Model C450...

The ¼" cartridge recorder that thinks it's a ½" tape deck.

Kennedy's Model C450—It's a start/stop drive which is faster than streaming in almost all applications; a drive that has a data reliability rate for soft errors of not less than $1 \times 10^{-10}$ and a hard error rate of $1 \times 10^{-4}$. The reason? Model C450's CCR recording technique.

Need Capacity? Model C450, with a DC 600A cartridge, will store up to 23 MBytes of unformatted data, and over 20 MBytes formatted.

In a hurry? A serpentine head is standard on Model C450, eliminating time consuming rewinds. Need simple interface? Model C450's intelligent Pico bus interface is not only easy to interface—it's been proposed as an industry standard. If you need a controller, there are a variety for all standard mini-computers.

The bottom line! Model C450 is the answer to Winchester back-up. Reliable, low in cost and available off-the-shelf. And built with Kennedy quality.

KENNEDY

Subsidiary Magnetics & Electronics Inc
1000 Shamrock Ave., Monrovia, CA 91016
(213) 837-8851 TWX 910-555-1243
CIRCLE 1 ON READER CARD

KENNEDY • QUALITY • COUNT ON IT
There are good investments and bad ones, too.
Some pay big dividends, others don't. Our AM Jacquard J100 multi-function computer system is the best investment you'll ever make when it comes to automating your office. It offers high dividends and solid returns where cutting costs and increasing productivity are concerned. You can bank on it.

The J100 gives you truly impressive efficiency, economy, operational speed and flexibility for handling your most demanding word and data processing needs. And as your needs increase, you simply add to your J100 system. It supports up to 10 satellite work stations, a wide variety of peripherals and can communicate with other minis and mainframes. Add the case of operation, 920 million bytes of on-line storage plus high-speed throughput and expandable memory and you've got the system for today's office—and tomorrow's, too.

And when it comes to an equipment portfolio, AM Jacquard offers the industry's most complete line of word and data processing equipment. There's the multi-function J500 stand-alone computer, our J125 word processor, the J225 laser-based OCR device, J321 mag card reader and even a power typing station. Stability is another payoff on your AM Jacquard investment. We're a division of AM International, a billion-dollar, Fortune 500 corporation that's been providing products for offices around the world for more than 80 years. Doesn't it pay to know who'll be around if you need us?

So add it all up. AM Jacquard guarantees a return on your investment. It's like money in the bank. For more information, contact AM Jacquard Systems, the Informationists, a division of AM International, Inc., Dept. 777, 2340 Ocean Park Blvd., Santa Monica, CA 90405. (213) 450-4242, ext. 777.

**LET'S TALK ABOUT INVESTMENTS.**
Before you tell me about the 308I won't even broach the subject. Let me tell you about the Advanced System 9000. I've already got it installed.

Unsurpassed performance is just another reason for selecting the Complete Computer Company.

© National Advanced Systems

For further information, write to National Advanced Systems: 800 East Middlefield Road, Mountain View, CA 94043. (415) 329-6000 (in Europe call 44-1-570-2323).

CIRCLE 5 ON READER CARD.
<table>
<thead>
<tr>
<th>FEATURES</th>
<th>NEWS IN PERSPECTIVE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>32 IN FOCUS</strong></td>
<td><strong>46 STRATEGIES</strong></td>
</tr>
<tr>
<td>Grumman/Cowen and DATAMATION survey &quot;The IBM</td>
<td>Citishare or Citigrab?</td>
</tr>
<tr>
<td>Market in Japan.&quot;</td>
<td></td>
</tr>
<tr>
<td><strong>98 LOCAL NETWORKS FOR THE 1980s</strong></td>
<td><strong>50 LITIGATION</strong></td>
</tr>
<tr>
<td>Howard Cravis</td>
<td>ADAPSO versus Citibank</td>
</tr>
<tr>
<td>A practical datacom system for</td>
<td></td>
</tr>
<tr>
<td>interconnecting terminals and</td>
<td><strong>52 THE PCMS</strong></td>
</tr>
<tr>
<td>computers that are not too far apart.</td>
<td>Taking a PCM stance.</td>
</tr>
<tr>
<td><strong>108 LIGHT THROUGH GLASS</strong></td>
<td><strong>58 COMMUNICATIONS</strong></td>
</tr>
<tr>
<td>Bill Stephens</td>
<td>M/A-Com plans B/A-Net</td>
</tr>
<tr>
<td>Lower priced, standardized</td>
<td><strong>63 APPLICATIONS</strong></td>
</tr>
<tr>
<td>components are making fiber optics</td>
<td>SOCAL's solution.</td>
</tr>
<tr>
<td>easier to use.</td>
<td><strong>69 SOFTWARE</strong></td>
</tr>
<tr>
<td><strong>119 CATCHING UP IN VEGAS</strong></td>
<td>A sequel for databases.</td>
</tr>
<tr>
<td>A guide to the subjects, seminars,</td>
<td>CGS moves into U.S.</td>
</tr>
<tr>
<td>and speakers at Interface '81.</td>
<td><strong>72 GOVERNMENT</strong></td>
</tr>
<tr>
<td><strong>125 TEN OBSERVATIONS ON LIVING WITH WORD</strong></td>
<td>A standard squabble.</td>
</tr>
<tr>
<td>PROCESSING**</td>
<td><strong>76 MANAGEMENT</strong></td>
</tr>
<tr>
<td>Bruce Huffine</td>
<td>Which comes first?</td>
</tr>
<tr>
<td>The Apples and Oranges Theory, the</td>
<td><strong>80 COMPANIES</strong></td>
</tr>
<tr>
<td>Nothing for Free Syndrome, and other</td>
<td>On the road to Hyperbus.</td>
</tr>
<tr>
<td>guidelines for successful relationships.</td>
<td>Another one bites the dust.</td>
</tr>
<tr>
<td><strong>135 A SURVEY OF DATA DICTIONARIES</strong></td>
<td>Li'l help from its friends.</td>
</tr>
<tr>
<td>Robert M. Curtice and E. Martin Dieckmann</td>
<td><strong>90 BENCHMARKS</strong></td>
</tr>
<tr>
<td>A comparison of the primary functions of</td>
<td>Twas time to combine; Bullish on</td>
</tr>
<tr>
<td>current packages for commercially available</td>
<td>bubbles; Battle for big bucks; New</td>
</tr>
<tr>
<td>systems.</td>
<td>name for IEEE?; Caught in the net;</td>
</tr>
<tr>
<td><strong>165 APPLICATIONS</strong></td>
<td>Surveying the manpower; Desktop</td>
</tr>
<tr>
<td>DEVELOPMENT**</td>
<td>troubles; GSA eases CSC suspense;</td>
</tr>
<tr>
<td>Linda Runyan and Willie Schatz</td>
<td>Databases booming; Micros in education.</td>
</tr>
<tr>
<td>A look at the problems, progress, and</td>
<td><strong>DEPARTMENTS</strong></td>
</tr>
<tr>
<td>people in a difficult area of the dp</td>
<td><strong>8 LOOKING BACK</strong></td>
</tr>
<tr>
<td>industry.</td>
<td><strong>13 LOOK AHEAD</strong></td>
</tr>
<tr>
<td><strong>176 HOT AND COLD DATA CENTERS</strong></td>
<td><strong>18 CALENDAR</strong></td>
</tr>
<tr>
<td>James E. Hassett</td>
<td><strong>23 LETTERS</strong></td>
</tr>
<tr>
<td>Suggestions for solving the problems</td>
<td><strong>29 EDITOR'S READOUT</strong></td>
</tr>
<tr>
<td>associated with maintaining an optimal</td>
<td><strong>221 PEOPLE</strong></td>
</tr>
<tr>
<td>thermal environment.</td>
<td><strong>224 HARDWARE</strong></td>
</tr>
<tr>
<td><strong>188 CAI CATCHES ON</strong></td>
<td><strong>240 SOFTWARE &amp; SERVICES</strong></td>
</tr>
<tr>
<td>Deborah Sojka</td>
<td><strong>246 SOURCE DATA</strong></td>
</tr>
<tr>
<td>Computer-assisted instruction was a broken</td>
<td><strong>254 MARKETPLACE</strong></td>
</tr>
<tr>
<td>dream 20 years ago.</td>
<td><strong>272 ADVERTISERS’ INDEX</strong></td>
</tr>
<tr>
<td><strong>195 ASSURING QUALITY QUALITY INSURANCE</strong></td>
<td><strong>COVER PHOTOGRAPH BY ROBERTO BROSAN</strong></td>
</tr>
<tr>
<td>Stephen L. Stamm</td>
<td><strong>MARCH 1981</strong></td>
</tr>
</tbody>
</table>
The Associative File Processor.

A Special Purpose Hardware System for Retrieving Textual Information.

Full Text Retrieval. Finds relevant information in large free text files (typically 300 million characters or more) that match queries.

Unrestricted Queries. Unrestricted query vocabulary with boolean AND, OR, NOT and proximity key word logic.

Simple Configuration. AFP® runs on a PDP11 host minicomputer and includes all necessary user software.

Real Time Data Input. New data may be input and searched as it is received, if necessary.

Special Associative Hardware. The processing power is made possible by the special AXP® hardware effectively having the capability of 1200 cpu's.

Affordable. Now you can afford full text retrieval costing only a few pennies per search.

Available in Three Configurations. The AXP100 attaches to an existing PDP11 computer; the AXP200 is self contained with a communication interface to a network or another host computer; the AXP300 is a turn key system including CRT terminals and a line printer.

Application Areas Include:

- Military and Intelligence
- Law Enforcement
- Library Search
- Word Processing Support
- Abstract Search
- Title and Property Search
- Trial Transcripts
- Patent Search
- Litigation Support
- Technical Report Retrieval
- Generic Record Keeping
- Current Awareness Bulletin
- Laboratory Testing and Retrieval
- Journal Abstracting and Control
- Pharmaceutical Literature Retrieval
- Product Bibliographies
- Chemical Compound Retrieval
- Historical Records and Archives

Call (213) 887-9523 or write for a detailed brochure.

Datafusion Corporation
5115 Douglas Fir Road, Calabasas, California 91302

4 DATAMATION
At Waterloo, Intel's FAST-3805 won.

The FAST-3805 saves the University of Waterloo thousands of dollars each month while it increases both user and system productivity. Waterloo's Associate Director-Systems, Romney White, explains how . . .

"Compared to any other DASD, the FAST-3805 in Native Mode* is the fastest thing going. It has a large enough capacity to satisfy the biggest users around, and it's a cost-effective solution. In other words, the FAST-3805 is really an ideal paging device."

"The FAST-3805 reduces paging overhead and increases paging capacity. It's an economical solution for extending current CPU resources."

Increases productivity
"We discovered that our 4341 by itself supported only 25 active users. With the FAST-3805 we were able to double the number of active users at less than half the cost of a new processor. And those users got more consistent and faster response times."

"We found the FAST-3805 eliminated page wait and the page wait that masquerades as I/O wait, as well as reduced device, controller and channel contention. The result was more users who are more satisfied."

Fast paging saves dollars
"On our 3031 we had a page wait of about three percent with two 2305s. However, when we switched to a FAST-3805—which brought in pages about two and a half times faster than the 2305s—the page wait went to zero. In our situation, switching to the FAST-3805 saved us a couple of thousand dollars a month in system and people time. But a user who has a 3033 with a 15 percent page wait could save $15,000 to $20,000 a month."

"Not only did the FAST-3805 take the place of two 2305s and a 2835 controller at Waterloo, but it helped us avoid the purchase of another 2305/2835 system. With the FAST-3805's increased capacity, we were able to stay within our budget . . . and still meet the increased needs of our users."

"Because we wanted to get the most out of our current system, we saw the FAST-3805 as a good investment. We looked at the available paging devices and determined that the FAST-3805, because of its micro-coding, offered the most flexibility."

"The installation was a breeze. Service has been good—and the unit is essentially self-diagnosing. The FAST-3805 is much more reliable than our previous disks."

"In summary, Waterloo got more capacity, better performance and better reliability for less money with Intel's FAST-3805 semiconductor disk."

If you are interested in learning how the FAST-3805 can unleash your system resources and increase your personnel and system productivity, contact Intel's Marketing Information Office at 512/258-5171. Or clip and mail the coupon below.

---

*Native Mode and 2305-emulation are two personalities of the FAST-3805 currently available.
STC can help you realize greater productivity from your information processing system with products designed for maximum performance.

Products such as the STC 4305 Solid State Disk. This high speed device improves paging rates and enhances total system throughput far beyond any other device available today.

The STC 8000 Series disk family provides the industry's fastest response times. Innovative features such as dual port, multiple recording formats and media interchange switch offer you higher capacity, optimum performance and greater reliability. Our STC/Documation 3000 Series impact printers with speeds beginning at 1550 LPM are upgradable to 3000 LPM as your throughput requirements increase.

STC tape products with their proven reliability make STC the world's largest supplier of high performance tape subsystems.

We have solved throughput problems for some of America's most demanding users—often at significant cost savings. To find out how STC can help you, call the STC sales office in your area. Or call us toll free at 1-800-525-2940, Ext. 4063. Storage Technology Corporation, MD-3M, 2270 S. 88th Street, Louisville, CO 80027.

THROUGHPUT

We can help.

STORAGE TECHNOLOGY CORPORATION

Fulfilling the promise of technology.

CIRCLE 8 ON READER CARD
### VOORHOEVE'S REBUTTAL

**March 1961:** The January 1961 issue of DATAMATION included an article by Daniel D. McCracken, "The Human Side of Computing," to which reader H.C. Voorhoeve responded in the March '61 "Letters to the Editor." The reference Voorhoeve objected to was McCracken's statement that professional status for dp people would be impossible to obtain "as long as anyone with ten dollars can join the ACM and proclaim himself a professional computer expert." Voorhoeve signed his letter of complaint, "Proud Member of the ACM," and defended his position by saying his membership represented a form of dp education, not instant professionalism. Nearly 18 years later, McCracken was elected president of the ACM; he completed his two-year term in 1980. And now, it costs you $40 per year to proclaim your professionalism.

### FILLING THE GAPS WITH S/3

**March 1971:** Early 1971 brought rumors centered around IBM and its impending introduction of a 64K version of the S/3, followed by another version with even more memory. The predictions said the 125 would be scrapped, and the new S/3 versions "would bridge the gap all the way to the 370/135." IBM would then push users to the 370/135 line from 360/25s and 30s, thereby collecting more revenue. This push, along with some other changes, gave IBM the appearance of breaking its products into two "more manageable" families. But then, as DATAMATION noted, "How and when can you grow from an S/3 to a 370? Or do you just slap on communications gear and become part of a 'computer utility'?"

"1971—The Year EDP Goes Multinational," by Dr. Mirek J. Stevenson, president and founder of Quantum Science Corp., discussed the reasons for going multinational and why 1971 was a turning point for U.S. computer companies planning on entering foreign markets.

"The computer industry will be forced into the worldwide multinational direction partly because use of computers is all-pervasive," wrote Stevenson. To gain and maintain a fair share of the hardware and services market, companies would inevitably have to go multinational. Global operations and manufacturing—not just increased exportation—would soon be necessary. Stevenson claimed the '70s would be characterized by the multinational competition of large and middle-sized computer companies. He said, "By 1975 the non-U.S. free-world market will have increased in size to 90% of the U.S. market and will still have a faster growth rate than the U.S. market."

Also, the Honeywell-GE merger had a great effect upon world computer markets. Together, these two companies created a European marketing strength second only to IBM, forcing other large companies to take a more competitive stand in foreign markets in order to survive.

Stevenson also noted that European and Japanese firms were becoming more important in world markets, and predicted that major European and Japanese companies would soon be moving at full force onto American turf via acquisitions, mergers, and consolidations. Conversely, once U.S. companies recovered from the necessary learning curve, they would settle more in foreign countries to manufacture the same goods at lower costs.

Stevenson ended his article with an insightful paragraph on the new decade: "It was not long ago that 'Made in Japan' was a slur. Soon it may be closer to a compliment. Consumer companies have found that if you can't beat them, you may as well join them. Even U.S. automakers are doing so. The computer industry is facing its worldwide challenge today and aggressive multinational posture is the road ahead."

—Deborah Sojka
Printers for every job. Terminals for every line.

NEC Spinwriter™ character printers and terminals can be configured in as many varieties as there are jobs to do.
They start as basic 55-eps printer mechanisms for some OEM buyers who want to add their own value. Then they grow and change to fit your precise letter-quality output needs.
Each of our 10 models is surrounded with features and options that make customizing easy.
Eight industry-standard interfaces, serial and parallel, let you add Spinwriter printers quickly to your current system. Ten form-feed options—most operator changeable—provide unparalleled document handling flexibility. Dozens of 10 or 12 pitch and Proportional Space thumbline — with up to 128 characters — solve your technical and language output requirements.
That's not all. Spinwriter printers and terminals have the industry in reliability, with a more than 2000-hour MTBF. And in serviceability, with a 30-minute MTR.
When you want hard-working printers that adapt to your individual needs, call the NEC Spinwriter representative nearest you. He'll assure a perfect NEC. Going after the perfect printer.

NEC Information Systems, Inc
Home Office: 5 Mifflin Drive, Lexington, MA 02173, (617) 862-312
Eastern Office: 36 Washington Street, Wellesley, MA 02181, (617) 431-114
Central Office: 5510 Tolgate Road, Elgin, IL 60120, (312) 931-185
West Coast Office: 8399 S. Sepulveda Blvd., Los Angeles, CA 90045, (213) 670-734
NEW RIXON STAT

More Choice... More Features... More
plus... an application team to help design

The RIXON™ Data Concentration Exchange (DCX) is a revolutionary concept in data communications equipment which combines statistical multiplexing, concentration, contention, network processing and switching functions in one product line.
### Features

<table>
<thead>
<tr>
<th>Feature</th>
<th>DCX015 STAT MUX</th>
<th>DCX036 STAT MUX</th>
<th>DCX046 NETWORK MUX</th>
<th>DCX050 SWITCHING MUX</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Compatibility</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Input Channels</td>
<td>4 to 8</td>
<td>4 to 60</td>
<td>4 to 240</td>
<td>4 to 240</td>
</tr>
<tr>
<td>17 Input Speeds, 50 to 9600 bps</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Composite Links</td>
<td>1</td>
<td>1</td>
<td>Up to 12</td>
<td>Up to 12</td>
</tr>
<tr>
<td>Composite Loopback</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Channel Loopback</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unbalanced Channel Speeds</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EIA Controls (4 FDX/Channel)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Automatic Baud Rate Detection</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Down Line Loading</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flow Control</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fly-Back Buffering</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Channel Reconfiguration</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Line Utilization Indicator</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Buffer Overflow Control</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Data Lost Message</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Link Down Message</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Link Up Message</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Channel Test — Non-Interfering Validation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Buffer Size (BYTES)</td>
<td>5.5 K</td>
<td>16 K</td>
<td>64 K</td>
<td>64 K</td>
</tr>
<tr>
<td>Link Statistics Reporting</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>User Controlled Networking</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>User Controlled Switching</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Port Contention</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Automatic Rerouting</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Event Log</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Connection Statistics</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Network Supervisor Terminal</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Enhanced Network Statistics</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Contact Rixon for complete details on its full line of Statistical Multiplexers.
In this game, it's clearly no contest. The BTI 8000 32-bit multiprocessor system gives you the lead in the first inning, and keeps you there all the way. And, you can sign it up for 30 percent less than competitive systems.

Furthermore, the BTI 8000's hardware and software architecture will continue to make it a top performer, long after other systems have been traded away. For example, starting with a basic system, BTI's exclusive Variable Resource Architecture lets you increase processing power by ten times, just by plugging in resource modules. You don't have to rewrite systems or applications software either.

Despite its "superstar" status, the BTI 8000 is friendly to users and a real team player. A virtual machine environment, hierarchial ac-count structure and fail-soft architecture eliminate any worries about security, control or downtime.

As for reliability, BTI bats near 1000, thanks to service via remote diagnostics. BTI has been using this method for over 10 years, and currently supports over 3000 systems. These are just a few reasons why you should put the BTI 8000 in your starting line-up. For a complete scouting report, contact your nearest BTI office.

BTI COMPUTER SYSTEMS

Corporate Offices: 870 West Maude Avenue, Sunnyvale, CA (408) 733-1122 Regional Offices: Piscataway, NJ (201) 457-0400; Palatine, IL (312) 997-0900; Atlanta, GA (404) 395-1630; Sunnyvale, CA (408) 733-1122. Sales Offices in major U.S. cities. In the United Kingdom: Birmingham (021)-477-3846

CIRCLE 23 ON READER CARD

BTI is a registered trademark of BTI Computer Systems
## LOOK AHEAD

### KEEP AN EYE ON THE PBX SCENE

Watch for stocks in North America's PBX builders to go through the roof. Suddenly these three little letters are all you hear. It seems that both Amdahl and Olivetti are currently scouring North America to buy a PBX company. (Olivetti is part of cash-flushed French industrialist Saint-Gobain's attempts to diversify into the area.) In addition, the Swedish telecommunications giant, L. M. Ericsson, and its recently acquired subsidiary, Datasaab, have joined forces with the U.S. Atlantic Richfield oil giant to mount a PBX/office automation thrust in America.

Also, IBM is shortly expected to capitalize on its 3750 PBX development in Europe by offering a modern American version as a gateway into U.S. offices and into its "Enterprise" systems and a "resculpted" SNA. The mighty mainframer has already applied to the FCC for authorization to connect its 1750 PBX switching system, previously offered only in Europe, to the U.S. telephone network.

And even a big bank is getting into the act: Citibank is expected to announce an advanced PBX through an internal development operation that we hear will be spun off at year-end.

### THE MARCH IS ON AT CITIBANK

Citibank's march into computer services (see related story p. 46) has led it into a major development effort with the same federal body that is currently investigating the legalities of other moves outside its traditional turf of banking. The talk is of a major federal funds transfer network being put together by a 200-man Citibank team down on Wall Street. The trans-action network, believed to be based on Tandem hardware, would link the Federal Reserve and the big banks in a major funds transfer network, insiders claim. It is not known at this time whether the network will be on a national scale, or indeed whether it will be greeted by objections that Citibank is adding common carrier status to its other ambitions.

### NEW LEASING COMPANY SURFACES

A new company has been formed in San Jose that touts its niche as "the first high technology-based financial support services company specializing in leasing programs for relatively new manufacturers in advanced markets." Western Technology Investment, Inc., headed by former Magnuson executive Ronald Swenson, hopes to have an edge over the traditional non-technology-based leasing companies by boasting an industry-trained

MARCH 1981 13
**LOOK AHEAD**

| MORE ON X.25 | Sources tell us that Ma Bell may have already submitted its version of the X.25 networking standard to the International Standards Organization (ISO) for ratification. And if IBM is indeed preparing to offer the X.25 interface in its new Mirage/Mistral front-end processor development (support is already offered for Series/I), as sources say, it shouldn't be too long before a market for X.25 begins to materialize in the United States. |
| ONE FIRM'S PLANS FOR HIGH FLYING | PolyMorphic Systems, Santa Barbara, Calif., one of the early-on suppliers of microprocessor-based systems, has been on something of a rollercoaster ride in terms of profitability lately. But it may now have the opportunity to take a motorcycle ride out of its troubles. New president Walter J. Kosinski is attempting to merge the firm with another of which he is president -- AMS (American Minisystems of California's Orange County). AMS offers a turnkey system for motorcycle dealers. The merger is viewed by Kosinski as the initial effort in positioning PolyMorphic in a variety of highly specialized vertical markets. And if motorcycles don't do the trick, maybe airplanes will. AMS is part of ITX, a mini-conglomerate which, among other things, is into timesharing of airplanes (much like the condo timesharing plans). "We already have two airplanes available to us," said Kosinski, himself a one-time private pilot who is now brushing up on his flying skills. |
| NEW STRATEGY FOR JAPANESE BANKS? | Japanese banks, which have long had the automation know-how along with experience in electronic corporate cash management, may be on the verge of doing something with it. Observers see it coming in the mid-1980s due to changes in the (continued on page 45) |
It's like multiplying your CICS programming staff by ten.

TRANS IV lets you increase programming productivity ten times or more — without adding CICS programmers. This solution-oriented application development system performs CICS/VS functions automatically.

With it, programmers can write on-line application programs interactively, without referring to CICS macros or internals.

**Features For Productivity.** With TRANS IV, you can define files and display formats in real time — also procedures unique to your applications (like edit and range checks).

TRANS IV gives you on-line error correction and test/debug capabilities — without cards, batch processing, or programming.

TRANS IV operates under all releases of CICS/VS.

With our Informatics classes and learning aids, programmers are fully productive with TRANS IV within a week.

**The Problem Solver.** If you've got a scarcity of CICS expertise and a growing demand for on-line applications, find out the details of TRANS IV.

It's an impressive system that can help you go a long way toward maximizing your CICS investment. In a very short time.

TRANS IV is one more way Implementation Systems from Informatics help you manage human energy problems.

Call or fill out the coupon for more information. Or attach your business card to the coupon.

**TRANS IV for DOS/VSE by Informatics.**

The Information Management Company.
A solution to a human problem in information management.

The Bell System knows that information management works best when it's people oriented. After all, that's been the basis of our business for years. So our Dataspeed® 4540 data communications terminal is human engineered.

It has a display unit with a tilting screen to eliminate glare and eye fatigue. Plus simplified controls on the console. And you get a choice of keyboards with numeric cluster arrangement.

Of course, the terminal is every inch an information management problem-solver. It transmits at speeds from 2400 to 9600 bps efficiently, has built-in diagnostics, greater hardware flexibility and 3270 compatibility.

Its microprocessor-based controller interconnects with up to 32 devices. Eight of them can be printers which can be located up to 2000 feet away from the controller. Keyboard displays can be up to a mile away.

The Dataspeed 4540 data communications terminal. You can expect it to add efficiency and economy to business applications involving inquiry response, data entry and retrieval.

With our knowledge, our advanced communications technology, our thousands of experienced information management specialists, we can help your business. A call to your Bell Account Executive will put our knowledge to work for you.

The knowledge business
**MARCH**

**Fourteenth Annual Simulation Symposium, March 18-20, Tampa, Florida.**

Part of Simulation Week, March 16-20, the symposium is sponsored by the IEEE, ACM, SCS, and IMAC. Contact Alexander Kran, IBM, B/300-40E, East Fishkill Facility, Hopewell Junction, NY 12533, (914) 897-2121 X 7142.

**Office Automation Conference, March 23-25, Houston.**

The major conference for users and designers of electronic office equipment, the OAC is produced yearly by AFIPS. Contact AFIPS, 1815 North Lynn St., Arlington, VA 22209, (703) 558-3617.

