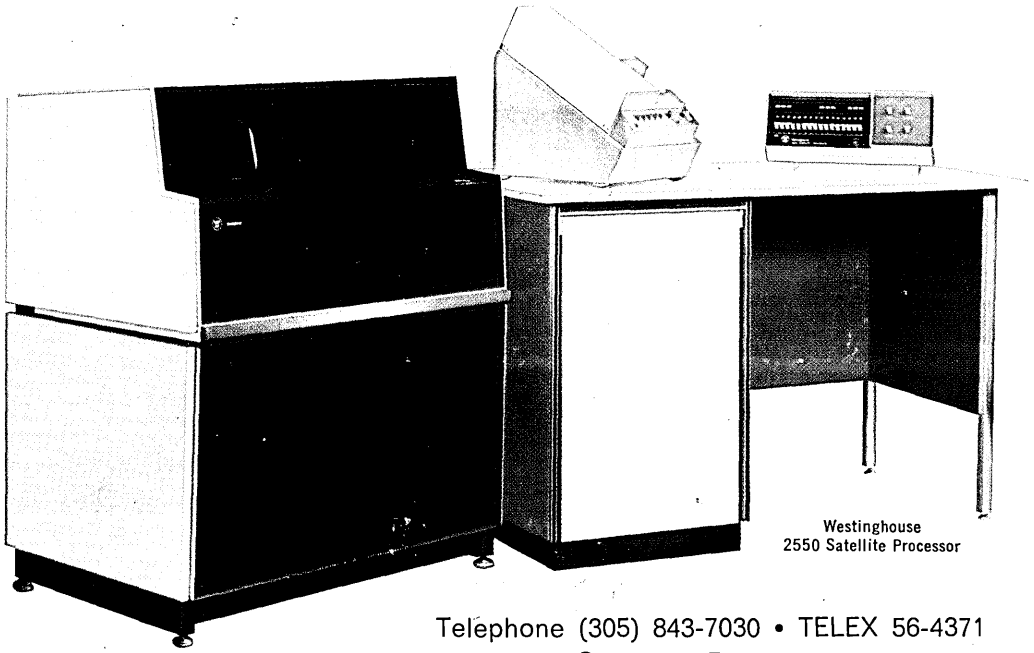
For the full story on the Westinghouse 2550 Satellite Processor and Westinghouse 2500 Computer product lines, services, and support, write, wire, call or visit your nearest Westinghouse Computer Department office or Westinghouse Computer Department, Orlando, Florida.



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