**Printemps Informatique, March 24-27, Paris.**


**Interface '81, March 30-April 2, Las Vegas.**

This is the largest U.S. computer show and exposition. It is devoted to data communications, distributed data processing, and networking. Contact The Interface Group, 160 Speen St., Framingham, MA 01701, (617) 879-4502.

**Exposium '81, March 31-April 3, Milwaukee, Wisconsin.**

State-of-the-art word processing and information processing systems, from the beginner level through the advanced, will be featured at this four-day conference and exhibition presented by the Word Processing Society, Inc. Contact Word Processing Society, Inc., P.O. Box 92553, Milwaukee, WI 53202, (414) 226-5215.

**APRIL**

**DPMA Quality Assurance Conference, April 1-3, Chicago.**

The objective of this conference, sponsored by the DPMA Education Foundation, is to explain methods tools, and techniques for improving computerized applications. Contact DPMA, 12611 Davan Dr., Silver Spring, MD 20904, (301) 622-0066.

**Hanover Fair, April 1-8, Germany.**

One of the world's largest technology exhibitions, it combines dp and office products as well as a variety of noncomputer-related pavilions. Contact Deutsche Messe- und Ausstellungs-AG, Messegelände, D-3000, Hanover 82, Germany.

**6th West Coast Computer Faire April 3-5, San Francisco.**

Since 1977, this annual small business and personal computing conference and exposition—with a strong focus on micros—has been held regularly. Contact Computer Faire, 333 Swett Rd., Woodside, CA 94062, (415) 851-7075.

**1981 AECT National Convention, April 6-10, Philadelphia.**

The Association for Educational Communications and Technology produces this show, the largest gathering of instructional media/AV professionals in the U.S. Contact AECT, 1126 16th St., N.W., Washington, DC 20036, (202) 833-4179.

**Computers In Manufacturing, April 6-8, New York City.**

Computers and dp as tools in manufacturing. Contact NIMR Seminars, P.O. Box 3727, Santa Monica, CA 90403, (213) 450-0500.

**Ninth Annual Telecommunications Policy Research Conference, April 26-29, Annapolis, Maryland.**

The object of this conference is to provide a forum for the analysis and discussion of telecommunications policy issues. Contact William E. Taylor, Bell Laboratories 2C-258, 600 Mountain Ave., Murray Hill, NJ 07974, (201) 582-2108.

**MAY**

**NCC, May 4-7, McCormick Place, Chicago.**

The NCC's theme this year is "Keys to Productivity." Contact Diana Snow, AFIPS, P.O. Box 9658, 1815 North Lynn St., Arlington, VA 22209, (703) 558-3617.

**Thirteenth ACM Symposium on Theory of Computing, May 11-13, Milwaukee, Wisconsin.**

STOC is sponsored by the ACM's Special Interest Group for Automata and Computability Theory. Contact George Davida, School of Information & Computer Science, Georgia Institute of Technology, Atlanta, GA 30332, (404) 894-3152.

**CompuFest '81, May 11-13, Louisville, Kentucky.**

The exhibition will feature vendors of computer hardware, software, service bureau services, and other related computer products. Contact Kathy Schoen, Kentucky Society of CPAS, 310 W. Liberty St., Louisville, KY 40202, (502) 589-9239.
A visible bandwidth of 30 kHz and a 1200-line resolution make this new CRT monitor the brightest and sharpest you can get.

G. Ried's new model M1028S in our QDM series, is capable of receiving separate horizontal drive pulses, raster drive pulses and video signal at the TTL level. This separate signal mode eliminates composite sync and video signal processing. The CRT is equipped with its own power supply unit. 58 phosphors are standard, but optional F36 or F39 phosphors can be provided. Available options: dynamic focus, Skip Scan, auto-zero reference, and a 15.5 kHz horizontal frequency.

The high performance and low price offered with this new CRT monitor give you all you need to really enhance your system's capabilities. For complete information contact your nearest G. Ried representative or G. Ried Electronics, Inc., 3RD
Beatheaven Street, Los Angeles, CA 90036; Tel. (213) 380-7773; Telex (WU) 65-2455; or 665
Third Avenue, New York, NY 10017; Tel. (212) 682-6820; Telex (WU) 12-9050

G. RIEDELELECTRONICS, INC.

Introducing the 12" CRT monitor for the system designer with bright ideas.
"It speaks our language."
Introducing Omniword.

The DDP word processor that speaks plain English.

Early DDP word processors were designed for DP professionals. But here's one that's made for secretaries—and their bosses. Where others use a lot of code, Omniword uses plain English.

Jobs that take complicated keystrokes on other machines, Omniword handles with a single "function" key.

And Omniword makes it easy to merge information from several sources into a single document.

In short, we've designed Omniword so that the average secretary (and, in a pinch, the average boss), can generate letters and edit documents with less than a day's instruction.

Simpler than most DDP word processors. More versatile than stand-alone word processors.

Omniword's Striker™ printer makes personal-looking letters fast.

But it also has a wide range of type styles which you can use for manuals, contracts, proposals—all kinds of short-run printing jobs.

Omniword has plenty of storage room for long name-and-address files too.

And at the flick of a switch, Omniword becomes a DDP terminal.

We make service simple too.

With an entire network of sales and support offices around the world.

Let us show you Omniword—the simple DDP word processor. Call your local Northern Telecom sales office or write Northern Telecom Inc., Box 1222, Minneapolis, Minnesota 55440.
YESTERDAY'S AUTOMATED OFFICE.

Word Processing, which many people used to equate with office automation, actually accounts for only 10 to 15% of the costs in an office. It's very helpful to clerical people. But it's only a small part of the potential of office automation.

TODAY'S AUTOMATED OFFICE.

The Prime Office Automation System is the only totally integrated system available today. It's designed for use by major corporations. And unlike word processing systems, it provides tremendous support to managers, who account for about 75% of office labor costs. As a result, our Office Automation System can make a substantial improvement in productivity. Briefly, here's what it consists of:

- **Word Processing and Text Management.** Text creation, editing, filing, list processing, and boilerplate library. Automatic spelling check and hyphenation, plus multilingual dictionaries to assist translation.
- **Electronic Mail.** Receives messages and forwards documents to an individual down the hall or around the world.
- **Activity Management.** Confidential personal calendar, meeting scheduler, tickler file, telephone log, and personal diary.
- **Personal Computing.** Financial modeling, data base inquiry and reports, programming, and other user-defined applications.
- **Information Access.** Direct access to central corporate data files, external data services and international networks.
- **Data Processing.** Business D.P., engineering and scientific D.P., and program development.
- **Productivity.** If you want to make your clerical staff more efficient, a word processor can help. But if you're serious about improving office productivity, you can automate your entire office with a totally integrated system from Prime. Today. Write to us at Prime Park, MS 15-60, Natick, Massachusetts 01760.

PRIME Computer

CIRCLE 27 ON READER CARD
COPING WITH KOPS

Re: “Tracking the Elusive KOPS” (Nov., p.99), our organization recently upgraded from a Burroughs B6807 to a B6811, so I was particularly interested in the KOPS ratings for those mainframes. While examining the figures, I came up with some questions and would be interested in Dr. Lias’s comments on them:

1. In the “Composite Hardware List” on p. 100, the Burroughs B6807 is listed twice (#74 and #101). Why are there two ratings for one mainframe?

2. I assumed that our B6807 was equivalent to #101 with a KOPS rating of 544. Since the B6811 (#129) has a KOPS rating of 765, our processor speed benchmarks performed after our upgrade should have shown an increase of approximately 40% (765/544 = 140.6%). Instead our figures showed only a 25% to 26% processor speed increase, which seems to be the average for other B6807-B6811 upgrades we are familiar with. What could be the reason for this difference?

CHARLES A. BERG
DP Manager
ESV Region V Computer Services Coop.
North Mankato, Minnesota

Dr. Lias replies: Charles Berg spotted one of two errors which were carried in the original KOPS list. On p. 100 two lines should be changed to read:

74 Burroughs 6807 (before July 1977) 340 KOPS
101 Burroughs 6807 (after July 1977) 544 KOPS

Another omission should be corrected on p. 100:

215 Honeywell dps 8/70 (2X) 3,576 KOPS

Charles Berg’s question regarding his machine’s performance illustrates the weakness in the KOPS standard. Several inconsistencies can be the source of the differences in measurement.

1) The benchmarking process by which the “real” increase of 25% to 26% was calculated probably used actual production-like programs which contain lists of instructions quite different from those presented in IBM job mix number 5.

2) Actual execution timings always include the time delays associated with disk I/O, paging I/O, mux channel bandwidth, and other operating system efficiencies or inefficiencies. KOPS measurements ignore all of these factors.

3) A call to Burroughs revealed that the new machine allows a greater “connectivity” within the system, meaning that processing events in any part of the system are more intelligently coordinated with events in other areas of the system than was allowed in the earlier machine.

This tradeoff is quite normal. As we purchase machines which are larger and faster, we also demand more sophisticated handling of security, paging, file handling routines, terminal handling routines and system accounting. KOPS, being a theoretical measurement, does not account for any of these things and therefore, as the article suggested, they are not appropriate for systems of the ‘80s. Unfortunately there are no other standards. KOPS and MIPS are all we have as of February 1981.

We are concerned about the misrepresentation of the product line marketed by National Advanced Systems.

None of the products listed under our name are marketed today as listed and several have not been marketed under these or any other designation for several years, either by National Advanced Systems or the former marketer, Itel Corp.

In January 1980 National Advanced Systems introduced its line of products and added to the product family through September of 1980.

We apparently were not one of the companies you contacted to source your article. Other references sources used for cross-checking quite possibly did not have the current information on National Advanced Systems either.

You can understand that, as presented, the product profile on National Advanced Systems is misleading to readers positioning PCs in their own minds with purchase intentions.

MICHAEL L. AYERS
Public Relations Manager
National Semiconductor
Santa Clara, California

The article was inaccurate with regard to Control Data systems performance.

Like many vendors, Control Data discourages its sales representatives from using kilo- or mega-operations per second ratings. Such ratings are heavily dependent upon cpu architecture and can only be useful in comparing computers with like instruction sets—such as IBM vs. plug-compatibles.

Since, however, many will read and use the DATAMATION KOPS ratings, we would like to go on record in two ways:

1) We do not endorse the ratings shown for our machines;

2) The ratings cited do not conform with results from benchmarks comparing our computers with each other and with other vendor models. In particular, the KOPS ratings for the CDC 76, 7600, and 176 should and, experience has shown, are nearly identical.

I would urge your staff to use price/throughput rather than KOPS in future evaluations. In automotive parlance, it isn’t the RPM, it’s the MPG that counts.

W. M. SHAFFER
Control Data Corp.
Minneapolis, Minnesota

PACNET SPEAKS UP

Re: “Data Communication Carriers” (Aug., p. 107), Pacnet was not included.

Pacific Network Communications Corp. is an FCC-approved resale common carrier offering data transmission services in speeds ranging from 50 baud to 4800 bps. We presently serve 28 cities including Honolulu, Hawaii.

The Pacnet FCC Tariff No. 1 became effective in December 1979. We serve approximately 60 customers consisting of
LETTERS

about 400 circuit terminations. Revenues for 1980 were approximately $1.8 million.
Our company revenue is derived 100% from data transmission services, and our fiscal year ends Dec. 31.

GIL WILLIAMS
General Sales Manager
Pacnet Corp.
Dallas, Texas

JARGON GRIPE
Re: “Japan Rediscovering DBMS” (Dec., p. 155), you use the buzz letters DBMS 15 times on the first page of this article, including the title and label of an illustration, and not once do you write out the words these letters stand for—let alone explain the idea.
I think good technical writing should include at least a short lead-in to explain what the article is about, including the full wording of any important contraction or acronym.
The reading public includes more than jargon-oriented engineers, and even engineers frequently must cross disciplines. It is irritating to constantly run into a wall of special jargon without any explanation.

GERALD WAXLER
Engineer
Spinnerstown, Pennsylvania

WANTED TO BUY
Re: “Evaluating Off-the-Shelf Packages” (Dec., p. 122), I am presently installing IBM’s IPICS Programs on a System 34. I was interested in the fact that there are at least 23 other companies that have installed or are installing programs on a System 3 or a System 34.
I am writing because the IPICS package lacks two important feeder-type programs, Production Planning and Master Production Scheduling, which feed and interface with the Material Requirements Planning Package.
We need these two packages and I do not want to reinvent the wheel. If any of these 23 companies has written these two programs, I would like to talk to them for the possible purchase of same.

KENNETH E. ZOELLER
Zoeller Co.
3280 Old Millers Lane
Louisville, KY 40216
(502) 772-2584

OUT OF THE MONEY
Re: People (Sept., p. 224), in the interview with Ivan Socher, the claim that Socher’s company Computer Advances was in 1974 second to IBM in dp revenues in South Africa is grossly inaccurate. There were (and still are) computer companies such as ICL and NCR whose revenues in 1974 were certainly much larger.

J.P. BLAKEY
Pinelands, South Africa

IGNOTUM PER IGNITUS
Re: Letters (Dec., p. 24), I propose that Mr. Burke and Mr. Lambropoulos should remain with their native languages (COBOL, FORTRAN, RPG, etc.) and leave the classics alone.
Please note that “erat” (one “r”) is a proper Latin form. It is the third person singular imperfect indicative active of the verb “to be.” That is first year Latin.
Can we state that this is just “Basic”? (Ouch!)

J. RICHARD LUTZ
Bronx, New York

MEUM ET TUUM
Re: “A Home for a Floppy Disk” (Oct., p. 88), in which it is related that Shugart has presented its first IBM-compatible floppy disk drive to the Smithsonian.
In 1963-64 Jack Potter and I experimented with a floppy disk, but the venture was not actively pursued until 1971, when it was decided to build, at Potter, a floppy to be compatible with the IBM 23 FD 11. Pilot production was started and advertising literature, dated 1972, was printed.
Just about this time, knowledge of the IBM 3740 system became available, and Potter Instrument Co. demonstrated publicly a fully IBM-compatible floppy at the New York Coliseum in 1973. According to my notes, life testing on one of the first production units was started in May 1973.
The electrical designs were Fred Reisfeld’s, the heads, which by 1974 were ferrite, were by Charlie Pear, and I did the mechanical design and managed both floppy disk projects at Potter.

IVAN O. FIELDGATE
Milford, Massachusetts

“Ever have one of those days when you don’t have anything to say?”

@DATAMATION
If your company asks you to recommend a financial planning and modeling system, tear out this page.

With more than 50 financial modeling systems on the market today, having to choose one can be confusing, at best. On the surface, many of the systems look alike. Looking deeper, only one stands out.

**FCS-EPS: More Than A Modeling System**
As a comprehensive planning, modeling and information management software package, FCS-EPS brings the power of the computer into the hands of the financial planner. Over 100 pre-coded functions, with modules for forecasting and econometrics, sensitivity and risk analysis, color graphics; hierarchical consolidation automates currency conversion, inflation scenarios, cost allocation and cross-sectional reporting. It all adds up to a three-dimensional system which provides views of your financial future more detailed than any mere modeling tool ever could.

**A System That Grows With You**
FCS-EPS is a system limited only by your imagination. Beyond the pre-programmed functions is an entire financial programming language to take you as far as you want to go. You can begin to use the system after only two hours training.

But don't take our word for it. Get the facts. Send for our free publication, "Selecting and Evaluating Financial Modeling Systems," which includes a checklist of features you should look for in a state-of-the-art system. Use it to compare FCS-EPS with your company's requirements. We think the facts will speak for themselves.

**eps**

Offices in New York, Detroit, Houston, Boston, Los Angeles, San Francisco, Toronto, Montreal

EPS, Inc.
8600 W. Bryn Mawr Avenue
Chicago, IL 60631
312/693-2470

CIRCLE 28 ON READER CARD
Overwhelming acceptance and praise from people who are not computer experts for an interactive system that's easy to use and easy to program for a wide range of computer applications. Just listen.

**Precision Tube Company, Inc.**

Mr. John Thompson, Vice President

"Compared to a computer of equivalent capacity five years ago, System 80 is one-fifth the size, consumes less than half of the power, is almost twice as fast and costs about 50 percent less."

**Magnode Corp.**

Mr. John M. Bidwell, DP Manager

"In an intensive 17 month search for hardware, the SPERRY UNIVAC SYSTEM 80 best met our three major criteria — cost effectiveness, growth compatibility and ease of use."

**GENUARDI Supermarket Chain**

Arden Stover, Director of Operations

"One of the major features we like about the System 80 is that it offers capabilities normally found only in large processors. And it can be used as a stand-alone system or as a part of a distributed processing network."

**Skidmore College**

Mr. John Butler, Comptroller

"A major factor in our decision was the high priority we gave to service. We were advised to be sure to make this a prime consideration. Every one of your customers confirmed his satisfaction with your equipment."

SPERRY UNIVAC is a division and registered trademark of Sperry Corporation.
Innovative Systems
Mr. Roland Short,
President

"After looking at over 40 different
potential systems over a seven-month
period, we gained complete confidence
in the System 80. It's the ideal system which
enables us to provide complete hospital
information systems for our customers."

Olde Worlde
Products Inc.
Kenneth Mackovic,
Chairman of the Board

"The acquisition of System 80 is
an important element in our long-term
strategy of continually seeking new ways
to enhance the support of our thousands
of representatives who sell Olde Worlde
products throughout North America.

*Call between 9 a.m. and 5 p.m. Eastern Standard Time only.

Send for our "Showdown" booklet.
Register now for a free seminar.

Sperry Univac, P.O. Box 500, Dept. 100, Blue Bell, Pa. 19424

Send me your brochure only.
Yes, I'm interested in listening to one of your seminars. Please send me a
confirmation of my reservation.
Computer system now in operation_________________________I would like to
bring_________________________ guests.
(Specify #)

(Complete the following or attach your business card)

Name_________________________Title_________________________

Company_________________________

Street_________________________City_________________________

State_________________________Zip_________________________

Phone #_________________________

In Canada: Telephone (416) 270-3030 or write: 55 City Centre Drive, Mississauga, Ontario L5B 1M4.
Listeners of National Public Radio can now hear concerts live and in stereo, thanks to Western Union's Westar communications satellites. Before using the satellite network, NPR broadcast programs throughout the continental United States over telephone lines and land-based microwave links. The system was limited only to monaural signals, so programs that depended on good audio fidelity were duplicated on tape and distributed by mail to member stations. With the Hughes-built Westars, however, the radio network can broadcast with better sound quality and also transmit programs to some 220 stations at once.

Digital modifications to the weapon control system of the U.S. Navy F-14 Tomcat will enable the fighter to meet evolving threats through the 1990s. Enhanced tactical capabilities include electronic countermeasures, improved missile launch zones, coherent air combat maneuvering modes, and a digital display system. The key changes to the Hughes AN/AWG-9 system are the addition of a programmable signal processor and its companion radar data processor. These units can perform up to 7.2 million operations per second. The modifications will allow the F-14 to fully incorporate the improved AIM-54C Phoenix missile.

For the first time, a new battlefield data distribution system will provide an integrated capability for data communications, position location reporting, and identification for ground and air units. The secure, jam-resistant system, being developed for the U.S. Army, is called PLRS/JTIDS Hybrid. It combines and expands the proven capabilities of two high-technology systems -- PLRS, the Army/Marine Corps Position Location and Reporting System, and JTIDS, the Joint Tactical Information Distribution System. Hughes has entered the second phase of a five-phase accelerated development plan designed to meet the Army's critical need for reliable battlefield data communication by the mid-1980s.

Hughes Research Laboratories needs scientists for a whole spectrum of long-term sophisticated programs. Major areas of investigation include: microwave devices, submicron microelectronics, GaAs integrated circuits, ion propulsion, lasers and electro-optical components, fiber and integrated optics, pattern recognition, and new electronic materials. For immediate consideration, please send your resume to Professional Staffing, Dept. SE, Hughes Research Laboratories, 3011 Malibu Canyon Road, Malibu, CA 90265. Equal opportunity employer.

Three communications satellites ordered by AT&T (American Telephone and Telegraph Company) will live longer and handle more long-distance calls than earlier models. The new Telstar 3 satellites will serve 10 years instead of seven and have the capacity for 21,600 simultaneous calls instead of 18,000. These improvements are due chiefly to such technical innovations as solid-state amplifiers, better batteries, and a greater capacity for fuel to keep the satellites on station while in orbit. The new satellites will be based on the model Hughes is building for Indonesia, Telesat Canada, Western Union, and Satellite Business Systems. The first Telstar 3 is set for launch in 1983.
We’re at an interesting point in the short but lively life of the computer industry. There are signs and portents that we are on the verge of new growth, new directions, a major shift in the rhythm and development of this complex high-technology industry that is reshaping the world.

One very clear indicator is a sudden profusion of industry gurus. There’s so much going on, at such a fast pace, on so many fronts, that anyone who can decipher a bit of the confusion is in great demand. The most successful oracles are those who remember the great truth in industry guruling—being wrong is pardonable; being unclear is unforgivable.

At the present time a number of future scenarios are being circulated by the pundits. We’ll look at two of them. We’ll call them the big fish/little fish and the flying fish theories just for the purposes of identification.

In scenario number one—the world of the big and little fishes—the small entrepreneurial companies are at the bottom of the food chain. Off to a fast start, they eventually find that the market demand for their successful product has put them in a capital squeeze. So their money man puts on his best pin-striped suit, shines up his wing tips, and sallies forth. His choices are limited: bank lines of credit (if you can find them), private investors such as the venture capital mavins, merging or being acquired, or going public. All offer a Hobson’s choice: they mean loss of control to one degree or another.

Often the little company is a one product company, or it may contain the seeds of its own destruction in a top management that is technical but not business oriented. Or it may have reached that delicious $20 million to $25 million mark in annual sales and is just plump and juicy enough for consumption by a larger predator.

Given all this Darwinian activity, goes scenario one, there will be no independent computer industry in 10 years. We’re on a track very similar to the one the movie industry followed: the Exxons, IBMs, General Motors, St. Gobains and the like will be the sole survivors.

The flying fish advocates are a bit more sanguine. They concede that the mergers and acquisitions are likely to occur for some time to come. And, on the user side, they do see stability in the big batch shops and lack of big user migration because of conversion costs.

But they also contend ours is far from being a mature industry and entrepreneurial opportunities are manifold and promising. We are not settling into the oligarchy painted by theory one; rather, those bold companies that are willing to leap into new environments will not only not get munched by the big companies below, but may be able to do a little munching of their own.

These gurus enthusiastically point to the opportunities just now becoming apparent in office automation, small business systems, distributed data processing, software and services, robotics, personal computers, factory automation, voice and image processing and the wacky world of consumer marketing, to name but a few. There is lots of venture capital available; ask some of the ceos of some of the more successful software package houses: they’re being accosted in elevators and parking lots and having millions of dollars in wadded up bills thrust at them by crazed investors.

Actually, the two theories are not mutually exclusive. There will be a great deal of ingestion by the huge corporations. And there will also be a great deal of new activity founding successful entrepreneurial endeavors.

The smart, surviving companies will be those who know how to deal with the high cost of money; who have the sense to plow back significant sums into research and development; and who move beyond a single product line into integrated systems incorporating word processing, communications, computers, facsimile, semiconductor technology, voice and image processing, and other essentials of the new corporate environment.

A good part of this growth will depend upon residing in a country that provides a favorable atmosphere for such growth and activity. The U.S., for example, could well learn from Japan and Germany about how a nation fosters its high technology development rather than hinders it.

In the world of computers and communications, Japan and Germany have become very big fish indeed. And, lest we forget, big fish have big appetites.
FRESH IDEAS ARE GROWING AT ALTOS

Silicon Valley, California. At one time few places in the world were as abundant with orchards. Today, no other area is as technologically fertile. And nowhere on earth is the business climate as prolific with computer innovation.

Yet within this competitive environment, one microcomputer firm continues to grow above the rest. Altos Computer Systems. Recognized as a world leader in single board microcomputer technology, Altos flourishes on its ability to produce ideas and deliver them to the market while they're still fresh and packed with price performance value.

Fresh ideas like Altos' new ACS8000-6/MTU single board microcomputer system with a DEI 1/4-inch cartridge tape back-up drive, and Shugart's 8-inch floppy and 14-inch Winchester hard disk drives, with total on-line capacities from 14.5 MBytes to 58 MBytes.

The ACS8000-6/MTU joins Altos' growing family of products that branch out to a multitude of single board system configurations to serve the OEM, the business sector, and many other end users. These systems range from the ACS8000-2 with its dual 8-inch floppy disk drives, to the powerful ACS8000-5, which is upgradable to any of Altos' hard disk and multi-user systems.

Altos supports three industry standard operating systems: single/multi-user CP/M, OASIS, and Altos' proprietary AMEX. Seven high level programming languages are offered which are CP/M or AMEX compatible.

Ideas aren't the only things growing at Altos. In three years over 4,000 field-proven microcomputer systems have been shipped worldwide to an ever-increasing customer base of over 300 companies. And recently a new facility has been acquired, expanding Altos' plot to over one-and-a-half acres of production facilities.

Weed through the microcomputer system alternatives. No matter what your application, you'll pick Altos.

For specific details about pricing or performance, call or write: Altos Computer Systems, 2360 Bering Drive, San Jose, CA, 95131, (408) 946-6700, Telex 171562 ALTOS SNJ.
A survey by G.S. Grumman/Cowen and DATAMATION looks at the IBM and IBM-compatible mainframe systems market in Japan.

Early last year, G.S. Grumman/Cowen, in conjunction with DATAMATION, conducted its third annual nationwide survey of U.S. mainframe systems users. Approximately 29,000 users at IBM installations were sent a questionnaire, and unduplicated returns from nearly 4,000 sites were included in the results. Along with the findings of the Burroughs, NCR, Honeywell, and Univac surveys, these results were summarized in the June 1980 issue of DATAMATION.

Concurrently, the questionnaire em-
The U.S. IBM user survey was provided to an affiliate organization in Tokyo, whose headquarters staff translated it into Japanese. Their sales staff then used it as the basis for face-to-face interviews with 194 customer organizations that are users of large-scale IBM systems and/or Japanese-manufactured IBM software-compatible (e.g., Fujitsu, Hitachi) cpus.

After the data were collected, they were retranscribed into English language questionnaires, which were returned to the U.S. for processing and analysis. The main focus of the analysis in this initial effort was to contrast the Japanese survey response with that garnered from the IBM users domestically so as to discern any noteworthy similarities and differences in the workings of that highly important marketplace—indeed, one that is second only to the U.S.

A second survey of Japanese users is presently under way. This and future research will provide the additional perspective of trends (e.g., in market share, sales/lease mix, software usage, etc.) as they develop from survey to survey.

What follows is an extract from this first survey, which looks mainly at the questions of software and telecommunications spending and usage among IBM users in Japan, although a number of other areas are touched on as well.

In total, 194 user sites located in and around Tokyo and Osaka, Japan's largest and second largest cities respectively, were included in the survey. Of these, 160 had one or more IBM mainframe systems installed. Japanese users employ their installed systems less intensively than do their U.S. counterparts.

What follows is an extract from this first survey, which looks mainly at the questions of software and telecommunications spending and usage among IBM users in Japan, although a number of other areas are touched on as well.

In total, 194 user sites located in and around Tokyo and Osaka, Japan's largest and second largest cities respectively, were included in the survey. Of these, 160 had one or more IBM mainframe systems installed. Japanese users employ their installed systems less intensively than do their U.S. counterparts.

The remaining 34 sites were users of IBM 370-compatible hardware, but had no IBM systems per se installed.

In terms of units, the respondents reported an aggregate of 250 IBM cpus in use at the time of the survey and 120 cpus of Japanese origin. Included among these specifically were 66 IBM 303X systems, four 4331s, 161 System 370s, five System 360s, and 14 in the System/3-38 family. Fujitsu figured most prominently among the respondents using Japanese-made cpus with 36 mainframe-class systems in place. Ten additional mainframes were from other Japanese cpu makers, and the remainder of the Japanese cpus in the survey installed base were mainly of the small business systems variety.

As for planned installations, for the 24-month period subsequent to the survey, the Japanese respondents stated their intentions to take delivery of 28 303Xs, 55 4300s, and three 370s from IBM, as well as of 110 8100s and 12 System/3-38 processors. During that same timeframe, they also planned to install 14 Fujitsu cpus, 15 from...
Hitachi (roughly half of these are relatively small-scale L340 systems), and a dozen systems from Nippon Electric Corp. (NEC).

According to survey results, Japanese users employ their installed systems less intensively than do their U.S. counterparts (see Fig. 1). The U.S. survey respondents reported that, on average, their installed 303X, 4300, and 370 systems were kept in operation for some 469 hours per month (out of a theoretically available maximum of 720 hours). The Japanese respondents who had these same models in use, on the other hand, indicated average monthly utilization of 376 hours, a level fully 20% below the U.S. figure. This possibly reflects the fact that IBM systems are much more heavily rented or leased in Japan than purchased (and thus, presumably because they can be more readily upgraded to a larger system, there is less incentive to utilize them to the hilt).

Even IBM's largest systems (the 303X at the time the survey was taken) are predominantly rented or leased from IBM rather than purchased (see Fig. 2). But in large part this is because of the relative absence of third-party financing activity in Japan. (Systems acquired via third-party lease are purchased systems from IBM's standpoint.) Whereas fully 67% of the 303Xs being installed by the U.S. survey respondents during 1981 were to be purchased directly or by third parties (for subsequent lease to the user), the comparable figure in the Japanese survey was a meager 6%.

On the other hand, the direct purchase and third-party percentage for the 303Xs already installed by the Japanese respondents during 1979 (43%) was much closer to the percentage indicated by the U.S. survey sites (50%). This suggests that post-installation from lease to purchase conversions, which are familiar phenomena domestically, are not uncommon in Japan either.

The potential for conversions in terms of percentage of systems installed on IBM rent or lease (and thus susceptible toward being purchased if, say, IBM cuts purchase prices and/or raises rental prices as it has on two occasions since the survey was taken) is much higher in Japan than in the U.S. (see Fig. 3). For example, only 34% of installed 303Xs in the U.S. sample were on IBM rent/lease plans, compared with a much more sizable 52% for the Japanese.

While IBM has no totally plug-compatible cpu competition in Japan (the Fujitsu and Hitachi operating system software is close but still somewhat differentiated, unlike the Amdahl and National Advanced Systems versions), there are U.S.-based peripherals vendors with a presence in that

In Japan, Memorex is the PCM market leader in disks.

In FOCUS

FIG. 5

DBMS PACKAGED SOFTWARE SUPPLIERS
(FOR DBMS IN USE IN 2/80)

U.S. RESPONDENTS

25% IMS (IBM)
28% IDMS (CULLINANE)
17% OTHER / UNSPECIFIED

JAPANESE RESPONDENTS*

58% TOTAL (CINCOM)
7% DL/1 (IBM)
19% SOFTWARE AG

* For Japanese respondents, DBMS installed on both IBM and PCM mainframes

FIG. 6

PORTION OF TOTAL DP BUDGET SPENT ON UNBUNDLED SOFTWARE
PERCENT OF SITES ANSWERING

2/80 SURVEY* 2/80 SURVEY* 2/80 SURVEY* 2/80 SURVEY*

OVER $100 K $51 K-$100 K $21 K-$50 K
$11 K-$20 K LESS THAN $10 K
NONE

* Excludes S/3-34 sites

34 DATAMATION
Datacorp's total COM service saves you paper money

The dollars you're spending for paper printout reports are eating away at your profit margins and your productivity. In today's business climate, you need timely information at the lowest possible cost.

The solution? COM, Computer Output Microfilm, from Datacorp. We're the nation's leading COM service organization, last year producing 12 billion pages of computer data on microfilm in 41 service centers across the country. Over 2,000 customers depend on us for reliable, high quality service, fast turnaround and competitive prices.

In addition to COM service, Datacorp is a major supplier of in-house COM systems. We offer complete solutions—from site analysis through installation and ongoing system support.

Whether you use Datacorp service, or produce your own COM, you can take advantage of our volume purchasing power to save on COM equipment and supplies as well. Readers, duplicators, film, chemistry and more, all at highly competitive prices.

Consider the facts in dollars and you'll see COM makes sense for you. Compared to paper printout, COM offers savings of 50-80%. Paper costs are eliminated. Decollating and binding costs disappear. You can duplicate, mail and store data less expensively. With COM, information retrieval is easy and fast. Using the 72x format developed by Datacorp, you can store 690 pages of printout on a single 4x6-inch microfiche.

So let Datacorp help your company realize the cost and productivity advantages of COM. Give us a call— together we'll find the COM solution that will save you lots of paper money.

Datacorp
5075 S. W. Griffith Drive, P. O. Box 2000
Beaverton, Oregon 97075 (503) 641-7400
Imagine.
A VAX™ virtual memory computer for a price that almost any organiz- 
ation can afford.
A computer with virtually unlimited programming space, contained in a cabinet so small it barely takes up the corner of a room.
Imagine VAX system power available to small departments. For dedicated real-time, interactive and batch environments. Distributed throughout your organization wherever it can improve productivity. And in a whole host of new OEM and end-user applications that were never practical before.
The VAX-11/750, from Digital Equipment Corporation, is so much computer for so little money, it will literally change the way you think about computers.

**VAX family compatibility.**

Despite its size and price, the VAX-11/750 is totally software compatible with the larger, faster

**VAX-11/780** — the computer that has been setting performance standards ever since its introduction. It has the same kind of real-time response. The same 32-bit addressing. The same powerful instruction set. The same two billion bytes of user program space.

And the VAX-11/750 runs the same VAX/VMS™ Performance Software, already proven in thousands of VAX-11/780 applications.

You get an...
optimizing FORTRAN that is a full ANSI 77 implementation. A high-speed COBOL based on current and anticipated ANSI standards. A PL/I in the same performance class as VAX FORTRAN. Plus highly interactive BASIC, PASCAL, CORAL and BLISS.

Because the VAX-11/750 offers total family compatibility with the VAX-11/780, you can run all your application programs on either system. Using the same data management facilities that include sequential, random and multikey ISAM, FMS for screen formatting, DATATRIEVE for query and report writing.

And to make system performance complete, Digital is introducing its own RM80 Winchester disks, the latest in mass storage technology.

**Distributed VAX power.**

The VAX-11/750, combined with Digital's commitment to network leadership, adds a new dimension to distributed processing.

You can use the VAX-11/780 for centralized program development, and then run your applications on strategically located 11/750s.

You can link VAX computers together using DECntm networking software.

You can even build one comprehensive, corporate-wide network that includes PDP-11s, VAXes, Digital's large DECSYSTEMs, and your own corporate mainframe.

All working together and sharing resources.

**State-of-the-art VAX reliability.**

The VAX-11/750 is the industry's first 32-bit "minicomputer" designed with custom LSI gate array circuits. This advanced circuitry means fewer components, lower power consumption, easier maintenance, and higher overall reliability.

In fact, the VAX-11/750 is one of the easiest computers to maintain and service that has ever been developed. It can even be diagnosed over telephone lines from Digital's Remote Diagnostic Center in Colorado Springs and from two centers in Europe.

And VAX computers are supported by Digital's worldwide service organization, with more than 14,000 people in over 400 offices.

Imagine. The VAX computer is now the VAX family.

Now more people than ever can afford to bring Digital's architecture of the 80's into their applications.

The VAX-11/750.

It will change the way you think about computers.

I'd like to know more about the VAX family.

☐ Please send me literature on the VAX-11/750.

☐ Please send me literature on the VAX family.

☐ Please have a Sales Representative call.

Name ____________________________________________

Title _____________________________________________

Organization ______________________________________

Address __________________________________________

City ___________________ State __________ Zip ________

Phone ____________________________

My application is ☐ Education ☐ Medical ☐ Laboratory

☐ Engineering ☐ Government ☐ Business data processing

☐ Resale ☐ Other

HARVARD BUSINESS SCHOOL
announces
Managing the Computer Resource
An Executive Education Program of the Harvard Business School

August 2-14, 1981

The program's emphasis is upon evaluating, managing, and planning the development and growth of the data processing activity.

The orientation of the program is toward management, not technology. Participants will include managers with direct responsibilities for computer-based information systems management; and senior management to whom the computer resource management reports.

Among the topics to be considered are integrating the information systems plan with corporate strategy; data processing personnel selection, organization and evaluation; hardware/software selection decisions; the role of minicomputers and distributed processing; design of cost control and internal controls within the EDP organization; the computer as an instrument of change; patterns of distributed operations; project management approaches; and privacy and data banks.

For further information, contact: Administrative Director, Managing the Computer Resource, Glass Hall, Harvard Business School, Boston, Massachusetts 02163.

As a matter of policy Harvard University does not discriminate among applicants and participants on the basis of race, religion, sex, national origin, color, or handicap.
INTRODUCING THE EMULATOR

The universal design concept today is that most of the new, fast-moving computer applications run on mainframe computers that are usually not compatible with your existing system. The SII Emulator has answers for that as well.

The SII Emulator operates exactly as you command, with the depression of just a few keys. Simulate ASCII, teletype, terminal control codes of any one of five popular video terminals. The teletypeight, 300 baud TTY, and ANSI video terminal give you full flexibility to use emulated or ASCII terminals for the price of one!

But best of all, not only does the Emulator replace these terminals, it performs communications, security, multi-user, and interactive appearance enhancement, including features not found on other terminals. It's all in one box.

SII Emulator features include:
- 90 WPM 13" alphanumeric screen with a full 24 lines by 80 column display.
- Adjustable speed and color for your terminal
- Separation of control keys, keyboard selectable baud rates
- Remote selectable baud rates and operating modes
- Audible signal tones

No matter which brand of main-frame you own today, finding another deal you can beat, and as an Emulator, you get all the advantages of your terminals to the price of one. And your company saves hundreds of dollars by the day, you get a terminal that you can remember. Call or write for an evaluation kit today. We'll also make available terminals on an immediate exchange basis.
marketplace. According to the survey data, however, PCM penetration is nowhere near as great among IBM mainframe users in Japan as in the U.S., with the PCMs accounting for 23% of the Japanese disk installations (versus 30% in the U.S. survey population), 19% of the crt terminals (versus 33%), and 20% of all add-on memory (versus 40%).

Memorex is the PCM market leader in disks, with a 14% share of the add-on installations projected for 1981-82 by the respondents, followed by Calcomp (6%) and Storage Technology Corp. (3%). Intel and STC are the major PCM add-on memory suppliers, with 5% and 4% shares respectively. And in the crt marketplace, Harris is the market leader with 9%, based on the survey data, and Memorex has a 1% share.

The data in Fig. 4 depict the percentage of sites in the Japanese survey compared with the percentage of U.S. sites planning higher spending in 1980 than in the prior year in each of a number of categories. What stands out most notably in the accompanying data is that while the average per site increase for salaries indicated by the Japanese respondents was only 6.7% (evidently a reflection of the lower rate of inflation than in the U.S.), it was quite substantial for software packages (16% versus 11.6% for the U.S. respondents). This suggests a very sizable market opportunity for U.S.-based IBM-compatible packaged software suppliers in Japan.

As for the highly important DBMS (data base management system) segment of the packaged software market (see Fig. 5), survey data provide convincing evidence of the strong share position enjoyed by U.S. suppliers in the packaged software market in Japan.

Looked at for all packaged software, Japanese users typically appear to spend more for unbundled software than do users in the U.S. This is depicted in Fig. 6, which provides a distribution of spending amounts for packaged software for each of the two survey populations, and in Fig. 7, which shows the percentage of Japanese respondents (juxtaposed with those in the U.S.) spending in excess of $20,000 per year for outside software by class of cpu installed. In every case the percentage is greater in the Japanese base than in the U.S.

On the other hand, the rate of increase in spending for hardware over the next three to five years was less for the Japanese survey population (8.3% per year) than for the U.S. sample (10.7%). Presumably this reflects, in part, the lesser rate of inflation in Japan. Relatedly, though, the Japanese respondents spend somewhat more on maintenance of old applications software (48% versus 46% for the U.S respondents) and less for new applications than is spent in the U.S. (52% versus 54%), and new applications implementation is what fuels the growth of user spending on the hardware side.

“How about I hunt and you gather?”

©DATAMATION
At Biomation, An Assembly Line
With a Steady Pulse

Today, assembly lines at the Biomation Division of Gould Incorporated almost always flow smoothly, with never a threatened stop to production because of missing parts.

"We used to operate with 130 days of inventory on hand," says Robert Nazarenus, vice president, finance. "We've cut that down to between 85 and 95 days. And on expensive parts, we time our orders so the items arrive just when we need them. We use less space for storage, and we don't buy and hold them before they are needed.

"At the same time, we've cut work-in-process time in half: from 2-4 weeks to 12 or 13 weeks."

Biomation's line of high-performance waveform recorders and logic analyzers is a materials-intensive business, Nazarenus points out. About 70 percent of the cost of a completed instrument is in the parts. To minimize the costs of lost production and out-of-balance inventory, the Santa Clara, California, division installed IBM's Communications Oriented Production Information and Control System (COPICS) in a 4331 Processor.

"Now that we can plan manufacturing," Nazarenus notes, "we can enter into long-term contracts with component manufacturers. Before we had COPICS, 50 percent of our purchase orders were for delivery in one or two days—which meant that we were buying from distributors, at 20 to 40 percent more than we would have paid the manufacturers."

COPICS is a complete online system for control of manufacturing, with modules for material requirements planning, inventory accounting, shop floor routing control and other specific tasks. At Biomation, the first module of COPICS to be installed was the bill of materials processor.

"There are 2,000 parts in a typical Biomation product, and frequent engineering changes to most models," Nazarenus explains. "So our bills of materials often contained errors. Since purchasing is done from the b'm's, this meant shortages of needed parts and purchases of unneeded ones. And expensive, high-level people spent time running around looking for materials."

"With COPICS, we achieved a 100-percent-accurate manufacturing document, and then a time-phased bill of materials to take account of engineering changes. With that and a valid master schedule, we were able to begin material requirements planning (MRP) using COPICS, letting us schedule shipments from our vendors to coincide with need."

"This mode of operation is profitable," he notes. "Putting out fires was not."
Capturing Heat from Exhaust Gas Makes Fuel Go Further

Valuable energy can be salvaged from the exhaust of gas turbines, industrial furnaces and other heat sources. At Henry Vogt Machine Co., engineers custom-design heat recovery equipment for each customer's specific needs, with the aid of interactive computing under IBM's Conversational Monitoring System (CMS).

The heat exchangers convert heat that would otherwise be wasted into usable hot water and steam. "The computer tells us the amount of heating surface and the number of tubes to use after the configuration of the external fins has been selected," says Robert Precious, general manager of the Heat Transfer Division of the company, headquartered in Louisville, Kentucky.

Characteristics vary

"Each exhaust heat source has its own characteristics—temperature, mass flow, and allowable back pressure," he points out. "And each customer selects his own desired steam flow, pressure and temperature. He may want to use the recovered energy to generate electricity, heat a chemical process, drive a steam turbine for rotary power, or warm a building."

Each specification is unique. The design engineer must find an optimum balance of heating surface in a superheater, boiler, and economizer section for each of as many as three pressure levels. He can do this by entering the variables through a terminal online to an IBM System/370 Model 138. The system responds by promptly displaying this optimum design.

Cost estimate in minutes

"It used to take a week to design a unit," Precious notes. "With the computer, our engineers get a detailed configuration and cost estimate in minutes."

In the early stages of heat recovery program analysis, many variables must be considered. The interactive computer can help to evaluate each of these quickly and accurately, and to select the most efficient arrangement of heating surface at the most economical price.

The computer program can calculate the performance of the heat recovery steam generator at less than full-load operating conditions. This is an important aid to the customer who must estimate steam production over the entire operating range of a gas turbine.

"Before we had the interactive system," Precious says, "we did well to provide one calculation at the design point. The customer wouldn't know what the performance would be at other operating levels. Now that we can analyze the whole range of heat rates accurately, we are in a much better position to receive an order based on this performance feature."

Putting the finishing touches on a Vogt Module Steam Generator. It once took a week to custom-design one of these units, also called a "waste heat boiler." With the help of an IBM interactive computer, engineers have a detailed configuration and a price estimate in minutes.
First 4331 Group II Goes in Fast, Boosts Power

At Roger Williams Foods, Inc., an IBM 4331 Group II Processor is serving as an online order processing and receivables system, supporting 15 visual display terminals and two remote printers.

Scott Laurans, executive vice president and treasurer, explains that the unit is an upgrade of a 4331 Group I, and that it doubled the processor speed and provided twice as much memory for the Cumberland, Rhode Island, food distributor.

"It's incredible how easily it went in," he says. "The job was done in eight hours on a Saturday."

"With the Group I system, the online load was starting to slow our response time at the terminal. Now, from an average of four seconds, we're back to less than one second. With a change of disk drives that we made at the same time, from the IBM 3340 to the 3370 Direct Access Storage Device, we've achieved a net saving of $15,000 a year on hardware while doubling our disk storage capacity."

"In meat, we turn over inventory 80 times a year, and prices are volatile—literally, they change hour by hour," Laurans points out. "At the same time, our margins are very low—no more than four cents a pound—so you can see that we need the quick response of an online system, but we can't pay a whole lot for it. The 4331 Group II gave us the power we needed at a price within our means. It was perfect for our needs."

Can't move without the Computer

"In perishables, we can't move without the computer," adds Jim Teixeira, director of data processing. "And the customer won't wait—he'll go to our competitor. That's why the excellent availability of the 4331 has been so important to us."

"We installed the Group I with absolutely no impact on operations or programs," Teixeira continues. "Later, when we converted to DOS/VSE, we made some minor changes in computer-room operations, but none at all to programs. The Group II upgrade was completely transparent."

DP Dialogue is designed to provide you with useful information about data processing applications, concepts and techniques. For more information about IBM products or services, contact your local IBM branch office, or write Editor, DP Dialogue, IBM Data Processing Division, White Plains, N.Y. 10604.
There's more to our new CADAM* graphics system than meets the eye.

Here is the CADISAM graphics system for the 80's—the Vector General 8250 graphics display system. It is especially designed for today's more sophisticated CAD/GAM applications. The VG 8250 is our third generation of 8250-type graphics display systems. A generation with features and performance that makes your CADAM, or other CAD/GAM system, an even more powerful design and manufacturing tool.

More Features The VG 8250's advanced system architecture, third generation hardware and state-of-the-art technology delivers more features than ever before imaginable. There is our newly developed remote capability that lets you locate display stations where your designers and applications are rather than where your GPU is located. Up to eight display stations can operate off a single Remote Display Controller unit with up to 12 sites or 32 stations incorporated into a single system.

And there are more features. For example, there's a hard-hat-style digitizer for designer convenience. There's "The Supervisor", the most powerful and advanced diagnostic and monitoring system available. There's a newly designed keyboard with function expressly developed for design and manufacturing applications.

More Performance The VG 8250 has already proven itself in an extensive competitive evaluation at 8250-type systems. A major CADAM user proved that the VG 8250 delivers superior performance with an overall 97% up-time. That study also showed that with the VG 8250 fewer display stations were required to handle the multiple applications.

The conclusion was that the VG 8250 delivers the best cost-effective performance.

For more than ten years, Vector General has been providing responsive graphics solutions. For your next CADAM or CAD/GAM application, look to Vector General. There's more than meets the eye.
Japanese government's attitude toward restricting the money market. Restrictions are beginning to disappear, and Japanese corporations are looking beyond loans for expansion toward manipulation of earnings on idle cash. It's in the planning now in a number of large Japanese banks.

Pertec Computer Corp. is spending a bundle on a 1981 advertising campaign to answer the question "What does Pertec mean?" The campaign will try to bring together the many conceptions the company thinks the data processing community has about it -- a peripherals company, a data entry company, a hobbyist computer firm -- but it isn't mentioning software. We hear, though, that the Los Angeles subsidiary of Volkswagen will be getting into software this year with the introduction of two new programming languages. But what Pertec wants us to think of now when we hear its name is "perfecting technology."

Joseph W. Rooney, who as president of the RCA Data Processing Division in 1971 presided over that division's phase-out of the computer business, and who later held executive positions with ill-fated Itel Corp. and the not much luckier Keydata Corp., has found a new home. He's the new president and chief executive officer of Image Resource Corp. of Westlake Village, Calif., a computer graphics company that emphasizes color graphics. Its primary product is Videoprint, a desktop unit making full-color photographs from corts. "Graphics is in the forefront of growth in the computer industry," said Rooney in his first week on the job. And he likes the small size of his new firm: "It has an entrepreneurial approach, and I like that."

It's a well-known fact that computer consultants often are hired to put out fires. Robert Patrick of Northridge, Calif., may be the best of them in terms of being equipped to do that. Patrick has purchased a 1920s full-size fire truck, complete with a siren and blinking lights....We hear Century Data Systems, acquired by Xerox from California Computer Products in 1979, is having financial difficulties. Word has it the firm is discontinuing successor lines to its Marksman series of disk drives, as well as laying off personnel.
CITISHARE OR CITIGRAB? 

Preambles and preliminary moves by Citibank have already turned it into, at the very least, the 26th largest independent computer services company in the country, sources say.

The mighty Citibank, one of the world's largest banking operations, has positioned itself to grab another crown—that of king of the computer services business.

Sources claim that moves over the past year, including the acquisition of at least seven computer services companies and the formation of 10 new subsidiaries, have laid the foundation for a new dp empire that seemingly has no limit.

The bank has proceeded through "legitimate" channels to secure federal approval for spinning off its internal dp arm, Citishare, which was set up in 1977. This application has been greeted with a hail of legal blocks from the services industry.

It is now clear that even before the legal question of Citishare is clarified in the courts, Citibank has gone ahead with the acquisition and expansion plan that relates to it—seemingly without seeking approval from the authorities.

"They're just waiting for the law to catch up with them," said one former Citibank employee. "But they figure that under the current government climate of deregulation, their plans will win out anyway."

It might not take too long to test this theory. A routine on-site investigation of Citibank's operation by a federal examiner in August apparently revealed violations of the Bank Holding Company Act, well-placed sources reveal. These "alleged" violations are believed to concern the bank's dp acquisitions and subsidiaries and are currently under review by the Legal Division of the Federal Reserve of New York.

Since its quest for approval of Citishare, which began in January 1979, Citibank has "openly" acquired the California-based Lexar Business Communications to supplement its internal office automation push. But last year Citibank set about buying other computer services concerns (at least seven) actively engaged in selling to the industry. Three are service bureaus for smaller and regional banks: Southwest Data Center (Texas), P.G. Data Center (Ohio), and Colorado Computer Center. Other acquisitions cover companies involved in more general financial services: Thrift Data Corp. (St. Louis), BSI (Dallas), Intercontinental Computing Inc. (Kansas), CPU (in Southfield, Mich.). The latter is also the subject of litigation from Computer Services Corp., also in Southfield, which seeks confirmation that Citibank bought CPU without federal approval. The CSC suit also calls for an investigation and appropriate action.

Citibank is keenly aware that current bank holding company regulations don't give it enough leeway to carry out its master plans. So, with its Citishare application, it is suggesting amendments to the law, observers explain. Former liberal interpretations of both the National Bank Act by the bank's regulator, the Comptroller of the Currency, and of the laws pertaining to bank holding companies, by the Federal Reserve Board, have broadened the stipulation of the law that such services must be directly "related to the business of banking."

Citibank is now pushing for the regulation to be so wide that it encompasses not only the selling of banking, but also of finance and economically related data.

If this happens, and the legal shackles are thrown off, the bank's dp operation is certain to explode. The face of the current $12 billion independent computer services industry—a profile, mostly, of thousands of small entrepreneurial outfits—will change irredeemably.

Sources within Citibank suggest that since it began selling its services on the outside in late 1976, it has nurtured them into a $100 million to $150 million a year operation.

That means, according to experts, that what amounts to preambles and preliminary moves by the bank have already turned it into, at the very least, the 26th largest independent computer services company in the U.S. This is from International Computer Programs' list of some 7,500 services companies that generate any mentionable revenues at all, as well as the hundred or so who do more than $10 million a year in business.

This slice of the marketplace has been generated by an operation that until recently, at least, was at best just ticking over.

When filing for Citishare early in 1979, the bank said that 60% of its external revenues at that time were generated by selling the "excess" from its own computers. The rest came from the General Electric time-sharing network and in-house installations of its systems. They said then that
25% of Citishare's computer resources went to service outside clients.

It is anyone's guess how these percentages might have changed since. But with the increase in outside client base following the new acquisitions, and with Citibank's organizational changes to incorporate them into the bank's Financial and Information Services Group (FISG) under vp Robert B. White, the percentages changed a great deal, sources claim.

Citibank has been less than open about the definition and aims of its Citishare concept. Since its application, it has repeatedly been pressed by the Federal Reserve and ADAPSO to throw more light on the subject. So far, both privately with the authorities and publicly in the courts, it has not done so.

So what are these plans? And what do they mean to the dp and services business?

Sources from both Citishare and Citibank, as well as the public record, have thrown up some clues.

Having been the single largest driving force behind the move to distributed processing in the 1970s, Citibank clearly wants to profit by selling this expertise in the 1980s. Much of its pioneering work in decentralizing its massive IBM central functions was achieved at great cost and much pain. There was a time in its ambitious Project Paradise (DATAMATION, September 1978) when it seemed that the bank had become a shop window for every green and untried minicomputer and terminal in the book.

All this costly education has given the bank a fierce resolve to profit on the outside from its experiences. In addition, the fading profitability of Citibank and others from their conventional banking business has added an economic argument to its plans.

But perhaps the most potent argument that Citibank will eventually unveil for the authorities to justify its penetration into computer services comes from the modern nature of banking. One former Citishare employee says: "Banking in an abstract form is keeping track of information—monitoring it, storing it, and dispensing it." He adds, "As the technology has grown, the banking industry, as defined, is starting to look more and more like the information processing industry."
NEWS IN PERSPECTIVE

The source added that it obviously represents sound banking principles to profit from the degree of similarity of the two converging areas. He said he thought the Fed and the new Administration would see it that way. What we are beginning to see, he concluded, is a new argument of a monopoly in the services area being justified as a "national resource."

So far in Europe, observers point out, the Post Offices (PTTs) have not been restricted from offering services to their own communications monopolies. Now, in the U.S. computer services field, Ma Bell is beginning to do the same thing.

ADAPSO members have privately expressed the fear that their diverse and varied industry would sooner or later be centralized through control by several giants—each a monopoly in its own field. In addition to the banks and AT&T, IBM is beginning to offer services (after having been precluded by law) to its own hardware "monopoly," Exxon and Xerox to the "office of the future," and so on.

What is clear from the Citibank plan is that it anticipates that each "monopoly" will go hunting outside its own traditional turf. It clearly intends to do the same.

Already under development within Citibank's Lexar unit is an advanced function semiconductor-based PARX system. This will provide the heart of a new company that Citibank is expected to spin off at the end of this year, say sources. It complements the System 90 management workstation which has already been sold to users outside the bank.

Both of these forays into office automation are believed to be part of a new subsidiary, BHC Resources Inc., which is expected to be a full-blown challenger to Exxon and Xerox in the office of the future. Another offering in this area is the bank's Automated Information Management (AIM) service, which integrates database management, text manipulation, micrographics retrieval, front office transmission processing, and the like.

Yet another important ingredient believed to be within this subsidiary is a 200-man marketing team in Florida, Citicorp Information Services, which sells minicomputers to bank holding companies. BHC Resources, like at least nine other subsidiaries, was incorporated last year in Delaware, where the laws covering the process are well known for their "softness."

As far as can be known at press time, approval to form these subsidiaries—all cogs in the Citibank wheel—was never sought by the bank. Until the banking laws are amended in the manner that Citibank wishes, its operation would seem to violate the statutes. Perhaps this is why approval wasn't sought.

Former employees of the big bank point out that it tends to shuffle subsidiaries around the Citicorp's vast holding structure frequently and deftly. So the exact place of each piece within the Citicorp-computer services jigsaw is at best an educated guess—even for its own management.

"Their strategy seemed to change every five minutes at one time," said one former Citibank employee. "Executives would go to their respective homes each night, each using his own piece to form an idea of the 'grand plan.'"

The ex-employee added that the bank did originally intend to follow up its Citishare application with a more detailed plan: "This was intended to be formulated some four months after the application for approval," he said.

Following the legal blocks to its move, Citibank now seems content to stall the requests for more detail and wait for the general situation to develop on the outside. "It has not pushed more than $7 million and 40 employees into Citishare; it's waiting to react," said a former employee. But on the inside, away from prying eyes, it has gone about building its empire.

Two of its subsidiaries, Correspondent Resources Inc. and Citicorp Remote Computing Services Inc., will acquire and develop service bureaus to build up a nationwide computer network to service smaller and regional banks. Each bureau currently sits at the center of a network of banks in each state. When interstate banking networks are allowed, perhaps in the mid-'80s, Citibank is positioned to meld them all into a massive national banking network.

Another subsidiary, Thrift Resources Inc., takes its services out to savings and loans institutions. Yet another, to credit unions (C.U. Resources Inc.). A more general subsidiary, Government Resources Inc., is believed to be the locus for Citibank's push into health care and medicaid, as well as municipal tasks such as violations processing.

On top of all this, Citishare itself has already offered a wide range of financial packages, time-sharing services, and database services to the industry. Citibank personnel are beginning to pop up with bids for all kinds of general purpose services contracts, including one for a recent large time-sharing contract awarded by Price Waterhouse (which it lost).

Within Citibank's suggested definition of banking, financial, and economic services, there seems to be no conceivable limit to the types of things it intends to do. What we've seen, say sources, is just the tip of the iceberg. What is under the water could easily sink the small-ship computer services concerns that are bracing themselves against Citibank's big wave. Their industry, they say, has thrived because of its variety and diversity—both by company size and customer requirement. These ingredients have created a competitive atmosphere which has fueled innovation and entrepreneurial flow. They are very much afraid that "monopolists" can only kill such an atmosphere.

They point out that banks (especially the largest) can operate from a position of privilege that is denied the rest of the services industry as well as the fueling business with their money, they are privy to all kinds of sensitive information from their customers and the government alike. All of this can be used with weighty (ADAPSO would say "crushing") effect in the unregulated services area.

So far, ADAPSO has used "at least six figures" worth of its members' money on litigation, say insiders, and is reluctantly moving toward a seventh figure. While resembling a mosquito repeatedly stinging an elephant, ADAPSO still hasn't come up with the mouse to frighten away the giant beast.

For ADAPSO there are encouraging signs that both the Comptroller of the Currency and the Federal Reserve are moving toward a unified approach to the laws governing bank holding companies. As one legal source said, "If the Fed reads the existing laws literally, ADAPSO's case at the next round in May is rock solid." But he added, "If the Fed reads the laws from the background of the evolution of technology, ADAPSO's case is not so good."

As the authorities deliberate, Citibank continues to do the thing it has done so successfully in the past-position itself to take advantage of change. Its big guns are being quietly moved to the front, and are primed and waiting. A favorable nod from the courts could be all that's needed to change the face of a whole industry, and at the same time herald the entry of other major banks that have been watching with interest, such as Bank of America and Chase Manhattan.

Even the most optimistic proponents of the ADAPSO stand feel that if Citishare is stopped this time, it will just emerge in some new form from within Citicorp's vast corporate womb. For Citibank, there seems to be no turning back.

Already the talk is of computer service companies hedging their bets by sounding out AT&T for future contracts in the "coming battle of the monopolists." Some of the more adaptable ADAPSO members could, of course, profit from all the key players in the services game.

But until the game is forced upon them, they'll continue to search for the illusive stone to topple a Goliath.

—Ralph Emmett
You're the D.P. Manager and they're coming at you from all sides. Users are crying for their programs. Programmers are crying for more test time. Operations is crying for more tape and disk drives. Auditing is crying for better security. And you’re crying “HELP!”

IBM has a solution: Buy more hardware and OS/VS.

But Insac Software has a better one: System/Manager. System/Manager is the only integrated system software solution to the full gamut of DOS/VS and DOS/VSE resource management and control problems. Not only does it bridge the DOS/OS gap without the upgrading of hardware or the addition of more sophisticated programmers, in many cases it can actually provide greater capabilities than are available in OS!

While many limited Disk and Tape Management Systems have been available for a number of years, not one has ever approached the breadth of features, ease of use, and high efficiency now offered by System/Manager. Because System/Manager has a unique system/catalog, it can address all the areas of Resource Management: Job, Tape, Disk Space and File Management, as well as Reporting.

Get 90 to 95% of OS benefits at a fraction of the cost. Finance will love this. Instead of the $500,000 price tag on conversion from DOS/VS to OS/VS, the ticket on System/Manager starts at about $8,500. And even that low amount will cost justify itself in an incredibly short time. It will immediately save most users one or more disk packs, quickly cut down on the number of tape volumes required and substantially boost multiprocessing capabilities, thus dramatically increasing overall throughput. Present System/Manager users have experienced a quick drop in job reruns and have generally avoided the host of costly computer operator errors. The file security and control facilities save expensive inadvertent file deletions and overwrites. In short, the many benefits of the more than 100 features in System/Manager can collectively pay off the system in a few short months.

Get long term savings too. System/Manager continues to provide handsome savings even after its initial cost has been justified. You can expect to postpone or eliminate additional disk drive requirements, increase throughput and multiprocessing, simplify operations, reduce reruns, and release programming personnel from tedious chores to be used for more productive applications. And beyond money and time savings, System/Manager can save you considerable aggravation. Don't let DOS/VS or DOS/VSE limit your installation's productivity any longer. Because you can now cross the bridge without falling into the financial abyss. Arrange for a simple, no-obligation trial of System/Manager and see how immediate, tangible and significant the benefits are to you and your company.

You want to know more about System/Manager.

I want to know more about System/Manager.

CIRCLE 35 ON READER CARD
## NEWS IN PERSPECTIVE

### LITIGATION

### ADAPSO VERSUS CITIBANK

Through legal wrangling, the trade group is trying to keep the big banks off its turf.

Beware, all ye data processing entrepreneurs. The big, bad banks are hungry to swallow you.

Or so the Association of Data Processing Service Organizations would have a federal district court and the Federal Reserve Board believe.

The trade group has been promulgating that theory rather successfully since 1977, when it sued Citibank and the Comptroller of the Currency. The suit alleges that the offering by Citibank of certain dp services is in violation of the Bank Holding Company Act. The act requires that a bank holding company or its subsidiaries engage in only those activities that the board has determined to be "so closely related to banking or managing or controlling banks as to be a proper incident thereto."

The complaint also asks that a 1974 interpretive ruling by the Comptroller be declared a violation of the National Bank Act. That ruling gave banks an opportunity (ostensibly in the name of progress, according to then-Comptroller James Smith) to sell "excess" computer power.

At the moment ADAPSO has a slight lead, having persuaded Judge Kevin Duffy, U.S. District Court-Southern District of New York, in late December to dismiss Citibank's counterclaim. Citibank had charged that ADAPSO conspired and combined with its members to delay the bank's entry into the data processing services business and that the action constituted a violation of the Sherman (antitrust) Act.

The action has since shifted to the Fed, and all bets are off. That body gained jurisdiction of the controversy when the $110 billion Citicorp, Citibank's parent holding company, applied for authorization to engage in certain data processing and transmission activities through a subsidiary called Citishare. That authorization would presumably require changes to some of the Fed's current regulations.

ADAPSO, joined by members ADP Network Services, Comshare, National CSS, On-Line Systems, Quantum Science Corp., and Tymshare, took strenuous objection to Citicorp's request. It asked the board to either deny the application or order a formal hearing on it. The board decided in November to hold a hearing on the applica-

---

**Citicorp argues that the Fed's regulations aren't flexible enough to accommodate the current diversity of dp services offerings nor to anticipate future technological developments.**

will, among other dp activities, provide to others byproducts resulting from permissible dp and transmission activities and sell to others for any purpose any excess capacity on data processing and transmission facilities used in connection with any of the newly authorized activities.

"No artificial restrictions should be placed on the natural evolution of technology," Citicorp counsel Richard Whiting told Judge Alpin. "Much of our competition comes from unregulated companies, and banks must be able to utilize fully the latest technology to stay competitive. Protestants [ADAPSO and friends] are trying to limit the use by holding companies of this technology and therefore prevent them from effectively competing."

"That is not the issue," countered
Discover the depth of changes brought about by the IBM 4300 Series.

DON'T LET IBM FOOL YOU AGAIN!

An insightful three-day seminar that asks the question: IS THE 4300 AN INDUSTRY UPDATE OR A REVOLUTION?

Send for full seminar information!

Do you believe that the IBM 4300 Series is the latest, most cost-effective reincarnation of the System 360/370 using 64K bits/chip technology? Well, it might not be so... especially with the 4331 hardware, and the software for the 4341 and the 4331.

New configurations signal a sharp break in the previous philosophy of centralized data processing. IBM is now moving towards interactive processing and program development on multiple systems close to, or even in, the user departments themselves.

IBM is Like a Centipede. You’re Always Waiting for Another Shoe to Drop.

The 4300 Series is more than the next shoe. It could be a cleverly disguised revolution in IBM's manufacturing and software plans. Frederic Lamond, TTI's seminar leader, gives you an objective explanation and appraisal of this radical departure in hardware and software design.

Why has IBM opposed distributed intelligence until recently? IBM has gone out of its way to play down the fundamental changes heralded by the 4300 Series. Mr. Lamond's investigative presentation shows you the real depth of the changes, the importance to all DP users, and the possible impact on the entire industry.

Is the 4300 Series for You?

What is the real story on the 4300 Series? What are its strengths and weaknesses? How can it best be used — both on its own and alongside other hardware? What are the alternatives — both from IBM and other mainframe manufacturers?

This timely seminar is an important continuing educational experience for all senior DP personnel — even those who are not presently using IBM equipment. Coming industry changes caused by the 4300 Series breakthroughs will affect all data processing within your organization.

FREDERIC LAMOND

Frederic Lamond worked at The Economist Intelligence Unit before joining Univac as a Senior Systems Analyst. You have read a number of his articles in Datamation and Computer Weekly. This seminar is the result of a just-completed investigation of the IBM 4300 Series. Mr. Lamond is a seasoned speaker who entertains as well as informs seminar attendees.

May 13-15, 1981 Los Angeles
May 20-22, 1981 Boston

Write or call Technology Transfer Institute
today for full seminar information:
(213) 394-8305

Please send me more information on the
IBM 4300 SERIES Seminar

Name

Company

Address

City State Zip

Telephone

CIRCLE 41 ON READER CARD
NEWS IN PERSPECTIVE

ADAPSO general counsel Milton Wessel. "There's no question that banks can use whatever technology they want. Marketing of dp technology by banks is the issue." That's not all, folks. ADAPSO challenged Citshare's proposed sale of excess computer time and time-sharing services as means for evading restrictions on processing non-financially related data. It contended that since a purchaser of the proposed time-sharing service would have a terminal on its own site, it would be impossible to monitor the purchaser's use of the computer services to prevent the impermissible processing of non-financially oriented data. It also claimed that many of the proposed dp services were not the kinds traditionally offered by banks.

Going for the jugular, ADAPSO argued that Citicorp's unrestricted entry into the computer services business would result in unfair and decreased competition, undue concentration of economic resources, and the likelihood of unsound banking practices. The adverse effects of allowing the newcomer in would, in this view, far outweigh any potential public benefit.

"The heart of the case," Wessel said, "is to what extent a corporation—a bank holding company—holding a government grant of monopoly power can use that grant to enter another market that has been thriving and competitive."

"For ADAPSO, Citishare equals Citibank. We protest the linking of the bank, the holding company, and data processing. We don't believe that the power of the bank and the holding company can be effectively separated. We are unwilling to rely on maximum separation."

After several hours of testimony, the judge gave Citicorp until May 18 to submit its statement on why it should get what it wants. ADAPSO will then have three to four weeks to respond. And as tomorrow and tomorrow and tomorrow creeps in, each side will bring in witnesses and cross-examine them. A firm decision from the Fed, then, is surely months away.

"It continues to be ADAPSO's belief that banks and holding companies should stick to the business of banking," ADAPSO president Jerome Dreyer concluded.

Will they or won't they? Not even the administrative law judge knows for sure. This show has several more acts.

-Willie Schatz

THE PCMS

BAD TIMES FOR THE ECONOMY BODE WELL FOR THE PCM VENDORS, BELIEVES NATIONAL ADVANCED SYSTEMS.

Ridiculously high interest rates, a lousy economy, and double-digit inflation seem to be providing the shot in the arm needed by the plug-compatible mainframe industry. When businesses are forced to run lean, reduce expenses, but still add to computing capacity, that's when the lower-priced alternatives to IBM systems gain credence in the marketplace. In bad times, says David N. Martin, executive vice president of National Advanced Systems, "...we gain market share percent and we're impacted less on an absolute basis than, say, IBM or Burroughs is."
Our new daisy wheel terminal gives you a lot more than pretty type.

The AJ 833. Latest in the AJ family of daisy wheel printing terminals with superlative print quality.

But there’s a lot more to the AJ 833 than pretty type. No other terminal of its kind can match the AJ 833 for applications versatility—timesharing, high-resolution plotting, communications, text processing, letter writing, and APL.

The AJ 833 does so much because it has so many built-in capabilities. Such as a unique, totally programmable keyboard. You can program every key for special use—and seven keys for multi-function use, with up to 31 steps. This lets you perform repetitive tasks, such as logging on the computer, at the touch of a single key.

You also get a non-volatile memory to store terminal status even when the machine is turned off, single-key status reporting, 45 cps bi-directional printing, precision plotting, and selectable data rates up to 450 bps.

If you need even more capability, the AJ 833 can provide it. Among a long list of options are 600/1200 bps full duplex operation with buffer overflow protection, extended memory, IBM 2741 compatibility, and Ultraplot high-speed plotting.

You can also add proportional spacing. And a text enhancements package that includes bold face printing, automatic centering, automatic underlining, even automatic margin justification.

If by chance you need less capability, you can choose one of the other members of the AJ daisy wheel family—the low-cost AJ 830 or the mid-range AJ 832. You can even upgrade existing AJ 832s to full AJ 833 capability.

That’s family for you.

We’ve got growing families of other types of terminals, too—efficient dot matrix printers, quiet thermal printers, and versatile CRTs. So you can come to us whatever your needs.

Another thing. We won’t sell you a terminal and forget you. Because we not only manufacture terminals, we also lease, install, and service them. Worldwide. When you deal with AJ, you deal with the source.

For details about the new AJ 833 or any of our terminals, call the AJ regional office nearest you: San Jose, CA (408) 946-2900; Rosemont, IL (312) 671-7155; Hackensack, NJ (201) 488-2525. Or write Anderson Jacobson, Inc., 521 Charcot Avenue, San Jose, CA 95131.
A whole generation ahead

The brilliant idea that created the Tandem NonStop System eliminated the "single point of failure" throughout the system and the system still thrives today. The system was designed to withstand failure situations at any point of failure. Perhaps most critical of all, there had to be "NonStop" protection of data and the integrity of the database. It took one brilliant idea to create the Tandem NonStop System, but it took hundreds more to implement it. And still more to improve it. The end result is the first commercially available NonStop online distributed processing system. It's a transaction-oriented, fast-transaction, transactional highly available database. It features low cost per transaction plus through protection for data, programs, and the data base. This is how we did it. Key distinctions from the rest of how it used to be.

NonStop architecture

The system was designed from the ground up, with the idea that no single component failure would bring the system down. We designed it with the certainty that errors or failures are bound to occur. Accordingly, we provide hardware, software, communications, and a variety of tools and techniques for error detection, checking for errors, and dealing with them.

NonStop software

Tandem's software packages which we will take advantage of "NonStop" capabilities and are essential to the system.

NonStop operating system

Tandem NonStop is a completely new operating system, designed from the ground up to provide all the tools needed for high performance and reliability.

A Tandem NonStop operating system is built on a completely new architecture, which is designed to be flexible and efficient. The system is scalable and can be expanded to meet the needs of any organization.
NorStop Systems

NorStop Systems, designed to operate at the
frontier of computer science, offers
breakthrough technology that
provides speed, efficiency and ease of
task with all the benefits of
NorStop's heritage.

One of the keys to the
NorStop System's strong
performance is the single
networked database that
functions as a backbone
for all applications. This
unified database, combined
with NorStop's advanced
technology, provides
unparalleled efficiency and effectiveness.

The NorStop System
permits multiple
central processing units
located anywhere in the
network. From anywhere in the system,
all the information is immediately
available and can be accessed
instantly. NorStop's System
provides the quick response
time necessary to meet the
rigors of today's business
environment.

A single, high-level language
environment allows for
enhanced productivity,
reduced development
time, and a more
user-friendly system.

The NorStop System
permits multiple
central processing units
located anywhere in the
network. From anywhere in the system,
all the information is immediately
available and can be accessed
instantly. NorStop's System
provides the quick response
time necessary to meet the
rigors of today's business
environment.

The NorStop System
permits multiple
central processing units
located anywhere in the
network. From anywhere in the system,
all the information is immediately
available and can be accessed
instantly. NorStop's System
provides the quick response
time necessary to meet the
rigors of today's business
environment.

A single, high-level language
environment allows for
enhanced productivity, reduced
development time, and a more
user-friendly system.
**Next time you want to impress, cite your decision to use KV Jackets.**

Today, few business decisions make more of an impression than those resulting in lower costs and improved efficiency.

That's why you should get to know KV MicroLimit Jackets. Not only do they improve filing and retrieval, they can save you up to 22% in costs.

What makes ours a better jacket? For one thing, KVs are not the "glued on" polyester ribbed type that can lose their adhesion. KV Jackets feature ultrasonic dual seal welding (a process we pioneered) to ensure durability under high retrieval conditions. We also added skip seals to prevent tearing and promote longer wear.

KV Jackets come with top service, too. Three to five day delivery versus 30 to 60 elsewhere. And that's for jackets with the best duplication characteristics in the industry. Add all these benefits and you see why KV Jackets are unique at their cost. KV Jackets with the best too. Three to five day delivery to prevent tearing and promote durability under high retrieval conditions. We also added skip seals to prevent tearing and promote longer wear.

**For fast action, call toll-free 800-238-3966**

KV Jackets: Kleer-Vu Industries, Inc., Dept. CAE
P.O. Box 449, Brownsville, TN 38012

Send me the full KV Jackets story plus FREE Samples
Print Name__________________________
Title_______________________________
Company____________________________
Address____________________________
City______ State______ Zip___________
Business Phone:______________________

---

**NEWS IN PERSPECTIVE**

By Martin's reckoning, the installed base of PCM mainframes worldwide at year-end 1980 looked about like this: NAS has between 500 and 600 processors installed, Amdahl Corp. has from 400 to 500, Magnunson Computer Systems has from 150 to 200, and the IPL/Control Data combine has from 100 to 150. All this has taken place in the few short years since the first of these plug-compatible machines was installed by Amdahl back in 1975. Further, Martin points out, NAS and Amdahl and Magnuson all shipped more hardware in 1980 than ever before. "And that will happen again in 1981."

He cites at least two reasons for this. One, the tarnish has about worn off the image of the PCM industry. When IBM established a startlingly new price-performance level with its 4300s, introduced in January 1979, the market went into a tailspin as mainframe customers put a hold not only on new orders but also on deliveries of previously ordered machines. Itel Corp. was forced to turn over its PCM business to National Semiconductors, which found that its first priority had to be to convince its customer base that National was in this business for keeps, that it would be able to continue supporting those customers. Martin personally had to make presentations to his customers' key managements about five times a week, trying to convince them of both the PCM industry's and National's viability. "I can't remember the last time I did one of those," he says now.

NAS strives to have the broadest line of IBM-compatible equipment in the business.

Secondly, he adds, user indecision that stemmed from their uncertainty over IBM's future products and prices has gone away, after announcements of the 4300 Model Group 2s and the more recent 3081. "So people are back in the decision-making mode," he avers.

The Mountain View, Calif.-based NAS strives to have the broadest line of IBM-compatible equipment in the business—not only a line of computers from small-scale to large but also tapes, disks, and communications gear. For many customers, NAS wants to be the single alternative to IBM. The company manufactures medium-scale processors in San Diego, Calif., hardware with power comparable to the IBM 4341 and on up to the 3031. To date, San Diego has produced more than 500 of these computers. In addition, National handles larger mainframes supplied by Hitachi Ltd., these spanning the IBM line from the 3031 to more horsepower than the 3033-AP.

And earlier this year the company added the AS/9000dpc, a tightly coupled system with almost twice the performance of the previously top-of-the-line 9000 im-

---

**DAVID N. MARTIN: *"Right now we're moving 4000 family products at a higher rate on a worldwide basis than at any other point in the history of the company."***

ported from Hitachi. The 9000, comparable in power to the IBM 3033MP, is about three times more powerful than the AS/7000, which is also supplied by Hitachi. With the announcement of the 9000 dual processor complex, NAS also lowered the price of a 16MB, 16-channel 9000 to $3,685,000, down from the original $4,520,000.

The new processor, of course, puts NAS into the same marketplace as the IBM 3081, as well as Amdahl's V8 and the new 3805s. And for the first time it puts NAS in touch with the nation's largest corporations. The company in recent weeks has hosted representatives from AT&T, GTE, Bank of America, Manufacturers Hanover, General Electric, and Chrysler for visits to the company's headquarters in Palo Alto, Calif., and the other at Guardian Royal Exchange Life Assurance Society in the U.K.

As for installations in '81, NAS says it may be held back not by market demand but by its supplier, Hitachi.

Motors, Ford, and Lockheed—people who have had to come and take a look at what the newest store on the block has to offer. "They never really had reason to be here in the past 12 months," Martin says.

The first two NAS 9000s, announced in September 1980, were installed in December, one at Lockheed in Palo Alto, Calif., and the other at Guardian Royal Exchange Life Assurance Society in the U.K. Martin won't say how many NAS expects to install in '81, citing corporate policy, but says the company might be held back not by market demand but by its supplier. Hitachi reportedly underestimated its domestic demand for the M-200H by a factor of more than two, and the NAS/9000 is based on the production-bound M-200H.
NonStop DBMS

5. The challenge: NonStop operation in an on-line environment.

To design a fault tolerant system (no single point of failure) requires a multiple processor environment and thus a distributed system. Programs must be able to run anywhere and to access data anywhere in the system without specific knowledge of physical location. In the event of a failure, system loads must be redistributed dynamically without changing application software. All this while the application is running in a single multiple processor system or in a multi-node network. Nothing less could assure availability of all resources through an otherwise crippling failure.

Consider the burden facing data base management in such an environment.

Users must be able to distribute a data base not only across multiple processors, but also across multiple systems in a network.

If the data base model is dependent on hard-coded pointers within the files, updating all these pointers is a nightmare. The problem is compounded if any one remote location is not available at the time of an update. Without concurrent access, the state of the data base is potentially inconsistent.

These pointer problems make both hierarchical and network data base models inflexible and difficult to modify. When the requirement to move files and applications among processors and among systems is coupled with the need to maintain the ability to transparently access the data base from any point in the network, the problem becomes staggering.

The solutions are in the relational data base model.

A relational data base is a collection of data items represented logically as two-dimensional tables. Files use logical fields within records as their only required linking mechanism. Users need not be concerned about details of structure, only about the logical relationships which exist between files. This simplicity and the ease of use inherent to relational data bases has been obscured historically by attempts of vendors to shoehorn add-on relational structure to a conventional operating system. The results are laboratory curiosities, interesting but cumbersome, and they give relational models an undeserved reputation for poor performance.

The Tandem data base management system, ENCOMPASS, is the world's first on-line relational DBMS designed right into the operating system. It's optimized for high performance and NonStop operation. Residing in each processor, ENCOMPASS provides complete independence from concerns about physical location of data. A user or an applications programmer need only know the file name of the data, peripheral device or system to be accessed.

Fully integrated into the operating system, the data base system handles enormous numbers of transactions with speed and efficiency.

Using ENCOMPASS, we can go straight from 'Read Record A' to the correct disc without having to utilize the intervening software steps typical of other systems:

a) DBMS translating the command into appropriate instructions, b) data base access methods determining where the data is located and translating the instruction to appropriate disc addresses and c) I/O services, part of the operating system, finally performing the actual retrieval.

Every level of software introduces more overhead and interferes with efficiency. Following the principle "closer to hardware equals greater efficiency," our data base operating system achieves outstanding performance:

In normal use, any random record from a file which fills a 300 M byte disc drive can still be retrieved with an average of one seek, using only one logical key to start the search.

One more reason why the Tandem NonStop System is a whole generation ahead: Call or write for complete information, Tandem Computers Incorporated, 20333 Vallco Parkway, Cupertino, California 95014 USA.

TOLL-FREE: 800-536-3107 or (408) 725-5000 in California.

TANDEM
CIRCLE 46 ON READER CARD
A whole generation ahead NonStop Systems
In addition to the 10 MIPS AS/9000, National is also getting its AS/7000 from Hitachi, the latter machine having about a third the power of the former. Martin notes that customers who have had their 7000 for three years are now looking for upgrades.

To assist in the migration of its 7000 customer base, NAS last month announced the 9000N, a processor with 80% the performance of the 9000.

and says a half-dozen or so prospects for the 9000 are from NAS’s own customer base. But, apparently to assist in that migration, the company last month announced the 9000N, a processor with 80% the performance of the 9000.

Below the 7000 is the 5000 family, which traces its lineage back to the Itel as/7031 made by National Semi and announced by Itel in November ’77. The 5000s, including upgrades announced late last year that incorporate features from the IBM 4300s such as DOS-VSE in native mode, are said to be gaining in acceptance. Martin credits this both to the new capabilities and to a stimulation of the market resulting from IBM’s 4300 Model Group 2 announcements. “Right now we’re moving 5000 family products at a higher rate on a worldwide basis than at any other point in the history of the company,” he says. He sees this continuing through the year.

But what excites Martin is that while he expected his smaller processors to be sold to smaller companies, larger mainframes to the largest corporations, he has begun to see 5000s being ordered by the latter for use at their second- and third-level remote sites. It’s distributed processing, and just as IBM has been installing 4341s at customers’ remote sites, some 50 to 100 at a crack, so also this has begun at NAS, albeit on a much smaller scale. “We now are starting to see some business in that area as well,” he says with a smile. That has become an important new market for them, and it’s nice to have in one’s product line the large-scale mainframes to go along with them.

When National Semiconductor acquired this business in late 1979 from Itel Corp., which earlier this year entered Chapter 11 bankruptcy proceedings, it got some 2,000 customers, the vast majority running some plug-compatible peripherals that required continued servicing by National. Now there are more than 2,000 customers in the U.S. alone, and of them some 300 to 400 are CPU-only customers. Since the acquisition, National has increased the number of customers some 10%, says Martin, but “that hasn’t been our focus, adding new customers.” The immediate need was to infuse the customer base with confidence in its new vendor. And there is reason to believe that this has taken place.

In 1981, says the confident Martin, the largest shippers of medium- and large-scale computers in absolute numbers will be NAS and Amdahl Corp., following IBM. This by two companies that five years ago hadn’t yet shipped their first computers.

—Edward K. Yasaki

**ANN ARBOR AMBASSADOR™**

**SETTING THE NEW STANDARD IN PRICE AND PERFORMANCE**

$995*

$1100*

*OEM 100 pc. price, U.S. domestic sales

The Ann Arbor Ambassador offers an impressive array of features for any CRT terminal application: Large 15-inch screen • 60 line display • Zoom and Scroll • Selectable host areas and scrolling region • 5 graphic renditions • 5 area qualifications • 22 cursor controls • 12 tab controls • 12 erase controls • 12 edit controls • 12 send controls • 10 print controls • 11 receiving modes • 11 operator convenience modes • 5 setup lines • Self-diagnostics • Down-loadable function keys • Support of ANSI X3.64, ECMA-48 and ISO DP 6429 coding • Ann Arbor quality • And much, much more.

Call or write us for more information!

6175 JACKSON ROAD • ANN ARBOR, MICHIGAN 48103 • TEL: 313-663-8000 • TWX: 810-223-6033

CIRCLE 47 ON READER CARD
**NonStop™ Network**

8 Unique network system architecture

The goal: NonStop™ operation in an on-line network.

The network must be able to handle the loss of any critical element without loss or duplication of any transaction in progress and without damage to the database. Applications must be able to run anywhere and access devices and files anywhere in the system without having specific knowledge of physical location. In fact, the entire network must look like a local resource to every user. This requires complete geographic independence.

The solution is the NonStop™ network. Every Tandem system is effectively a local network comprising two or more processors.

So even the minimum system is already a complete, true distributed processing NonStop™ network. A unique message system at the heart of every system controls communications among processors. Networking software simply increases the scope, to allow communications among as many as 256 separate Tandem systems—each ranging in size from two to sixteen processors. To the user, Tandem's network EXPAND™ appears as a single set of computer resources rather than a collection of individual systems.

The result is something totally new in on-line transaction-oriented systems: the ability to deal with a remote program, a remote processor, a remote terminal, even remote data as if it were right at the users' fingertips.

Since programs can access devices and files anywhere in the system without having specific knowledge of physical location, the development of applications can be identical to single or multiple system environments. A request for information may originate from any node and that same request can be run on any other system in the network without the need to modify it in any way. And it is incredibly easy to learn. Since the network uses the same inputs and procedures as the minimum individual system, there is no need for special training manuals.

The EXPAND network gives users the flexibility to build a network that supports their business and not have to change the software on the network. Users can place exactly the right amount of computing power at each site.

As computing requirements grow, they can add memory, processors or peripheral devices to any site and still retain total compatibility of operating system, data and application programs.

In fact, nodes consisting of 2 to 16 processors can be added or removed and communications paths altered without recompilation or changing a single line of code in existing application programs.

Another reason Tandem is a whole generation ahead. Call or write for complete information. Tandem Computers Incorporated, 1985 Valley Parkway, Cupertino, California 95014 USA. Toll-Free 800-538-6107 or (408) 775-6000 in California.

**TANDEM**

A whole generation ahead

NonStop Systems
try. But all that has changed since the company went on the acquisition trail in the late 1970s.

Today M/A-Com Inc. is involved in virtually all the burgeoning phases of telecommunications. Of particular interest has been the company's growing involvement in data communications networks as typified by its acquisition of Digital Communications Corp. (DCC).

Having concentrated on assembling the pieces needed to build advanced networks, M/A-Com now appears ready to put it all together—in more ways than one.

In order to meet its own internal communications requirements, the company has announced plans for a network that will initially serve in-house needs but will also form the basis for a commercial network product available to dp and other users. To be called Macomnet, the coast-to-coast system will connect corporate locations with such capabilities as electronic mail and teleconferencing, in addition to data transmission.

Using satellite communications for long-haul transmission, Macomnet will provide an end-to-end network capability. Earth stations in the system will be 4.6 meter, 15 foot antennas produced by the Prodelin division of the company, according to Andrew Werth, senior vice president of DCC. Locations to be interconnected include Burlington, Mass., which is M/A-Com's current headquarters; Germantown, Md., where DCC is based; North Carolina, where the Valtac division produces fiber optic and other cable; San Diego, Calif., where the Linkabit division makes microprocessor-based control equipment for military satellite systems; and Boca Raton, Fla., where M/A-Com will establish a new corporate headquarters.

A key element of Macomnet will be the use of Dynac earth stations which are based on Dynamic Network Assignment Communications using time-division multiple access (TDMA) modulation. Local distribution elements of the network will use the same systems that are being tested in a cooperative venture that M/A-Com is conducting with Satellite Business Systems (SBS) and Tymnet Inc.

Through another affiliate, Local Digital Distribution Co. (LDD), M/A-Com is demonstrating the feasibility of Cable Pack-

et Communications (Capac) and Radio Packet Communications (Rapac) systems. These will be included as part of Macomnet, depending on local transmission requirements, Werth said.

While B/C-Net will be primarily a private network, the company doesn't rule out its ability to interconnect with public data networks.

For the corporate network, such applications as subminute facsimile, both slow scan and full motion teleconferencing up to 1.5M bit/sec, 56K bit/sec data transmission, and other uses will determine the equipment to be used. The follow-on commercial network offering, to be known as Business Communications Network (B/C-Net), will draw on a variety of options so that each configuration is tailored to the needs of the customer, he said.

With Macomnet scheduled to be operational in the spring, the company expects to have a commercial version ready before the end of the year. Discussions have been held with several prospective companies about the installation of B/C-Net, Werth revealed.

The Rapac system was originally part of the cellular radio concepts proposed as part of the Xerox Xten network, and
Data Vault.
They're all the security your software will ever need.

Today, your software is faced with severe security problems. Problems that can happen every time your computer tapes or discs are carried, shipped or stored.

It's the world—out to destroy your data. With dust and moisture. Accidents. Careless handling. And the frightening thing is, there hasn't been much you could do about it. Sure, you could get "special" packaging. And end up fighting clumsy flaps or metal inserts to pack your valuable software. Losing time. And money, when containers proved less than durable.

But now there's something better: Data Vault shipping, carrying and storage cases. Engineered to give your data the security it deserves.

Data Vault cases are ruggedly built of precision-engineered thermoplastic material. With internal foam to absorb shock. Convenient positive action locking. Integral labeling. And durable fail-safe carrying handles. In a range of models to economically meet all your transport and storage needs. All, backed by the reputation for reliability we've earned over the past fifteen years, protecting priceless footage for the motion picture industry.
So don't trust your software to luck. Trust us. For more information, see your local computer products dealer, or write or call us directly.

©1981 Plastic Reel Corporation of America

PRC Computer Products Company
A Division of Plastic Reel Corporation of America
46 Passaic Street, Building 52, Wood Ridge, NJ 07075 (201) 933-9125
Or Call Toll-Free:(800) 526-7453

CIRCLE 50 ON READER CARD
NEWS IN PERSPECTIVE

some FCC approvals may be required before
this type of distribution system can be in­
cluded in the company's commercial offer­ing.
The highly directional, low power radio system was proposed to operate at 10
GHz, but this could be modified for other
frequencies if the Xen proposal is not au­
thorized, he explained.

While B/c-Net will be primarily a
customized private line network offering,
Werth did not rule out its ability to intercon­
nect with public data networks if customers
need this type of extension. Although the
network offering will depend greatly on
each customer's requirements, Werth said
that costs could come down to "about
$90,000 per earth station site."

The key advantage of B/c-Net, ac­
cording to Werth, is that the user can get a
customized network, including intercity,
intracity, and even intrafacility intercon­
nections. Satellite links can be replaced
with other long haul transmission if that
seems more feasible, and all-digital Data­
phone Digital Service (DDS) facilities would
be compatible with the system, he said.

Essentially, B/c-Net is an integrated
corporate network solution for large busi­
ness users. In order to prove the concept,
Macomnet will be used to link the most de­
manding customer of all—the parent corpo­
ration.

—Ronald A. Frank

A PRO AT SNA SOFTWARE

A software package from
Comm-Pro Associates allows
teletypewriters and similar
asynchronous terminals to
transmit data to IBM
mainframes operating in SNA
nets.

While users of IBM’s Systems Network Ar­
chitecture (SNA) wait for the vendor to pro­
vide support for terminals attached to X.25
nets, a small telecommunications software
supplier already has such a product.

Comm-Pro Associates, which spe­
cializes in giving IBM 3705
users features
not available from IBM, has a package that
allows teletypewriters and similar asyn­
chronous terminals to transmit data to IBM
mainframes operating in SNA nets.

Called Network Access Software
(NAS), the package later this year will be up­
graded to support IBM’s main line of 3270
type crt terminals, according to Steve

Dubow, a Comm-Pro partner. While admit­
ting that his X.25/SNA software has drawn a
high level of interest from IBM network
users, Dubow pointed out that his firm has
specialized in such products since 1973.

Starting with packages for the earlier
IBM 2703 line controller, Comm-Pro later
phased into software for the 3705 when it
became the main front-end for IBM network
customers. Today the firm has packages
running at more than 200 user sites, and in
each case the software makes maximum use
of IBM software so that existing applications
and network operations are not adversely
impacted.

Does Dubow worry that the soft­
ware modifications developed by his
company will be announced by IBM? Not
really. He explained that IBM cannot afford
to write specialized teleprocessing software
unless its market studies show that enough
users will want it and use it to justify the
development effort.

So what about SNA support for X.25?
Dubow said that it would take widespread
support for the international standard on a
network like AT&T’s long promised Ad­
vanced Communications Service (ACS) for
IBM to make a major commitment. He has­
tened to add that IBM might offer more
limited X.25 support before that, but in ei­
ther case he doubted that such a move would
severely restrict Comm-Pro’s opportunities.

The Perfect Pair
for Digital Testing.

EIA Interface Test Set

Continuous monitoring
of 9 interface signals
Two uncommitted
indicators
Two clock activity
indicators
Twenty-four signal
isolation switches
Does not load inter­
face signals
Sturdy case with alumi­
num extrusions, hinge
and positive latch

Modem Test Set

Test asynchronous
modems from 300 to
19.2K bps
Test synchronous mo­
dems up to 76.8K bps
Full duplex operation
Crystal controlled
clock
Self test capability
Transmits 4 different
patterns

Quality is the standard
by which every
Electrodata product
is measured.

Electrodata, Inc.
23020 Miles Road
Bedford Heights, Ohio 44128
(216) 663-3333
TWX: (810) 427-2280

CIRCLE 51 ON READER CARD
A similar situation exists with the impending upgrade to the 3705. While the new front-end may include more liberal SNA features for users, IBM has so much software development folded into the 3705 that it cannot afford to completely obsolete existing SNA software systems, Dubow believes. Also, users have put significant effort into migrating to SNA, he added, so any new front-end capabilities will have to be approached in an evolutionary manner.

The list of Comm-Pro software packages, which now number more than 10, read like a cookbook of features that users of IBM front-ends would like to have. Such capabilities as automatic speed select by a 3705 of teletypewriters and IBM 2741 terminals on the same line; code conversion between ASCII and BCD terminals; the ability of low-speed terminals to access multiple IBM hosts through a 3705 are routine with software from the independent supplier.

Comm-Pro was an outgrowth of an early data communications company called American Data Systems (ADS). In the early 1970s, ADS had a front-end that had many of the advanced features not available until much later on the 3705. When the company went out of business, its ADS 900 front-end had more power than an IBM 360/40, Dubow said.

So with ADS gone, Dubow and others formed Comm-Pro to provide software that would give many of the advanced features to IBM front-end users. Although there have been few suppliers of front-ends, Dubow gave credit to Comten, which he said was comparable in capabilities to the ADS equipment. Comten is now part of NCR, but for many years it was one of the few independent front-end suppliers.

Getting back to the Comm-Pro X.25 package, Dubow explained that the key to making a teletypewriter compatible is to make it look like a known terminal device to the IBM host. "On either end of the X.25 connection it looks like a Teletype, and when it gets into the Network Control Program (NCP), it maps the Teletype to SNA. That's how it's done," he said. This software mapping is done by the IBM Network Terminal Option package—with modifications developed by Comm-Pro.

Asked if the overseas products available from IBM will be similar to U.S. X.25 support, Dubow said the current overseas versions rely on both software and hardware. "It's much cheaper to do it in software than to do it in both hardware and software," he said, suggesting that IBM would probably use an all-software approach for U.S. network users.

For IBM, the stakes are high in deciding what features it will give its network users. As IBM unfolds its capabilities, the specialists at Comm-Pro look for little niches that have been overlooked where they can tailor a package.

—Ronald A. Frank

APPLICATIONS

SOCAL'S SOLUTION

Programmers produce an average of 4,000 lines of debugged code per month in the programming environment at Standard Oil of California.

There's something to be said for those things called programming environments. Especially one that enables a programmer to produce an average of 4,000 lines of debugged code per month. And one where the dp manager is equally ecstatic about other benefits it is getting.

The company is Standard Oil of California, based in San Francisco, and its environment is called the Chevron Program Development System (CPDS). It is an integrated applications programming environment centered around its own version of PL/I. Programmers write only macros of executable code in a language called PL/X (for programming language/extended), and from each programmer-written line of PL/X code the system generates between one and 10 lines of PL/I code. This explains in part applications programmers' high output.

Because the system generates the source code, it also achieves a very high level of standardization. This, in turn, eases the maintenance job. But the CPDS also facilitates system definition and documentation, analysis and design, system test, installation, and production, in addition to programming and system maintenance. For management, it also provides access to information about project cost and progress to date.

The CPDS has been used by SOCAL for just over four years, developed at a cost of about a half-million dollars when the company had to develop a credit card processing system. At the time, that was considered a large job, perhaps requiring 15 to 20 man-years. After that came a wholesale marketing project, which appeared to be a 200 man-year endeavor. With a project that large, requiring at least 80 people, "we had to have something, especially in the IMS environment, which is very complicated, to try to hold them together," says David P. Davis, application consultant with the
Call a manufacturer and you’ll hear one story: Me, me, me.
Call Selecterm and you’ll hear the whole story: Which manufacturer is best for what kind of business; where the new technology is coming from; which terminal and how many.
Selecterm leases the finest data terminal equipment from all the major manufacturers of terminals. We don’t just push one (unless we think he happens to be the best one for you).
We won’t recommend more terminals than we think you need.

We won’t hold anything back. If there’s better equipment coming out in a month or two, we’ll tell you to wait.
You see, we’re in business to offer you management help on the selection and service of the best terminal equipment.
The best doesn’t mean the one that’s most easily available, or the one that brings in the highest commission.
The best means the one that’s best for you.
Because what’s best for you is best for us.
To our way of thinking, an open mind is a lot better than blind loyalty.
NEWS IN PERSPECTIVE

Computer Services Dept. at SOCAL.

For the wholesale marketing project, the productivity of each programmer was about 2,000 lines of PL/1 code per month. But Davis explains that on large projects something less than 50% of the people are actually producing code; the remainder are support people and management folks who, obviously, are not programming. So if one takes the 2,000 lines of code and dilutes that by including the other people on the project, it comes out to about 1,000 lines per month. More recently they've had programmers on smaller jobs and here the output has been about 4,000 lines. Typically, on small projects everyone programs, so there's no dilution. And that gives you a 4 to 1 ratio between a three-man project and a 50-man project. "During the period when people are programming and testing," he says, "we figure we gain somewhere between 5 to 1 and 7 to 1 over the more manual methods we used prior to this." But the CPDS does not make much difference in productivity in the front-end activities, getting the specifications and doing the design work. In the early days, programming and testing was perhaps half the project, but now it's more like 15% to 20% of the total. "Also, modern methodologies put a lot of emphasis on the front end—doing lots more design before you start programming." This has made the front end bigger and helped lower the ratio.

Davis says it is difficult to cite statistics of the CPDS as a maintenance tool because of a lack of numbers that make comparison possible. But the credit card system is being maintained by only three people. He says another large oil company has the same size credit card customer base, and has 35 people maintaining its credit card system. SOCAL feels it has been able to get programmers productive in a couple of months, even when they know nothing about IMS.

It's a good trade-off.

If SOCAL had to it do all over again, would it take this same programming environment approach? "Oh, yes," enthuses Davis. "Primarily, I think, because we really don't see how we ever would have accomplished those two enormous projects without some programmatically enforced standards. To get people to try to enforce them is almost hopeless in that environment."

An additional benefit has been the ability to front-end IMS, "trying to keep the programmer from having to know so much about IMS in order to use it," he explains. The company feels it's been able to get programmers productive in a couple of months, even when they know nothing about IMS, with this system. Before CPDS, it might have required two years to get them productive to the same level. Davis explains that CPDS is not for IMS exclusively, and is used for other things, but the major thrust has been with IMS, perhaps because it's the hardest thing to code.

Significantly, the system has become so popular with programmers that they consider it the development technique. "For the first time in this company's history," says Davis. "It looks like we finally have development under control, in the sense that almost everyone is doing it the same way. We know how they're doing it because they're going through programs we've written and so we have the control to change those programs and therefore change their output. We didn't really anticipate that direction, but these days that's probably one of its most important benefits."

Recently the company performed an inventory of the programs written in this manner, finding something like 100,000 modules—individually compilable PL/1 programs. If something about IMS were to change, or if their understanding of IMS were altered, and they wanted to modify the way those programs deal with IMS, it would be virtually impossible to locate that many programs and change them to deal more effectively with IMS. But now they know where the programs are. Much more significantly, they can (and quite often do) change the code in the CPDS, then pass all those programs through over a weekend, and they'll have all the Standard Oil systems pick up on that new technique.

"And we have data dictionaries for all those systems, too." Standard, like so many other companies, is interested in data resource management. "We aren't there yet, but because we have data dictionaries for all these major systems that are automa-

Model 204 DBMS.
A perfect 4!

Bull's eye! The leading software rating service gives Model 204 DBMS a perfect score—4 out of 4—for ease of use.

Because with Model 204 it's easy. It's easy to learn. Easy to install. Easy to set up new databases. And easy to develop new applications—for inventory control, personnel data, financial applications, correspondence tracking, project control—and every other kind of corporate database.

And since it's easy, it doesn't require teams of programmers. And it doesn't take years. Which means cost savings on a large scale.

If you want to find out how some of America's largest corporations solve their DBMS problems with Model 204, clip your card to this ad and send it to us. It's easy!

Computer Corporation of America, 675 Massachusetts Avenue, Cambridge, MA 02139. Or call 617-491-7400.

Model 204

Computer Corporation of America

CIRCLE 54 ON READER CARD

MARCH 1981 65
Big Apple or any Manhattan, USA: It makes no difference to Sorbus, the leading third party maintenance organization in the information processing world.

We've built our reputation by providing prompt, first-class service to clients wherever they may be—from just across town to clear across the country.

The readers of Datamation and Data Communications magazines must appreciate that kind of attention, for in six consecutive brand preference surveys conducted since 1974, they've selected Sorbus as the number one service company—the one they'd most prefer to do business with.

That same good feeling carries over to the OEM market, where Sorbus is the service arm for over 60 manufacturers. Why?

Because Sorbus takes full responsibility for their hardware. We install the equipment; write the manuals; train the people; stock the parts; make the calls.

Sorbus also knows a little about IBM equipment. In fact, we service more IBM systems than anybody else—except for IBM themselves.

Sorbus. Providing service for more pieces of hardware (90,000), in more user locations (30,000), from more cities (160) than any other third party maintenance company in the business.

So, no matter where you are today, or where you'll be tomorrow, Sorbus service isn't far away.

In fact, we're probably already there.
NEWS IN PERSPECTIVE

ically maintained by programs, we have the underlying data to do the job with," says Davis. "Because of that, I think we'll get there sooner than many other companies."

Hiring programmers to work in this environment hasn't been a piece of cake for the people at SOCAL. College graduates, having been taught that the latest thing is structured programming, tend to be enthusiastic about using modern methods; the oil company has had its best luck with these people. Older, more experienced people tend to feel that what they have to sell in the job market are the skills they've developed under the old methodologies, and so some of them don't like this environment; others like working with new techniques. So it's a push.

"On the other side tend to be people like myself who are interested not so much in the application but in the internals of the computer," says Davis, "how it works, what goes on at the bit and byte level. Those people don't like it, of course, because what we've done is to put up a big piece of software between them and what's really happening. Fortunately, these people are in the minority. Most get their kicks out of the application, producing the code and seeing it work. They're happy because they can do this more quickly, can turn out more code, and can see how happy the end user is.

Programmer turnover at SOCAL, then, has not been inordinately high or low, but is thought to be in line with industry norms.

A significant benefit is that the cost to train programmers is said to be "much, much less." This is because of all the software positioned between the programmer and most of the things that are difficult to deal with—CL, IMS, library maintenance, change control. 'Most of those things happen automatically,' Davis explains. 'You just say, 'I'd like to change this program,' and something marvelously does that.' As a result, SOCAL is able to get a programmer to a productive state more quickly. College graduates become "reasonably productive" at writing IMS transactions in a couple of months and a few have become very proficient at writing applications in 18 to 24 months.

Davis is quick to admit to a disadvantage. "If you're shielded from all this stuff, you really don't have a deep understanding of what's going on behind the scene." Novice programmers might become productive much more quickly, but the technical knowledge is harder to come by—unless the individual takes it on himself to study it. "We don't encourage them to do that, but we don't discourage them either."

There's a large backlog of applications programs, and that's the focus of management's effort.

But while the average programmer might have a poorer understanding of the host system, it also need not be a problem.

Davis, who says the system can also be a good teaching tool, notes that most of what he's learned about programming has come from reading other people's programs. The programmer is able to see the code generated by the system, "and it's a fairly good teacher that way."

In that context, Davis says the code generators were written by highly experienced people, and he thinks they produce good code. Criticisms are often heard about the technical knowledge is harder to come productive much more quickly, but we don't discourage them either."

The next phase, which SOCAL has already started, is to automate the design functions, the front-end job.

a system producing inefficient code (like, you can turn it out fast but it's pretty bad). He doesn't think that's true of CPDS. "I would grant that you could probably, on average, take 15% or 20% out of the program by very careful hand-coding, by recoding by hand. But no more than that."

Similarly, the system makes possible quick changes. If someone finds a way to produce more efficient code, this change can be made, and then the 100,000 programs run through once again to be updated with the new methodology.

Standard Oil of California's CPDS is obviously concentrated on facilitating the coding processes. Davis points out that follow that Model 204 performs—and keeps performing, even if your database gets up into the billions of bytes and your terminals get into the hundreds. Which means no system changes, no reprogramming. Which means big cost savings.

Don't be 'remiss.' Get further information by clipping your card to this ad and mailing to us at 675 Massachusetts Avenue, Cambridge, MA 02139. Or call 617-491-7400.

Model 204 DBMS.
You're 'remiss' if you don't check it out.

Here's what the leading software rating service says: "Anyone interested in installing a flexible, user-oriented DBMS would be remiss if they did not evaluate Model 204."

They're right. It will pay you to check out Model 204.

Because you'll find that Model 204 is so easy to use that you won't need large teams of programmers for bringing up new applications. And you'll get the job done quickly. Which means big cost savings.

And it will pay you to evaluate Model 204 performance. Because you'll dis-
For a low purchase price and just pennies a page, the 4612 can copy the graphics and alphanumerics on your raster scan or video display, at the press of a button. Tektronix' unique electrostatic technology produces sharp, high contrast, permanent images. With easy loading of paper and toner. And reliability in the best Tektronix tradition.

The copying process is liquid-free. Our dry powder toner is clean and convenient, and makes electrostatic images of the highest quality. Copies last indefin­itely, and are as easy to write on as bond paper.

The 4612 expands the Tektronix family of video copy devices...including the toner-free 4632 for high resolution and gray shading. And the 4634, whose critically sharp photographic quality and extensive gray scale shading is the most economical approach ever to continuous-tone imaging applications.

The Tektronix video copier family is compatible with any RS-170 video signal, and with many others as well. So for the most practical approach to putting your displays on paper, contact your Tektronix sales engineer or call, toll-free, 1-800-547-1512 (in Oregon, 644-9051 collect).

Tektronix, Inc.
Information Display Division
P.O. Box 1700
Beaverton, OR 97075

Tektronix International, Inc.
European Marketing Centre
Post Box 827
1180 AV Amstelveen
The Netherlands

THE GRAPHICS
STANDARD
NEWS IN PERSPECTIVE

SOCAL gave serious consideration to converting to VM and estimated it would require four man-years. If the conversion were instead to TSO, it would take eight man-years. And if, say, one had to go to a Univac system, it probably would be easier to start from scratch, retaining only the concepts.

Davis sees the Standard Oil systems as but an interim solution. It's very procedural, and he'd like to see it more declarative. "The solution to the programming problem is not to write better tools for professional programmers," he says, "but to get rid of professional programmers—and provide the end user with a language that's business-oriented so he can write his own." He acknowledges that that's a lovely solution but also thinks we're a long way from it.

—Edward K. Yasaki

SOFTWARE

A SEQUEL FOR DATA BASES

IBM offers the relational alternative.

IBM's experimental relational database system—System R—seems to be coming out of the back rooms of the R&D lab and into the commercial marketplace. On the last working day of January, Data Processing Division announced SQL/Data System, a licensed program product for IBM's "intermediate range of computers: System/370 (models 138, 145, 148, 150), 3031, 3033, 4311, 4331, or compatible processors supported by vss/Advanced Functions Release 3."

General availability is slated for February 1982, with a basic license going for $300 per month and support for the licensed program priced at $105 per month.

SQL stands for Structured Query Language, although it is more than simply a query language. Developed as part of the System R effort headed by Frank King at IBM's San Jose, Calif., research center, SQL has been known since the mid-70s. System R was an attempt to implement the relational model of data, formalized by Dr. E.F. Codd of IBM San Jose. The original definition of SQL (pronounced "sequel") was published under the authorship of Donald Chamberlin. It's a unified data definition and data manipulation language. Chamberlin did a great job, according to Larry Ellison, president of Relational Software, Inc., in nearby Menlo Park. Since the language definition was in the public domain, and since it is powerful, uniform, and relatively easy to grasp, Ellison and company chose to implement versions for a number of machines, from minis up. (SQL is the language of Relational Software's Oracle database management system.) As with minicomputer makers and distributed processing vendors, Ellison delights in IBM's "legitimization" of his company's offering. "IBM will educate people to SQL," says Ellison, adding that there's plenty of business to be had in sublicensing RSI's implementation to PCMS, as well as selling minicomputer versions.

Developed under VM (and also installed under MVS), San Jose's System R has been seen by a number of people outside the company. Most who saw the system reported that it evidenced massive uses of system resources—both machine cycles and memory. As recently as a few years ago, observers were saying that System R would never make it out the door—it could eat a 370 alive, leaving little if anything left over for applications processing.

Still, cycles and memory continue to decrease in cost, while personnel costs climb rapidly. IBM's facility at Endicott, N.Y., took on the responsibility for taking System R out of the lab and into the computer room. Today's announcement is probably a polished version of System R, says Ellison, adding that it will take a few more years before the system can be totally rewritten.

SQL/DS, the IBM announcement states, should be useful in many applications, "particularly those involving user analysis, reporting, and planning—where the very nature of the applications is constantly changing. . . . These applications typify instances where it is of primary importance to be able to establish inter-relationships within the database, dynamically define new tables, and to have integral query/report writing facility."

Ease of use is possibly the most ambitious design goal stated by IBM for SQL/DS. Commenting on the commercial product offering several days after its release, Dr. Codd noted that "perhaps the most outstanding feature of SQL/DS is its support for automatic navigation to the target data." This lets the user access data "by specifying what he or she wants, not how to get it."

The SQL user doesn't need to know how the data are stored, unlike the user of hierarchical DBMS prevalent today, systems which require skilled programmers with a knowledge of the underlying structure of the data and how to navigate through the database.

"This feature makes the databases

<table>
<thead>
<tr>
<th>Model 204 DBMS. CCA's Revolutionary Idea.</th>
</tr>
</thead>
<tbody>
<tr>
<td>We think a DBMS should have excellent performance and be easy to use. Not a revolutionary idea? Guess again! Only Model 204 can do it. While some inverted-file systems are easy to use, their performance falls apart when the database gets large or the load gets heavy. Then there's IMS. It performs pretty well, but it's so hard to use, you need large teams of programmers for developing applications. But with Model 204 you get excellent performance, even with large databases and a heavy load. And using Model 204 is easy. The leading rating service gives Model 204 a perfect score—4 out of 4—for ease of use. In short, Model 204 gives you performance and ease of use in a single package, Revolutionary! For details, clip your card to this ad and send to us at 675 Massachusetts Avenue, Cambridge, MA 02139, or call 617-491-7400.</td>
</tr>
</tbody>
</table>

Model 204 |
|---|
established under SQL/DS readily accessible to end users who have little or no knowledge of programming," Codd says. He adds "This very same feature also makes application programmers more productive, since they can concentrate on the essential logic and data requirements of their applications, instead of concerning themselves with the details of data representation."

Those hierarchical database are out there, though, containing countless data—SQL seems planted in fertile ground—the DOS/VSE environment.

essential to the operations of organizations in every sector. The ingenuity of systems implementors and the rapidly falling price of hardware have, to a great extent, quashed the early objections to relational databases—no longer is it prohibitively expensive to run a relational system. The current roadblock is compatibility—an organization with a large investment in an existing DBMS isn’t likely to chuck all its applications and rewrite them for a new system. And IBM, the market-driven organization that it is, doesn’t seem in a position to shove its large IMS users into an incompatible system.

So, SQL/DS seems planted in fertile ground—the DOS/VSE environment. No IMS here, just DL/I. And SQL has a one-way bridge from DL/I: an extract function can copy information from a DL/I database into SQL tables (although there is no converse capability to transfer data from SQL tables into a DL/I structure).

As the 4300 announcement proved so emphatically, IBM can and will drop machine prices while raising performance—where it sees fit. The nearly explosive popularity of those 4300 processors attracted an avalanche of new users (and excited the PC/market as well) with aggravating staffing problems. SQL’s case-of-installation and ease-of-use design criteria place “additional requirements on the program product, which, in turn, may increase the system resource requirements (cpu cycles, real storage, I/O activity, and DASD space).” Without the 4300 foundation, it seems likely IBM would have trouble selling SQL, which requires at least 1MB of real memory and 2MB if the DL/I extract function is to be used.

With the 4300, IBM can sell to new users who are not yet locked into a hierarchical DBMS. And, Codd points out that applications can use both SQL and DL/I databases concurrently. Under an application program control, data can be written to both databases, with the actual commitment performed simultaneously (i.e., commitment succeeds in both databases, or is backed out of both). While IBM hasn’t provided a two-way bridge, it has provided a foundation.

From a marketing viewpoint, one also notes that SQL/DS doesn’t compete with IBM’s best-known step towards relational databases—QBE (Query by Example). QBE works in a different environment: VM/CMS. A statement of direction released with the SQL/DS announcement concludes: “In summary, the SQL/DS announcement has expanded the IBM VSE data systems offerings. It is IBM’s direction that any future analogous offerings in the MVS (CICS, IMS, TSO) and CMS environments will address similar customer data requirements.”—Bill Musgrave

MTI will sell you two graphics terminals for the price of one.

Our Retro-Graphics enhanced ADM-3A and VT100 together cost less than one Tektronix 4010 Series terminal.

The Tektronix 4010-1 graphics terminal sells for about $5200. MTI will sell you the ADM-3A Retro-Graphics enhanced terminal for $2025, or the VT100 for $3160. Or both. Two graphics terminals for the price of one. Both are completely compatible with Tektronix Plot 10+ and most other existing graphics software.

Retro-Graphics are retro-fitted graphics boards manufactured by Digital Engineering, Inc. that fit neatly into Lear Siegler’s ADM-3A and 3A+ and DEC’s VT100. They give full graphics capability while maintaining the original high performance features of each individual terminal.

If you already have an ADM-3A, 3A+ or VT100, and want to enhance it with Retro-Graphics, MTI can supply you with a retro-fitted board at a low, low price. MTI is the one source for all the terminals, peripherals, applications expertise and service you’ll ever need at truly great purchase and lease prices. Call us today: 516/482-3500, 212/895-7177, 518/449-5959, outside N.Y.S. at 800/645-8016, and in Ohio: 216/464-6688.

MTI will sell you two graphics terminals for the price of one.

Our Retro-Graphics enhanced ADM-3A and VT100 together cost less than one Tektronix 4010 Series terminal.

The Tektronix 4010-1 graphics terminal sells for about $5200. MTI will sell you the ADM-3A Retro-Graphics enhanced terminal for $2025, or the VT100 for $3160. Or both. Two graphics terminals for the price of one. Both are completely compatible with Tektronix Plot 10+ and most other existing graphics software.

Retro-Graphics are retro-fitted graphics boards manufactured by Digital Engineering, Inc. that fit neatly into Lear Siegler’s ADM-3A and 3A+ and DEC’s VT100. They give full graphics capability while maintaining the original high performance features of each individual terminal.

If you already have an ADM-3A, 3A+ or VT100, and want to enhance it with Retro-Graphics, MTI can supply you with a retro-fitted board at a low, low price. MTI is the one source for all the terminals, peripherals, applications expertise and service you’ll ever need at truly great purchase and lease prices. Call us today: 516/482-3500, 212/895-7177, 518/449-5959, outside N.Y.S. at 800/645-8016, and in Ohio: 216/464-6688.

MTI will sell you two graphics terminals for the price of one.

Our Retro-Graphics enhanced ADM-3A and VT100 together cost less than one Tektronix 4010 Series terminal.

The Tektronix 4010-1 graphics terminal sells for about $5200. MTI will sell you the ADM-3A Retro-Graphics enhanced terminal for $2025, or the VT100 for $3160. Or both. Two graphics terminals for the price of one. Both are completely compatible with Tektronix Plot 10+ and most other existing graphics software.

Retro-Graphics are retro-fitted graphics boards manufactured by Digital Engineering, Inc. that fit neatly into Lear Siegler’s ADM-3A and 3A+ and DEC’s VT100. They give full graphics capability while maintaining the original high performance features of each individual terminal.

If you already have an ADM-3A, 3A+ or VT100, and want to enhance it with Retro-Graphics, MTI can supply you with a retro-fitted board at a low, low price. MTI is the one source for all the terminals, peripherals, applications expertise and service you’ll ever need at truly great purchase and lease prices. Call us today: 516/482-3500, 212/895-7177, 518/449-5959, outside N.Y.S. at 800/645-8016, and in Ohio: 216/464-6688.
Prime Systems hardware, running the PRIMOS operating system, does everything right. But the software should use better language. They should use INFO.

INFO IS THE HIGH PRODUCTIVITY LANGUAGE.

It is already in use at more than 300 installations. Many of the FORTUNE 500 use INFO extensively and many other companies do all their data processing in INFO.

WHY INFO?

INFO is a true productivity language.

Development time is 4 to 10 times as fast as COBOL. An application that takes one week in INFO would take four or more weeks in COBOL, with access to large data files through your host's multi-key ISAM.

INFO IS A RELATIONAL DBMS.

INFO can relate up to 10 data files simultaneously - the joining process is so easy, even Managers and Secretaries can develop their own relational data bases. Any data base can be normalized to fit the relational model, and INFO allows relational structures to be modified without need to re-write applications.

INFO IS COMPLETE.

Full Program Development and Production Language.

Query Language.

Report Generation.

Data Entry/Data Update.

INFO IS FRIENDLY.

It not only improves programmer productivity, it improves the efficiency and accuracy of users.

Managers and Secretaries agree, INFO's plain English commands are easiest to use.

INFO IS FOR IBM, DEC VAX AND HONEYWELL L/6 SYSTEMS, TOO.

INFO is inexpensive. Complete and installed, INFO costs about one-fifth what systems with less capability cost:

$10,000 for VAX and Prime Systems.

$15,000 for IBM 4300, 303X and 370 installations, with VM/CMS.

If you want your computer to use better language, better get the details on INFO. For a copy of our new INFO brochure, write, send coupon or call (617) 237-4156 (TWX 710 383 7529).

WANT TO USE BETTER LANGUAGE?

Please send INFO info to:

Name: ___________ Title: ___________

Address: ____________________________

City: ___________ State: ___________ Zip: ___________ 

Can't wait. Call me at: ___________
some time with the idea of a bigger presence in the U.S. But it was only over the last few months that it found the bargain it was looking for.

"DASD gives us 500 more employees, a company with a profitable growth record since 1974, and a network of 29 branch offices covering most of the U.S.," declared CGS vice president Phillipe Dreyer.

CGS' growth from a $6 million to a $200 million a year company in 10 years' time stems mainly from mergers and acquisitions.

But clearly attractive to CGS was the fact that DASD was still independent, giving it a similar company ethos to CGS, which is still controlled by one man, president Serge Kampf. Also, its geographical spread contrasted with the more regional nature of all but very large U.S. software companies.

At DASD, the takeover should mean little change in the early days. The French management is happy to let local staffers get on with a job they have been doing well. But they hope that there will be additional benefits to DASD in the takeover. Another CGS vice president, Jean-Baptiste Renondin, says he expects DASD's business to score in three ways.

Access to CGS' 60-odd European offices will help DASD sell its expertise to multinationals with overseas offices located near a CGS facility. Secondly, Renondin hopes DASD will be able to capitalize on some of the special know-how already present in France, "particularly in the electronic phone directory [cheap terminal] area and systems which dialog with the general public." Lastly comes the claim that the bigger company will offer more opportunities for existing personnel at the smaller U.S. firm.

Apart from strict financial reporting to a set formula, there is little chance that French management methods will be forced on DASD personnel, asserts Renondin. Nor will DASD employees or their customers have to brush up on their French. Le software will work equally well in all languages, he said.

The inexorable growth of CGS from a $6 million a year company just 10 years ago stems mainly from mergers and acquisitions, though the company is anxious to point out a 27.5% growth in sales last year when there were no significant structural changes in the company. Just why the growth occurred can be attributed to a number of French government planners and a few individuals like Kampf.

To have a share in world software and consultancy markets—which account for a remarkable 90% of the company's revenues—industry strategists came to the conclusion that the cottage industry approach, hitherto the primary mode in the software industry, would do for only extremely specialized outfits. So the plan was to build up software and services companies till they reached an "industrial" size. Backed by a little government money and a lot of moral support, the French companies have grown fat. Of the European top 10 in the software and services sector, the majority are French. Apart from government software contracts, CGS benefited financially from the French Nuclear Energy Agency, which controlled a 34% share of the group until recently.

Now, with 3,500 personnel including the DASD people, CGS reckons it has software production well tapped. One tool its programmers have been using for years (and which the firm has sold to a number of large users) is its C.P.1 compiler, which can take a source program and output object code suitable for a wide range of mainframes and minis.

Products are still a relatively small part of CGS's activities compared with contract systems and programming work. Ultimately, CGS hopes, DASD will take over the marketing of its products in the U.S. Meanwhile, the firm has set up a small office in Boston to test-market some of these, mainly systems software programs.

For the future, the sky's the limit for the French group, which has been doing the ground control systems software for Europe's satellite launcher, Ariane. "While we may not set up worldwide, we want to be good enough to cover the world if necessary," says Renondin. "But we need time."

—Andrew Lloyd

---

**GOVERNMENT**

**A STANDARD SQUABBLE**

The dispute over the government's I/O channel-level interface standards is far from over.

In promulgating its most recent set of I/O interface standards, the government has managed to alienate four of the country's largest mainframe manufacturers, go against the recommendation of the company on whose architecture the standards are based, and become entangled in a complicated lawsuit. The government's claim is...
If you want to know if UFO helps CICS application programming, listen to the...

"word of mouth!"

Greg O'Reilly, Systems Manager, Figi's Marshfield, WI: "We have gotten many applications going because UFO is so easy to use... jobs such as on-line credit card verification, file maintenance utilities created without CICS mapping, and many small requests by user departments. Most of our people aren't CICS trained."

Steve Harris, Director of MIS, Children's Hospital, Boston, MA: "The first thing I did when I joined the hospital was buy UFO because I used it for more than a year at my last job; we are simply more productive in our on-line development with UFO. Many projects which were too expensive with traditional CICS technology become cost-effective when you use UFO. UFO trades off machine power for people power. While it takes a reasonable amount of training to teach someone UFO, you certainly don't have to be a CICS programmer to use it."

Ken Cyrus, Database Manager, Carter Machinery, Salem, VA: "We were looking to get on-line transactions up faster than under standard COBOL. We had DMS installed for two weeks, but got absolutely nothing done. Within the first two weeks with UFO, we had at least 20 to 30 VSAM update/inquiry programs up.

The most surprising thing about UFO was its execution speed. I never figured anything interpretive could execute as fast as it does."

Frank Scafidi, Director of Technical Services, University of Pennsylvania, Philadelphia, PA: "Two years ago we had 10 applications up under CICS. Today, we have over 50 applications up under UFO. We never could have done so much without UFO."

OXFORD SOFTWARE CORPORATION
174 BOULEVARD • HASBROUCK HEIGHTS, N.J. 07604 • 201-288-1615
OFFICES IN ATLANTA, CHICAGO, DALLAS, SAN FRANCISCO
REPRESENTED AROUND THE WORLD BY WORLDWIDE SOFTWARE ASSOCIATES AND OTHER AGENTS

800-631-1615
that there is some method to this madness—that the standards will, as intended, save the American taxpayer millions of dollars over the long run.

The latest battle has been raging for more than a year. When the standards, which the companies insist are hopelessly outdated, were first promulgated, Honeywell, Burroughs, Control Data, and Univac brought suit in U.S. District Court asking that they be overturned. But the government, despite conceding that the standards were an administrative matter and could not be challenged in court by vendors, who, the government said, were trying to tell it what kind of computer equipment to buy.

The plaintiffs obtained a stay pending appeal from the U.S. Court of Appeals, but that was overturned by the Supreme Court, allowing the standards to go into effect last June. The companies are now asking the Court of Appeals to grant them standing to challenge the original District Court ruling. A decision is expected imminently.

Meanwhile, the government, using the economy and efficiency phrase mandated in federal buy by the 1965 Brooks Act, is scouting for adapters that can make the government’s existing systems comply with the standards. Systems under $400,000 are excluded from the standards. All others must comply. An agency that wishes to purchase a system which doesn’t comply must get a waiver from the Assistant Secretary of Commerce for Production, Technology and Innovation. To obtain a waiver, the requesting agency must be able to demonstrate that a major adverse economic or operational impact will result in failure to procure that system.

“The technology they’re specifying is 15 to 17 years old,” a Honeywell spokesman lamented. “The drawings of the interfaces had IBM parts numbers on them. IBM advised the National Bureau of Standards against adopting them, and they did it anyway.”

“NBS was under pressure from Brooks to come up with standards because the industry couldn’t do it in 10 years. And Brooks was under pressure from the peripherals manufacturers. The whole reason for the standards is to open up competition for PCM peripherals. Brooks got on his hobbyhorse for them. The industry recognized that the channel level is not the proper place for interface standards. That’s why it never offered any.”

That’s also why Honeywell and its friends are fighting the implementation. The government told the appeals court that because the Brooks Act does not address vendors, the companies cannot legally protest that they have been injured by regulatory actions.

The government argued that because the Brooks Act doesn’t address vendors, the companies cannot legally protest that they have been injured by regulatory actions.
A new terminal from Volker-Craig, the VC2100, offers more benefits than just DEC VT100* compatibility.

The microprocessor-based VC2100 is the first of a new series of Volker-Craig display terminals designed for the more intensive data processing needs of the 1980's. VC2100 provides plug-in compatibility with the DEC VT100 and offers many usable features the DEC terminal does not have.

**Advanced Features Standard On the VC2100:**

- Microprocessor-based M6801 (Terminal Controller) and 8048 (Keyboard Controller)
- Advanced Video Option (AVO) standard, but non-AVO functions supported.
- Jump/Smooth scroll, key selectable.
- Bidirectional/variable speed smooth scroll.
- Double size, double width on a per character basis.
- User-oriented status line.
- 8 user string keys, 20 characters per key, host or user loadable.
- Host savable set-up control.
- Home and clear keys.
- Local or remote copy.
- Full and half duplex.
- Stored set-up mode parameters.

**VC2100 Optional Features:**

- RS449 interface accessory.
- Current loop accessory.
- National character sets.
- National Keyboard layouts.
- Serial peripheral interface (buffered).
- Non-glare CRT, green or amber.
- Second screen page (24 x 132).

---

**A Modular Design With Worldwide Service and Support.**

The new Volker-Craig series of terminals will feature the cost efficient principal of a modular printed circuit board design. Keyboards, screens, power supplies, and logic systems are separate, easy-to-replace units. This design reduces end-user service costs, and supports value added OEM modifications.

The new, first in a series, VC2100 combines features and price that surpass DEC VT100 and other emulators.

It has superior capabilities that are competitively supported worldwide by engineers and trained distributors.

**Learn more about the VC2100.**

For details about the new VC2100 and about a full range of other terminals tailored to your needs, contact us today.

*Registered trademark of Digital Equipment Corp.*

Phone us Toll Free at (800) 828-6543
In New York State, Call Collect (716) 475-1417

---

volker-craig limited
266 Marsland Drive, Waterloo, Ontario N2J 3Z1 Canada
Tel: (519) 884-9300
Telex: 068 5527 Toronto (416) 456-2070

volker-craig inc.
333 Metro Park, Rochester, New York 14623 USA
Tel: (716) 475-1221

volker-craig (UK) limited
Volker-Craig House, William Olds Estate, Tolpits Lane, Watford, Hertfordshire, England
Tel: 09237 71378 Telex: 51260102

---

CIRCLE 176 ON READER CARD
**NEWS IN PERSPECTIVE**

configure their systems to the appropriate adapter.'’

As far as Dynamic Sciences is concerned, it thinks it may be the only company currently making an adapter for the Burroughs machines. ‘‘We’ve been manufacturing adapters for the last five years, long before the government was even thinking about doing this,’’ commented DSI vice president of sales Eli Shiri. ‘‘We have just entered the second phase of the contract, but I can’t tell you whose systems we’re manufacturing for, how much [the contract] is, or how many adapters we will make. I’m sure Burroughs is aware of our product, though.’’

Well, sort of. ‘‘We’ve heard comments about them,’’ said Burroughs’ director of products management for federal special systems, Al Kosla. ‘‘But we have no concrete information on them and we have no idea if what they’re doing complies or not. We certainly didn’t know about the contract.’’

As for going after government contracts, Kosla said, ‘‘The lawsuit has had no effect in terms of whether we bid or not. But it has affected our chances of winning. We do not have any intention to comply with the standards, so we’re bidding with equipment that’s excluded. If it looks like the specifications are such that we can bid under $400,000 or we think the agency can get a waiver, we’re in the running. But if there’s no exclusion or no waiver, we’re out of it.’’

Kosla added, ‘‘We’re bidding on procurements and taking exceptions to the standards on the assumption that the legal situation will resolve itself in our favor.’’ At least one other mainframer, however, appears to be hedging its bets. In a recent Control Data contract with a Commerce

For $27,500, Dynamic Sciences Inc. will manufacture an adapter for a Burroughs B 4700 at a Navy site.

Department agency, there are provisions for CDC to supply an adapter to Commerce’s new Cyber 170/750 if the agency chooses to exercise that option to the contract. CDC has also applied to NBS for certification of that adapter. Obviously, for CDC to get the contract in the first place for a system that wasn’t already in compliance with the standards, a waiver had to be granted.

‘‘It’s not necessarily a case of not being able to bid,’’ a CDC spokesman said. ‘‘We first asked for a blanket waiver. It was denied, with the corollary that each procurement request for a waiver can be submitted to the procuring department within the agency. Thus far we haven’t had any significant cases where a waiver hasn’t been granted.’’

Others feel differently. ‘‘We are excluded from bidding on new procurements that require compliance with the standards,’’ commented a Honeywell spokesman. He drew some solace from the revision of the waiver procedure. Prior to the standards’ implementation, waivers had to be given before the bids arrived, requiring the waiving official to be something of a clairvoyant. Now the procuring agency can solicit bids, then request waivers for those that aren’t conforming.

‘‘I wonder what interface IBM has on its new series,’’ he mused. ‘‘There’s no question that the standards force you to maintain two product lines. It’s going to take us and the others at least three or four years to comply.’’

Burroughs’ Kosla added, ‘‘I don’t have a good feel at this point in time. It’s still too early to tell the precise effect. But it’s bound to have some.’’

‘‘The way they do this,’’ said the Honeywell spokesman, ‘‘neglects the pervasive impact of the standards. It goes to the heart of your hardware and software. They got all this advice not to implement [the standards], then they just went ahead and did it.

‘‘Then they’ll have to review it again in three or four years.’’

-Willie Schatz

**OUR DISKS ARE FLEXIBLE. OUR STANDARDS AREN’T.**

We certify every *Ectype™* flexible disk we make. Not every other one. Call 1-800-843-9862 for the name of your nearest distributor.

(In Canada call 605-996-8200)

SYNCOM®
Your flexible alternative
P. O. Box 130, Mitchell, South Dakota 57301

©1981 Syncom, division Schwan’s Sales Enterprises, Inc.

**WHICH COMES FIRST?**

At BAI’s recent productivity conference, a number of chicken-or-egg questions were addressed—people or technology, leisure or job, money or fulfillment?

The key ingredient is people.

This was the dominant theme that emerged from the Bank Administration Institute’s first PATH (Productivity through Automation, Technology and Human Resources) conference in late January in Dallas.

Keynoter Clair Vough, who founded Productivity Research International, Lexington, Ky., when he retired from IBM in 1975, underscored the importance of people and their attitudes. ‘‘You have to have regular morale audits.’’

When he was with IBM, he said, and charged with a productivity improvement project, he decided IBM’s company-wide
The Electrohome EDP 56 data projector gives everyone in the room a front row centre view of your presentation. You’re in complete control of group sessions, because the EDP 56 projects computer generated images onto a large screen.

Designed especially for large, high resolution data/graphic display, the EDP 56 will be a dynamic addition to all presentations—from the boardroom to sales clinics. We wouldn't begin to tell you how to use it—your imagination is limited only by your imagination.

Complete adaptability means the EDP 56 readily interfaces with most CRT computer terminals. Its rugged, yet lightweight construction makes the EDP 56 completely versatile. It can be hung from the ceiling, mounted on a stand, or used from any convenient desk top. In addition, the EDP 56 is easy and fast to set up for either standard or rear screen projection, even for non-technical personnel.

For considerably less than what you might expect to pay, the EDP 56 can be yours. And, it comes complete with the quality engineered features and group impact potential you want and need.

So seat everyone front row centre at your next presentation. Start by contacting Electrohome Electronics, a leader in video displays.

809 Wellington St. N., Kitchener, Ontario, Canada N2G 4J6 Telephone (519) 744-7111 Telex 069-55449
This simple principle can double your computer room storage.
Introducing MAX
The new Magic Aisle® X high density storage system doubles capacity and saves space.

Have you ever seen sardines packed loosely in a can? Of course not. Because space is used most efficiently when they're lined up neatly and orderly, fin-to-fin.

The same principle applies to your computer room. If you're using stationary cabinetry or open shelf storage, you're wasting a lot of valuable floor space.

That's why we're introducing "MAX." The new Magic Aisle X series from Acme Visible is the multimedia storage system designed specifically to meet the needs of the computer center — to save you space, time and money.

**Maximum space savings.**
Now you can let MAX compact mobile shelving double your storage capacity. Units slide together eliminating unnecessary aisle space.

**Maximum time savings.**
MAX gives you fast access to whatever information you need. At a push of a button or turn of a handle, these track-mounted units slide open to allow entry at the proper location.

New cantilevered shelving allows fast scanning over an entire storage bank.

Add new KromaKode® color-coded tape reel labels to the system and filing time can be cut up to 40%. Eliminate misfiles, too.

**Maximum flexibility.**
MAX provides storage accessories specially adapted to many different types of media. For tape reels, Disk packs, Data binders, printouts and more.

**Maximum ease of installation.**
Why risk excessive downtime with units that require tracks built into your floors?
MAX utilizes new modular track and deck that mount directly on current raised flooring. Installation is fast and economical.

Your existing stationary shelving can also be incorporated into the MAX system. Simply put your current storage units on MAX carriages and tracks with the rest of your new MAX system.

Another new idea from Acme Visible.
Magic Aisle X series is just one of the many new systems Acme Visible has designed to meet the needs of information management.

Find out what else is new. Call us collect at 804-823-4171 or return the coupon below.

---

**ACME VISIBLE**
First in putting information in its place.

Acme Visible Records, Inc.  
DA31CM5  
1000 Allview Drive  
Crozet, Virginia 22932  
□ Have your computer room information specialist contact me.  
□ Please send free MAX literature.

Name ________________________________ Title ________________________________
Firm ________________________________ Phone ________________________________
Address ________________________________
City ______________________ State ______ Zip ______


CIRCLE 131 ON READER CARD
attitude surveys, conducted every 1½ years "were not enough. And 75% of the questions were irrelevant. We set up our own and surveyed one-fourth of our people every three months."

"The worker is the key," said Henk Koehn, vice president-futures research, Security Pacific National Bank, Los Angeles. He too was concerned with attitudes and talked about the "entitlement ethic," a feeling prevalent among today's workers that they are entitled to risk-free and rewarding environments.

He urged his audience to acknowledge this feeling in planning for productivity "because you can't measure productivity in a new era using old tools... it's not just counting... what matters quantity when quality has gone to hell?"

He berated the term "office of the future." "Any project called office of the future shows a failure to understand the true nature of the work place of tomorrow." His advice: "Examine the structure of the organization of 1990; examine the nature of work in the organization of tomorrow; add to that attitudes and values of workers of the '90s; then extend the scenario out and design, if not invent, the work place of the future. It's work, worker, work place. In that order, not the other way around." Koehn contended that his approach could lead to fewer abandoned projects and less equipment up for resale in the 1990s.

The "entitlement ethic" is a feeling prevalent among today's workers that they are entitled to risk-free and rewarding environments.

Lawrence Eldridge, vice president of Continental Bank, Chicago, talked about new work values, which he said are most prevalent in data processing.

One sign of new attitudes, he said, is that people are "committed to themselves primarily. The job and family come second. Their own fulfillment, satisfaction, and stimulation are first. It used to be a worker wanted money as a vehicle to take care of responsibility. The new attitude toward money is as a vehicle of gratification."

Eldridge said the new attitudes are displayed by 30% of the general work force, by 70% of systems people and by 50% of younger people (and this is growing).

He said there is also a marked shift in employees' attitudes toward leisure. "It used to be leisure was way down the line. Now it's up at the top and the job is way down the line."

Material things have a different meaning for these new wave workers, said Eldridge. "They're no longer 'keep up with the Joneses' symbols. They're not symbols of success, but instruments of gratification."

"If a new wave worker's money-gratification level is met, he said, then money becomes less important than the need for recognition, the need to be creative, and the dislike of boredom.

For such people, Eldridge believes, annual performance reviews are "not nearly enough. Divide these people into groups of committees which can actually fix policy and participate in work groups. Offer them flex-time and a cafeteria approach to benefits."

Eldridge said systems people are prime candidates for "quality circles," a term which came up often at the BAI conference.

James King, assistant vice president of Chemical Bank, New York City, defined the quality circle concept as "a total employee involvement approach to encourage employee/management communication and teamwork, through a small group which meets voluntarily and regularly to generate new ideas for improving productivity, quality and the work environment. The quality circle is really a way of capturing the creative and innovative ability that our employees have." He noted that the idea of quality circles was born in Japan in the early '60s. And he pointed out that it originally started with industry, but is applicable anywhere.

Richard Matteis, senior vice president, Citibank, New York City, said that Citibank achieved productivity improvement in operations when it "stopped looking at them as clerical operations." He said Citibank has reduced its back office operations from 10,000 people to 6,000 people in an eight-year period and has enhanced the quality of work at the same time. The bank did this, in part, with the introduction of minicomputer-based workstations—"new technology which is taking care of the ills of big machine technology."

A somewhat different view was presented by George DiNardo, senior vice president, Mellon Bank, Pittsburgh, Pa., who described himself as "a big iron bigot and chief mechanic at Mellon."

He said Mellon's data processing operation is divided into functional groups which report directly to the user. "I refuse to believe that minicomputers are worth a damn." He said Mellon has some 6,000 terminals dedicated to point of source activity and a big computer dedicated to nothing but programmer testing.

"With big machines you can build integrated systems. How can you do that with minis? Since 1970 I've gotten one of everything that's come out. Each of our branches has a local controller. Now if that's your definition of a mini, than I guess I like minis. I see them as extensions to the mainframe."

Robert O. Metzger, managing principal, Metzger & Associates, Tustin, Calif., seemed to share the more prevalent attitude that people come ahead of technology.

He described a visit to a prospective New York client, a large bank. "I was ushered into the executive suite by the senior vice president of operations. It was a magnificent showpiece of an office complex: hand-laid parquet floors covered with Persian carpets, a few Picasso etchings on the walls, and a large marble fountain on the 18th floor at the entrance to the executive dining room. We were given thick, matte printed menus dated that day and a choice of a sumptuous lunch, prepared by a French chef, replete with the finest cigars and brandy offered at the end of the meal.

"Following lunch, we went over to another building nearby, which was the operations center. There, around dim corridors, were organized 300 people on the same floor. The carpet was threadbare, the keypunch operators were lined up 10 abreast with an overseer standing behind them. The furniture was all metal with the paint peeling off. There was graffiti in the men's room.

"A general smell of air conditioned sweat was in the air and the operations cafeteria special that afternoon had been roast beef hash. The employee's lounge had furniture in it with the springs showing that they were totally opaque. My host bragged proudly of his hardware and software, of the progress made in bulk filing, and of the newest generation hardware which was being installed this spring. I left him bemoaning his employee turnover and that fact that it really was difficult to find good people anymore."

—Edith Myers

ON THE ROAD TO HYPERBUS

It took six years and many blank stares before Network Systems got its concept of local nets off the ground.

Like many other current phrases in the dp and telecommunications fields, there are a number of interpretations given by users to a local data network. Given the divergence
A little wheel's a BIG wheel when it carries 124 characters.

It's like a typewriter, 2 characters to each type bar. It's super-hard plastic, with the petals interlocking to reduce diameter, for less inertia to overcome, more resistance to hammer impact and vibration. Which all goes to make a longer-lasting, quieter machine.

And the Ricoh RP1600 is versatile. Wheels come in many fonts, interchangeable with a touch. And it interfaces with Q-3, H-II, 10DATA, RS-232C.

Ricoh RP1600—The Big Wheel Among Daisy-printers.

RICOH

From Ricoh...holder of the Deming Prize for Quality Control.

RICOH OF AMERICA INC., 20 DMA Lane, Fairfield, New Jersey 07006, U.S.A. Phone: (201) 575-8500
RICOH NEDERLAND B.V., Apollo Parkweg 102, P.O. Box 114, Amsterdam, HOLLAND Phone: (020) 4386551
RICOH DEUTSCHLAND GmbH Frankfurter Allee 45-47, 4328 Entron 1, WEST GERMANY Phone: (06196) 45549
RICOH COMPANY, LTD., 15-5, 1-Chome, Minato-Aoyama, Minato-ku, Tokyo 107, JAPAN Phone: (03) 479-3111

CIRCLE 68 ON READER CARD
of definitions today, it is not surprising that a company trying to interest users in local networks six and a half years ago got little more than blank looks.

The company that began missionary work on the local data net concept over six years ago is Network Systems Corp. The firm's president, James Thornton, admits, "We have had to do a lot of educational work to get our Hyperchannel off the ground." Even after three years of production, users are just now beginning to see how Hyperchannel can be used.

While NSC maintains it has a local network product, there are some who disagree with that definition. Basically, Hyperchannel is a high speed bus that uses a contention scheme, has multidrop capability, and can interconnect CPUs and other high speed devices that typically are part of a corporate dp center.

Using coaxial cable technology and having established itself in the high speed arena, NSC is now investigating other applications.

Having established itself in the high speed arena, NSC is now investigating other applications. The Hyperchannel certainly is similar to other local data network products. But differences become evident when a customer realizes that the 50 Mbit/sec transmission capacity between Hyperchannel network adapters is far more bandwidth than a typical local data net.

The Hyperchannel emulates both the physical and logical characteristics of direct access subsystems typically operating with CPUs. The adapter interfaces directly to a mainframe o/o channel so that on a system like an IBM 370 it appears to the host as an extension of the block multiplexer channel.

A Hyperchannel adapter costs about $36,000 and is used for high volume bulk data transfers, such as load sharing between mainframes. "Our product has to do with allowing the (dp) equipment to be spread out in the building," Thornton explained, "and while that sounds routine, it is also pretty important." Thus the key element of Hyperchannel is that it allows high speed data transfers up to 2,000 feet between interconnected devices. "We would not work if we did not have the high speed; we wouldn't be different from anybody else," he said.

So the typical Hyperchannel site is a dp center which has six, eight, or nine large mainframes that can't physically be installed close enough together. That's where the Hyperchannel comes in—to provide the interfacing and network that allows the CPUs to interact together at their normal operational speeds.

In addition to connecting CPUs, the NSC network adapters can also link large direct access peripheral subsystems such as tape and disk to a mainframe; and they can be used with other subsystem controllers such as minicomputers that transfer high volume data to a host machine.

According to Thornton, the company now has about 90 customers who may install as many as 15 Hyperchannel adapters, once they become familiar with the intended use.

Unlike other network systems, the NSC adapters do not seem to be oriented toward certain applications. Rather, they are installed when a user wants to create a "printer pool" away from a dp center, or when a tape subsystem might be moved to the tape vault to be nearer the data.

Having established itself in the high speed arena, NSC is now investigating other applications. It recently signed a developmental agreement with Satellite Business Systems to see how the Hyperchannel (or
GDC's new TDM moves more data faster with greater cost savings.

Real-time bit synchronous multiplexer with the least transmission delay on the market.

Transporting data at rates from DC to 2 MEGA-bits.

Transmission efficiency to 99%.

Mix and match up to 54 synchronous, asynchronous and isochronous channels with absolutely no restrictions.

Mix data, graphics and voice channels simultaneously.

Automatic System Configuration on site, at will, without traffic interruption.

Automatic Service Restoral through redundancy for immediate failure recovery without traffic interference.

Interactive Network Supervision gives immediate access to system status and configuration. And end-to-end operator communications.

It all adds up to the most cost effective use of your transmission media. MEGAMUX. It's our hottest new system product. And, your datacommunications network can't afford to be without it.
NEWS IN PERSPECTIVE
modifications) will operate in satellite nets.
But Thornton does not ignore the
more accepted definition of a local data net­
work—to interconnect lower speed devices
such as terminals to cpus. He understands
that products like the Xerox Ethernet are
also providing users with a solution to their
on-site network needs, even though the
technical characteristics and uses may be
different.

The Hyperbus product will
compete with Xerox's Ethernet
and similar products.

So NSC will address these more con-
ventional needs in 1981, when it introduces
its Hyperbus product that Thornton admits
will compete with Ethernet and similar
products.

For now, the purists may argue that
Network Systems does not truly supply a
"classic" local data network solution, but
by the end of the year, it plans to have all the
bases covered.

In the meantime, Thornton claims
NSC has no competition in the 50 Mbit/sec
Hyperchannel area. If that is true, it was
probably worth six years as a missionary.
—Ronald A. Frank

ANOTHER ONE BITES
THE DUST

When Infotech International
filed for bankruptcy last month,

it left a string of U.S. industry
experts out on a limb.

One of Britain's leading computer confer-
encing and training concerns has gone into
bankruptcy, leaving a long list of U.S.
creditors.

Some of the industry's most colorful
and prominent personalities have been
burned by the liquidation of Infotech Inter-
national on Feb. 5. Among the gurus who
are owed from several hundred dollars to
over $5,000 each in expenses and speaking
fees are Phil Dorn and Herb Grosch (both
independent consultants); Bob Beamer, a
Honeywell executive; Professor Howard
P. Morgan, from the prestigious Whar-
ton School in Pennsylvania; and Joe
Ferreira, Diebold Group vice president.

Though unconfirmed at the time of
writing, it is believed that the company
went out of business supposedly owing $1 mil-

lion, but that its 150 or so employees were
paid at the time of liquidation.

Infotech was owned and run by Roy
R. Goodman, a Briton known for entre-
preneurial activities on several continents.
His companies are believed to be operated
through a Swiss holding company, BK
Wissenschafts-Informationen-Service AG, in
Zurich. Observers say that Goodman put
Infotech out of business twice before, earli-
er in the '70s, and has aborted several U.S.
subsidiaries.

In general, 1980 was a poor year for
the conferencing business in the U.K. Info-
tech's major rival, Online, has had to lay off
some staff to pare down operating costs. By
the autumn of last year, some informed
sources were saying that Infotech was head-
ing for bankruptcy following poor trading
figures by the $10 million a year concern.

At that time, several prominent
U.S. speakers were owed money by Good-
man from earlier summer engagements. A
major conference in November attracting
over 425 people at $1,370 a head seemed to
herald a return to positive cash flow.

Now many of the unpaid Americans
are trying to piece together what could have
happened to this $550,000, and how it was
distributed.

"The problem," said one of them,
"is that Infotech was a paper flow company
with no real assets other than its people."  
Several approaches have been made to the
U.K. lawyers handling the liquidation to

CIRCLE 71 ON READER CARD
FROM STATISTICAL MULTIPLEXORS TO COMPLETE DATACOMM NETWORKS, EVERY DCA COMPONENT IS ENGINEERED TO EXPAND

DCA protects your initial investment in statistical multiplexors with the lowest-cost network growth in the industry. So you can start with a small datacomm network today, and expand or modify it to meet your needs tomorrow.

Our System 115 statistical multiplexor can be used in point-to-point networks to support from 2 to 32 asynchronous terminals at a remote site. DCA's statistical multiplexing assures excellent response time, character transparency and error-free transmission.

DCA's multipoint multiplexing configuration serves a number of remote terminal locations with just a single telephone line, for substantial savings in phone-line and hardware costs. DCA users have benefitted from multipoint multiplexing since January 1979.

DCA's System 205 is a statistical multiplexor designed for DEC UNIBUS* -based computers. The 205 requires only one UNIBUS slot to emulate up to 16 DEC DZ11 modules and a 128-port stat mux. This greatly lowers hardware costs and improves response time as well.

Because of DCA's unique modular design, all of the above networks could easily expand into larger, more powerful networks. As the master network processor, System 355 gives terminal users access to any host computer anywhere in the network. In addition, the 355 supports up to 126 ports, 62 of which can be high-speed synchronous trunk links. Several 355's can be combined to greatly expand this support. Features include port contention, switching, unlimited routing, X.25 support and a wide array of network management tools.

Total system access and unlimited network growth at very low cost — that's the DCA advantage. For complete information, call or write for our 16-page brochure.

*DCE Digital Equipment Corporation
MEGAMINI
32-bit minicomputers for the power-hungry. From Perkin-Elmer.

The Perkin-Elmer 3220 and 3240 are minicomputers so powerful we had to find a new word to identify them—Megamini. They're engineered for the power hungry—people who demand extra power, speed and reliability. For CAD/CAM applications. Real-time simulation systems. Number-crunching scientific applications. Large volume transaction processing requiring scores of terminals, all operating concurrently with less than two-second response.

Power is our specialty.

Hungry for memory access power? Check out our 3240. Feast on its 16 megabytes of directly addressable MOS ECC memory, with a unique hierarchical storage scheme for megafast access. The fastest effective access on the market for its price—250 nanoseconds with cache memory.

Need throughput power? Our Megamini 3240 delivers 40MB/second I/O bandwidth, 64MB/second peak system throughput rate and multilevel interrupts. Up to 115 gigabytes of on-line storage and a throughput capability of 40 million bytes per second can be configured on a 3240 system which can control more than 1,000 devices.

More power to you.

Need operating system power? Our highly-efficient OS/32 is the power behind the power. It has been perfected from use in more than 3,500 of our 32-bit supermini installations worldwide. Up to 256 user tasks can be executed concurrently at user-defined levels of task priority. Our user-alterable writable control store enables you to tailor your programs with microcode to suit your needs.

And our globally optimizing FORTRAN VII compiler produces object modules at a speed of 2,000 lines per minute. In addition, our Multi-Terminal Monitor lets up to 64 programmers work interactively in any mix of FORTRAN, COBOL, CAL MACRO, Pascal, BASIC II, Coral 66, or RPG II.

What price power?

Our price/performance story is the best of all. The 3240 starts at about $90,000 (U.S. only). The 3220, with many of the same features, starts at approximately $36,000. Both with 60-day delivery.

Call toll free 800-631-2154. In NJ 201-870-4712.

CIRCLE 73 ON READER CARD
NEWS IN PERSPECTIVE

see if anything "tangible" can be salvaged. An unconfirmed rumor at press time was that an offer for the remnants of the operation might come from the Diebold Group in New York. Also not known at this time is whether one of Infotech's conferencing agents, the large French software concern CAP-Gemini-Sogeti, which recently promoted some events in France for Infotech, was financially embarrassed by the collapse. Some sources feel that the French company may now try to recruit some of Infotech's key personnel.

—Ralph Emmett

LI’L HELP FROM ITS FRIENDS

Times may be tough for ICL in the U.K., but optimism is oozing from its North America Operations.

Debt-plagued ICL Ltd. may be having its troubles in England, but perhaps there’s help coming from this side of the Atlantic.

The mood at ICL/North America Operations' new headquarters in Dallas is one of optimism. Reports from England indicate ICL is having trouble finding enough customers for its ME 29 systems (Feb., p. 14), but Jon Nicholls, vice president of marketing for ICL/North America, thinks he has found a market for them here. This find is one of the reasons ICL/North America began to consolidate its marketing efforts in Dallas last October. The market is the oil and gas industry. "The ME 29 is a good machine in that environment. It's a good shared resource machine, and oil and gas operates in a distributed environment."

ICL developed its oil and gas system, which it calls O'Gas, in Calgary, Canada, where it has one system operating and sees a good market for more. Its second ME 29 commitment came from Texas. "It comes from an organization offering facilities management for oil companies. We're involved in a joint venture with them to Americanize the system."

The "Americanization" has largely to do with legislative reporting, which is different here than in Canada. "We're not for the Exxons of the world," Nicholls emphasized, but for joint venture type operations where a number of people invest and acquire rights to drill and explore. "There's a lot of accounting tied up in this and nobody else wraps that up in one parcel."

He explained that the system includes ICL's Interacct accounting system, general ledger, IDMS database, report writers, and COBOL language, and is designed to be parameterized. "We pick up the development ourselves and make the source code available to users—with hefty protection, of course."

While bringing the oil system from ICL's oil and gas system, which it calls O'Gas, is based on the ME 29 machine.

Canada to the U.S., the company is hoping at the same time to take a system it calls Revenue Data Collection from the U.S. to Canada. This system is for entities that derive revenue from a variety of different sources at one point of collection, such as government bodies (utility payments, dog licenses, etc.) golf courses (restaurants, green fees, pro shops, etc.) and universities (tuitions, dorm fees, etc.). The system produces receipts, does verification, and captures data at the point of collection. It then takes care of allocating the monies automatically. The first systems went to Arlington County, Texas, and to Washington State Univ.

"We are not all things to all men."

COBOL SOFTWARE TOOLKIT

Functional, well engineered, low cost, system independent software tools for COBOL programmers.

Documentation Preparation: Doc-F is a text formatter with 34 commands to allow users to position, justify and paginate text. Ideal for system and user documentation preparation. Store easily modified input in your source library. Print reports and manuals on demand.

Price $1000 Circle 74

Cross Reference: COBXREF supports a superset of COBOL. It produces a full program listing for programmers - both an alphabetically ordered reference list and a bi-directional list. Where variables and paragraphs are defined, all occurrences are referenced. At each occurrence, the defining statement is referenced.

Price $500 Circle 75

Compare Utility: DIFFS finds all differences between two files even when there are extra or missing records. It has options for skipping leading and trailing blanks, selecting fields and hexadecimal reporting.

Price $500 Circle 76

Structured Precompiler: SCOBOL supports a superset of COBOL which allows eight control structures for gotoless programming. SCOBOL programs can use while-do, repeat-until, if-then-else-elseif-then-else-endif, select-case-endcase and other structures. The precompiler translates them into standard COBOL. Includes the precompiler, program formatter and cross reference. FORTRAN, COBOL and IBM's FORMTRAN (parallel system for FORTRAN) also available.

Price $1400 Circle 77

Decision Table Precompiler: COPE is an optimizing precompiler for decision tables with a built in COBOL specific macro processor. Reduces PROCEDURE DIVISION code by fifty percent.

Price $1500 Circle 78

Our software is being used on every major vendor's hardware. Trial installation and monthly payout options assure satisfaction.

Software Consulting Services
901 Whittier Drive, Allentown, Pa. 18103, (215) 797-9690
Raster brilliance, contrast and erasability. Z-8001 intelligence plus programmability. All in a desk top, high resolution (1024 x 792), monochrome, graphics terminal ticketed at a low $10,000.

Genisco's G-1000 is the low cost graphics terminal you've been holding your purchase order for. It is the first direct raster replacement for the Tektronix 4014-1** terminal—plug to plug and software compatible. But, at the same time, the on-board Z-8001 microprocessor plus 16K words each of RAM and PROM let you develop your own programs at your pace while your system is up and running on existing software (like PLOT-10).

Because the G-1000 is a bit map raster scan device it can do things a storage tube can't approach—like provide easy viewing in normal room light, and allow erasure of any portion of the screen without altering or redrawing the rest of the display. Genisco has equipped the G-1000 with all the quality features—60Hz noninterlaced refresh for flicker free viewing, a large 19 inch display, a detachable keyboard with cursor joystick. And, an optional alphanumeric overlay eliminates the need to use a second terminal. The unit supports a selection of I/O equipment including graph tablet and hard copy devices. With all that and the Z-8001 intelligence, the list of future capabilities is virtually open-ended.

Take a look at Genisco's new G-1000—the 4014-1 replacement and a whole lot more.

Call or write for more information to Genisco Computers Corporation, 3545 Cadillac Avenue, Costa Mesa, California 92626. (714) 556-4916.

*Price varies according to quantity.
**Trademark of Tektronix Graphics software from ISSCO Graphics.

Genisco
CIRCLE 81 ON READER CARD
said Nicholls. “What we’re trying to do is select areas where we can provide a basic system in which 75% of the work is already done. We operate autonomously [from ICL said Nicholls.]

In the point of sale (POS) field, Nicholls said, “we continue to outsell ourselves year after year.” He said a “significant number” of ex-Singer POS users in the U.S. and Canada are not ICL users.

Nicholls, who moved to Dallas from ICL’s Toronto office last October to take charge of ICL North America marketing, says he was acquired with Singer by ICL.

“I’ve been with Singer/ICL for 10 years.”

In the last year, in Canada, he said, ICL ran neck and neck with NCR on new POS contracts. In POS, as in other areas, the ICL North America operation likes to zero in on specific targets. One of these is home improvement centers. “They sell both retail and to contractors. We can handle the strange mix of wholesale and retail with the same software and hardware. We have a good retail system and a good general purpose system.”

—Edith Myers

**BENCHMARKS**

**TWAS TIME TO COMBINE:** “Mergers and acquisitions in the computer services industry hit an all-time dollar volume high last year,” says the ADAPSO/BROADVIEW Index, recently released by Broadview Associates, Fort Lee, N.J., merger specialists. Dollar estimates for the 87 mergers and acquisitions that took place in 1980 are placed at $688.4 million, compared to 107 mergers and acquisitions in ’79 at a value of $671 million. The index shows that the average transaction went up 26.2% over ’79 averages, most of these gains occurring during the second half of ’80.

Bernard Goldstein, a partner at Broadview Associates, says, “This growth is extraordinary in light of interest rates having peaked twice during fiscal year 1980, since high interest rates usually have a “chilling” effect on acquisitions and mergers. Further, Goldstein claims that the computer services industry is one of the most acquisition-prone segments of American business.

Jerry Dreyer, president of ADAPSO, agrees with Goldstein and says “the computer services industry is one of the fastest growing segments of our economy,” adding that the industry shows remarkable resiliency in the face of combined recession and inflation.

**BULLISH ON BUBBLES:** The latest predictions are that the shipments of bubble memory devices will grow from $18.4 million in 1980 to $226 million in 1985, an annual growth rate averaging 68%. This, according to the Venture Development Corp., Wellesley, Mass., consulting firm. VDC sees applications for the bubble memory devices expanding from those which specifically require the ruggedness and small size of the bubble to more general applications. Initial use will mainly be in machine and process control and portable terminals, but stationary computer and word processing applications will become more important. Slow growth rates in the last three years are attributed to the absence of price reductions that had been predicted. Instead of being priced lower than RAMs, bubbles have been more expensive. VDC sees prices declining over the next five years since bubble makers have now learned how to produce their product in quantity. Presently, Texas Instruments is leading the bubble memory manufacturing market, with Rockwell International and Intel hot on the trail. IBM and AT&T are continuing research (the latter producing units for its own systems); National Semiconductor and Motorola are new entrants; and Fujitsu, Hitachi, Siemens, SAGEM, and NEC are the foreign producers, expected to begin more active competition in U.S. markets.
But perhaps the best part of the picture is our picture. And you can see this beautiful picture in six different models ranging from 7" to 19" (all screen sizes measured diagonally) at prices starting as low as $450.

Beautiful pictures come naturally to Panasonic color monitors because they all have our Quintrix™ in-line black matrix picture lube. And that means a picture so life-like you'll feel like you're part of it, whether you're watching production tapes or the latest computerized color graphics display.

Some monitors like the 19" CT-1910M, the 13" CT-1310M and the CT-1310V monitor/receiver include ColorPilot™ which automatically adjusts color intensity and hue to preselected levels.

Our 10" CT-110M monitor is small enough to fit on a desk and economical enough to be used in multi-monitor configurations. While our 7" portable, the CT-700M, works on both AC and DC power and comes with a 12-volt car battery adapter.

Best of all, Panasonic color monitors are just one part of a complete line of Panasonic video components. Including portable and studio color cameras, ¾" VCR's, editing systems, professional VHS™ recorders and cameras.

Want to get the complete picture on color monitors? Feast your eyes on Panasonic.

*Manufacturer's suggested price.
Attention: Engineers Age 40 and Up

Put yourself on easy street by spending pre-retirement years with Aramco in Saudi Arabia

Retirement incomes that sounded princely a few years back are beginning to look paltry in today’s economy. And they may be hopelessly inadequate in tomorrow’s.

What can you do about it? Come to work for Aramco in Saudi Arabia. Just compare these Aramco benefits with what you’re getting now.

Collect more extras you can put right in the bank

First, you get a tax-protected bonus of up to $5,000 as soon as you join us.

You can join an automatic payroll savings plan in which Aramco matches up to 6 percent of your salary (the match begins at 50 percent and escalates up to 100 percent after ten years of service).

And you participate in Aramco’s retirement income plan.

Earn a whopping tax-protected pay premium

We start you off with a base salary that compares with any in the oil industry.

We also give you a cost-of-living differential in Saudi Arabia so that the higher costs of things like food come out of our pocket, not yours.

The best part is our premium for overseas employment. This is fully sheltered from all taxes.

We pay you a 40 percent premium on the first $30,000 of base pay —plus a 20 percent premium on the next $20,000.

Maximum is $16,000 per year.

Tuition and board anywhere in the world for high schoolers

High school students get their educations in Europe, the United States, anywhere. We pay 80 percent of all tuition and board (up to $4900 annually) for three years of high school.

We also pay air fare for high schoolers visiting parents in Saudi Arabia —three trips per year. (The same goes for air fares for college students but they get fewer trips.)

Youngsters from kindergarten through the ninth grade attend our American-style schools in Saudi Arabia.

Free trip home every year —long vacations

You get 40 days of paid vacation every year —plus an average of 12 holidays every year —plus weekends.

You get a travel allowance every year, too. This is equal to the economy round-trip air fare between Saudi Arabia and the U.S. or Canadian city where you were hired. Good for you and your family. Every year.

Where you go is your business. Is it any wonder that so many Aramco people get to see Europe, the Orient, the world on their annual leaves?

Free life insurance and health care

You’re automatically covered with a life insurance policy the day you join Aramco. No cost to you.

You can also buy extra insurance up to thirty times your monthly salary for about 34¢ a month for every thousand dollars.
All your medical needs are free while you are in Saudi Arabia — even your prescriptions.
Unlike medical care, dental care is not free for Aramco employees. However, the costs are comparable to what you’d expect to pay back home.

A chance to save huge sums of retirement money

We can only give you a bare idea of how the money can multiply over a 10-year span. For the sake of illustration, let’s add up the fortunes of an engineer working for Aramco in Saudi Arabia making $35,000 U.S. in base pay, with no raises for the 10 years (not likely!). Remember this is just a hypothesis.

Right off, you see that our imaginary engineer in Saudi Arabia can gross around $149,000 more. The amount saved out of that grand total is strictly up to the individual.

But look at that $130,000 premium. Whatever the dollars work out to in your case, please remember that this is the bundle which is totally tax-protected.

This graph doesn’t show what you save on medical expenses, it doesn’t show the allowances on your children’s education, it doesn’t show the travel allowances which cut down on vacation costs, it doesn’t show the retirement benefits you may accumulate.

What it does show is that you have the chance of a lifetime to save a really important amount of money.

A sensible way to check out the new lifestyle

Everyone in Saudi Arabia lives within the letter of the local law. (No alcohol, for instance.)

But the Americans and Canadians eat steak and french fries, they go golfing and sailing and water-skiing, they tend their nice suburban houses.

While the lifestyle is easy, sometimes living so far away from relatives and friends can be difficult for some. That’s why we’ve begun a new policy: The Aramco overseas tryout.

If you don’t want to move your whole family over at once, come and work for us on bachelor status for one year. We’ll fly you home three times so you can keep the family informed about your adjustment to life in Saudi Arabia. Then at year’s end or sooner all of you can decide whether the life is for you or not.

Take on job challenges you thought you’d never see again

Aramco is the world’s largest oil-producing company. So the job opportunities for experienced engineers are boundless. You can stay within your specialty — or you can expand into new territories.

Here are the engineering job categories we’re interviewing for right now: Project Management & Construction • Oil & Gas Operations • Facilities Planning • Corrosion Control • Inspection • Resources Planning • Exploration & Development • Maintenance

(PS. Our opportunities are open to qualified engineers of all ages.)

Interested? Call our 24-hour line any day: (713) 750-6965 — if you wish, call toll-free, (800) 231-7577, Ext. 6965 between 7 A.M. and 5 P.M., Monday-Friday, Central Time.

If you prefer, send your résumé in full confidence or write for more information to: Aramco Services Company, Department DM0301ML04B, 1100 Milam Building, Houston, Texas 77002.
We're electronics

Racial has a high technology approach. Advanced research, pioneering work in microelectronics and careful market evaluation help to keep us in the forefront across a wide range of electronics markets.

We're market leaders

From radio and data communications to radar and navigational systems, from computer-aided design to instrumentation and encryption devices—Racial is a world leader in these and many other fields.

We're growth

We're a company that's going places. During the past five years our annual sales have grown from an initial $150 million to an annual rate in excess of $1 billion.

We're worldwide

We operate through over 50 principal Racial companies, to markets in 180 countries and backed by more than 1000 distributors, agents and service locations. We are totally committed to customer support wherever it's needed.

We're here

Today there are some 15 Racial companies based in the United States with a total of around 5,000 employees. These US companies represented 36 percent of our 1983 gross annual sales.

An information package on Racial is available by writing, the Racial Electronics Group P.O. Box 9500, Grand Central Post Office, New York, N.Y. 10016.

The Electronics Group

We’ve Always Offered More Graphics Solutions.

Now CalComp adds the full line of Talos digitizing tablets to what is already the most extensive line of computer graphics solutions available from any manufacturer.

Talos gives you a wide choice of digitizers in sizes from 11" x 11" to 44" x 60", with the option to back-light and rear-project images. And that’s the kind of selection you need for your varied applications, including pipeline layouts, printed circuit boards and data reduction. Plus, they can accommodate conductive materials for digitizing seismographic and well-head logs.

Our newest products, the 800 Series and the Wedge, both feature electromagnetic technology to allow you to digitize from conductive materials, and to give more precise data input and greater data stability.

The flexible 800 Series with MULTIBUS® module lets you use dual tablets, dual cursors, and multiple interfacing for greatly expanded system capabilities.

The Wedge, designed especially for applications using small systems, offers end users and OEMs an affordable yet highly dependable alternative to traditional CRT control devices. And to aid operation ease and efficiency, the Wedge offers a unique five-degree sloped surface.

The 600 Series, using electrostatic technology and incorporating the "active inch" principle, is also available in a wide range of sizes and surface options.

To further expand accuracy and high speed performance, we offer SMART software packages for the 600 and 800 Series. SMART provides local processing of digitized data to let you combine functions and calculations, and much more depending on your working requirements.

CalComp for all the alternatives in computer graphics.

CalComp offers full lines of drum, flatbed and beltbed plotters; controllers; computer output microfilm (COM) units, and electrostatic plotter/printers. And, new from CalComp, the Graphic 7 display system.

Plus CalComp support. All CalComp products—including Talos digitizers—are backed by the largest professional team of sales, systems and service people in the industry—direct from CalComp. And our worldwide service organization means we can give you fast assistance wherever you’re located.

We have all the solutions to your graphics needs. Call today to see how we can find the right one for you.

CALCOMP
A Sanders Graphics Company

CIRCLE 87 ON READER CARD
NEWS IN PERSPECTIVE

BATTLE FOR BIG BUCKS: It's the Sperry Univac 1100 vs. the Burroughs 5901 for the largest acquisition of commercial computers in the history of the industry. The winner earns an Air Force contract expected to exceed $1 billion. The loser goes home and sulks in its software. The two companies were the finalists among a reported eight competitors who bid on the Air Force Phase IV Base Level Data Automation Program under the recently instituted "Fly Before You Buy" procedure. Pursuant to its $49.7 million contract, Univac will demonstrate the capability of the 1100 and its operating system software for seven months, then show the machine's conversion and transition abilities for the following 15 months. Simultaneously, but at a different site, Burroughs, which was awarded a $45.3 million contract, will perform similar tasks with its 5901. After 22 months, the two will go mainframe-to-mainframe at Gunther Air Force Base. Following the four-month Qualifications Operational Test and Evaluation, the Air Force will make a Production Buy Decision to determine which manufacturer will have the pleasant and extremely lucrative honor of installing its hardware at 150 Air Force bases around the world.

CAUGHT IN THE NET: U.S. computer industry revenues from network products will grow twice as fast as total data processing revenues over the next five years, according to the Arthur D. Little impact study of the world computer industry. The study says network products, which will account for 20% of the $54 billion in total dp revenues for this year, are expected to climb to $36.7 billion from $13.4 billion by '85. The value of their mainframe shipments and directly associated peripheral equipment increased 13%, from $19.5 billion in '79 to $22 billion in '80. The study predicts that major U.S. mainframe vendors will increase their dp revenues by 10% per year through '85. However, they will lose some of their present share of the network products market to independent suppliers, some of whom may not be in the running. American mainframe vendors also will lose computer market share outside the U.S., according to the study, since manufacturers based in other countries are expected to cut the U.S. share from the current 59% to 50%.

R&D FUNDS UP: Expenditures for R&D in the U.S. are expected to reach $6.8 billion in 1981, an increase of $8.2 billion, or 13.7%, over the $60.4 billion estimate for 1980. Most of the increase will be absorbed by inflation, says Battelle's Columbus (Ohio) Laboratories, but a real increase of 3.8% should come in 1981.

SURVEYING THE MANPOWER: The American Electronics Association, Palo Alto, Calif., has launched a survey to discover the nation's technical manpower needs over the next five years. AEA is sending out its questionnaires to over 1,300 companies in major U.S. electronics centers, with the end result (the AEA believes) being high motivation for educators to expand their training facilities for the electronics industries. Survey results will be announced this spring, and will include geographic breakdowns as well as U.S. totals. In addition to aiding educators, the survey results will assist companies in assessment of future technical personnel needs.

DESKTOP TROUBLES: Desktop computer development will be inhibited through the 1980s primarily because of three factors: present-day systems demand that users have a technical, or logical, turn of mind, combined with an evident need for a computer (and the number of people in society who meet these qualifications is limited); substantially more powerful desktop computers must be developed so their use can be so simplified it is no more difficult to use than any other office machine; and the spread of desktop computing on terminals to giant computers and distributed processing will erode the market from above. So stated Business Communications Co., Inc.'s report, "Booming Markets For Desktop Computers—When?" The report forecasts that today's technology will continue through 1985, and then newer technology will take over and replace most of the old units. Sales between 1980 and 1989 are expected to jump from 2,355,000 for a total value of $10 billion in 1980 to 8,586,000 units, expected to generate $8.19 billion worth of business for this decade.

NEW NAME FOR IEEE?: The Institute of Electrical and Electronics Engineers, acting on a motion submitted by director emeritus Donald G. Fink, is considering changing its name to "reflect the influence of computers." One proposal, by IEEE's Computer Society, is the Institute of Electrical and Computer Engineers. Robert W. Lucky, executive vice president, is chairing the committee in charge of a possible name change, and he plans on thorough discussions within IEEE before any action is taken. The IEEE's name originated in 1963 when it was created by the merger of the Institute of Radio Engineers and the American Institute of Electrical Engineers.

GSA EASES CSC SUSPENSE: Computer Sciences Corp. has resumed bidding for all new General Services Administration computer services business (except time-sharing since the GSA eased the suspension placed on the company last Nov. 3.) The suspension resulted from a federal indictment against CSC, related to a GSA contract under which the company provided its Infonet services to federal agencies from 1972-77. Since the suspension order, a U.S. district court has dismissed most of the charges and set a trial date of March 9 to hear the remaining charges. In a separate action, NASA notified CSC it had completed its review of the company and that it could continue competing for technical support contracts from that agency, where it is the fifth largest contractor. Spokesmen for CSC stated, "These rulings are most welcome because they remove widespread concern as to our ability to continue serving major federal markets for our contract services technology." In its fiscal year 1980, CSC received $287.7 million, or 63% of its total revenues, from the federal government, with $243.4 million coming from contract services and $44.3 million from Infonet services.

DATABASE BOOMING: Revenues generated by online database services will reach $2.99 billion by 1985, says Creative Strategies International (CSI), the California-based market research and consulting firm. Contributing to the rapidly developing markets in the reference and source database areas are the growing concerns over professional and managerial productivity, improved software, and the increasing number of databases in a widening subject area (over 450 databases are currently online). Over the next five years, the industry is expected to achieve a compounded annual growth rate of 38%. Reference segment information is usually less business oriented than the source area, there are currently more than 225 reference databases, with new ones coming online each month. The fastest growth area in the source segment is the numeric database, often used by the decision-maker without intervention by intermediaries. In the U.S., Canada, and Europe, there are presently over 270 producers and vendors involved in this industry.

MICROS IN EDUCATION: The Foundation for the Advancement of Computer-Aided Education awarded nearly $150,000 worth of micro-based systems to 26 educational groups—the fourth set of awards made by the foundation since October '79. The foundation was chartered originally in 1979 as the Apple Education Foundation and is a nonprofit corporation, organized to support and develop new methods of learning through small computers. The majority of the systems provided by the foundation are Apple IIs, aimed at projects in the elementary through university levels in such subjects as foreign language and special education.

...continued

--Deborah Sojka
DASI DEPENDABLE. MEMOREX FUNCTIONAL. IBM COMPATIBLE.

Data Access Systems, Inc. (DASI) introduces the Memorex 2078 Display Station, a rare achievement in data communications technology.

The 2078 is first with true plug-to-plug IBM compatibility, and new features never before found in a single data terminal.

Best of all, as the country's largest independent supplier of telecommunications equipment, DASI provides you with local off-shelf delivery, 24-hour nationwide field service and an unprecedented 30-Day Free Trial Offer!

The Memorex 2078 from DASI. The right terminal from the right source at exactly the right time.

Call for more information, or mail the reply card today. We'll have you up and running in no time.

CIRCL 88 ON READER CARD
Local networks prove practical for datacom systems in close proximity

By Howard Gavis

In recent years, local networks have increasingly replaced dedicated file servers, data communications equipment, service centers, and other methods of communication. The design, installation, operation, and performance of these networks have been discussed at conferences sponsored by the University of California at Berkeley, the National Bureau of Standards, and the National Society of Engineers. In May 1979, the latter organized a National Local Network Conference. Vendor interests in local networks are exemplified by the early 1980s development by IBM of a local network to develop standards, technical and marketing specifications for local area communications, which is the subject of many local area products.

A local network is a communications system for the interconnection of terminals and computers that are within the building, in several buildings on the same complex, or in close proximity, in which the network is connected with the more familiar host and terminal networks for private lines, public switched services, and private switched systems. The total amount of local communication may range from as little as a few hundred watts to as much as several kilowatts.

Local networks are desirable for the same reason that conventional networks are, and there are possible uses of resources such as computing power, data storage, and switching capacity at sites in diverse locations. The characteristics of modern high-speed local area networks are very similar to conventional local and medium area networks in bandwidth, a group of diverse network systems constituting a total. It is feasible and relatively inexpensive to implement local area networks of several hundred milliseconds per second (Mbps) in local networks. These networks have characteristics similar to those of conventional local area networks, and they are used to provide services to local users, such as file sharing, data storage, and other applications.

The earliest local networks were those implemented with private branch exchanges or central telephone systems. These systems were limited to the telephone service. Most of the data communications were transmitted using the same switching systems as the telephones. Since the data rate is limited to 9600 bits per second (bps) with some special switching, the local area network uses similar switching techniques. These networks can be used to provide integrated voice and data communication services.
LOCAL NETWORKS FOR THE 1980s
Any type of control can be used with any network topology.

currently with data communication at a speed of up to 9600 bps from a separate terminal. This is accomplished by installing an Add-on Data Module (ADM) in the telephone set and using for data one of two pairs of cable at the station. A different approach is represented by the Integrated Business Exchange (IBX) of InteCom, in which voice and data communications are also integrated. Here the total data rate at the station is 128 kilobits per second (Kbps), of which 9 Kbps is used for control signaling, 64 Kbps for voice, and 56 Kbps for data. In both the SL-1 and the IBX, additional equipment is required to extend data communications beyond the terminals connected to the PBX switching system.

**LOCAL NETWORK CONTROLS**

In each local network there is a control mechanism by means of which the connected terminals and computers share the use of the bandwidth. One of the simplest control methods is multiplexing, the transmission of a number of messages simultaneously over a single circuit. A network in which there is a separate cable pair, or other medium, per connected device exemplifies space division multiplexing; this is suited for the earlier kinds of local networks in which the data rate per cable pair is limited to 9600 bps or so. Modern systems with higher bandwidths employ both frequency division multiplexing (FDM) and time division multiplexing (TDM). In the former, there is a portion of the frequency spectrum of the medium assigned to each point-to-point connection, whereas in the latter, a time interval or slot is so assigned. (Both of these techniques are widely used in long-haul transmission, and TDM has been integrated in some cases with telephone central office switching.) At the Boston meeting in 1979, MITRENET, was described. This is a local area network implemented by MITRE Corp. in which the 300 megahertz (MHz) bandwidth of community antenna tv (CATV) cable system is divided by FDM into voice, data, and video channels, and, within certain of these channels, individual devices share the capacity by means of either TDM or contention control, which is explained later in the article.

A star network (see Fig. 1) with space division of the communications channels, and certain kinds of networks with FDM or TDM and fixed channel assignments to devices, are examples of centralized control of a local area network. In contrast, two other kinds of distributed control have been developed for the sharing of bandwidth in wideband local networks: ring control and contention control. In one method of ring control, in the network of Fig. 2, there is a constant circulation around the ring of pack...
THE CALLAN™ INTEGRATED WORK STATION IS THE PERFECT PACKAGE FOR OEM USERS OF MULTIBUS™ OR LSI-11 COMPATIBLE CARDS.
Design of the CIUs has become the critical problem in distributed control local networks.

...its destination as having been delivered, and its network is in use at Cambridge Univ. in England.

Several kinds of contention control mechanisms have been developed as a result of experiments with the ALOHA packet radio system in Hawaii; the original work was sponsored by the U.S. Department of Defense. ALOHA is not a local network in the sense used in this article, but rather a shared radio network. The ALOHA researchers found that if several transmitters have low duty cycles, it is efficient to have them simply transmit packets when they need to do so, taking a chance that there may be a "collision" between two or more packets transmitted nearly simultaneously, in which case they must be retransmitted at a later time.

Several schemes exist for dealing with collisions. In order of increasing efficiency in utilization of the total bandwidth, these are 1) retransmitting a packet after a fixed or random time interval if an acknowledgment has not been received (presumably because a collision has occurred); 2) "listening," that is, finding out if another packet is on the channel before transmitting and delaying transmission if it is; and 3) listening not only before transmitting but also while transmitting, so that a collision is detected more quickly than in method 1. Method 3, known as carrier sense multiple access with collision detection (CSMA-CD), is used in Ethernet, the proprietary local network system developed by Xerox that uses coaxial cable as the transmission medium. When the average device activity is sufficiently low, this method has the potential of more efficient use of the channel bandwidth than in the case of multiplexing; thus, a larger number of terminals at a given data rate per terminal may share the network.

It might appear from the foregoing discussion that centralized control is intimately linked with the star network topology, and perhaps with multiplexing; that ring control is linked with a network of ring topology (Fig. 2); and that contention control is linked with the kind of network in which it is often used, viz., a bus. However, as is also pointed out by Clark and his coauthors, any type of control can be used with any network topology. Thus, networks have been built with the bus topology and ring control, with the ring topology and contention control, and so forth. These variations arise from the desire of experimenters to exploit certain characteristics of the network, such as the collision rate in a ring network with contention which is lower than that in a similarly loaded bus network with contention.

**DESIGN OF THE CIU**

As the illustrations show, the terminals or computers are connected to the local area network proper by means of communications interface units (CIUs). In a network with centralized control, the CIU is simply a conventional or limited-distance modem; the necessary logic for access to the network is in the terminals and the central computer, perhaps with help from human users. On the other hand, in a distributed control network with ring control or a bus network with contention control, this logic is primarily in the CIUs. Thus the design of the CIU has become the critical problem in distributed control local networks.

With few exceptions, CIUs have been custom designed for specific local networks. In the MITRENET, for example, the CIU has three main components. The first is a conventional CATV subscriber outlet, which makes accessible to connected devices 50 video channels of about 6-MHz bandwidth each. All of the digital connected devices use a high speed (1 Mbps) bus derived from one such video channel, thus requiring a special modem to modulate 1-Mbps serial data into a CATV channel and conversely to receive data. The second component is the bus interface unit (BIU). In a particular implementation of MITRENET with contention control by means of CSMA-CD, the BIU accepts data from the connected device, buffers this data until the channel is free, and then transmits it as an addressed packet. The BIU also receives data for its connected device by scanning the channel for its own address, buffering the received data, and transferring it to the device at the appropriate rate, which is generally much less than the bus rate of 1 Mbps.

The design of a CIU in general will depend on the speed and type of network transmission medium, the method of control, and the speed and code of the connected devices. In addition, the CIU's design is often influenced by considerations of network reliability, e.g., as to redundancy of components or special techniques for recovery from CIU failure. Further, it is in the CIU that error detection and correction are normally performed, although the inherent bit error rate performance of local networks is good, by reason of their limited geographic extent.

In the language used by the International Organization for Standardization (ISO) for describing "open systems interconnection," we have so far described local networks mainly in terms of the lowest layer—

2. The word "carrier" is a holdover from the radio origin of this scheme. As noted by Clark et al. (loc. cit.), method 3 cannot be applied in radio networks, owing to local transmitter interference in the receiver, but it is suited for cable media.

3. The description here is extracted from the paper by M. V. Wilkes and D. J. Wheeler, "The Cambridge Digital Communication Ring," presented at the 1979 Boston meeting.
THE ELECTRONIC WORLD COMES TO TORONTO
MAY 20-22

YOU CAN'T AFFORD TO MISS IT
NORTH AMERICA'S FIRST MAJOR VIDEOTEX CONFERENCE
AND EXHIBITION

See the World's leading Videotex Systems in Action—
Telidon/Canada, Teletel/France, Knight-Ridder/AT&T USA,
Prestel/UK and other International Systems.

Hear about
• developments in Videotex in North America, Europe and
  Japan
• applications in business, publishing, broadcasting and the
  home
• standards, regulations and the Videotex marketplace

The electronic highway of two way video communications is
here. Your world will never be the same.

COME SEE, HEAR AND PARTICIPATE.
VIDEOTEX'81 TORONTO CANADA MAY 20-22, 1981

ACT TODAY—DON'T MISS TOMORROW

(416) 598-1981

write to: VIDEOTEX'81, c/o Infomart, 122 St. Patrick Street,
Toronto, Ontario, Canada M5T 2X8 Telex 0622111

Videotex'81 is organized jointly by Infomart of Toronto, Canada and Online Conferences Ltd. of London, U.K. In Europe call (09274) 28211 Telex 923498
PIOS Manufacturing Software

Real Time in the Real World

By Woodrow W. Chamberlain
Woodrow Chamberlain is President of Rath & Strong Systems Products, Inc. Since joining Rath & Strong in 1972, he has figured prominently in the development and implementation of PIOUS systems in manufacturing facilities nationwide.

What is PIOUS?
An on-line, real-time manufacturing control system that fits the complex realities of your unique environment. PIOUS (Production & Inventory Optimization Systems) makes it possible. Rath & Strong Systems Products, Inc. makes it happen!

Field Tested & Proven
PIOS software is a product of Rath & Strong’s innovative leadership in the field of manufacturing management for the past 45 years. PIOUS is a complete, closed loop manufacturing system which has been field tested and proven in the toughest manufacturing environments, including: electronics, aerospace, heavy machinery, job shop, assembly environments, and automotive manufacturing. It doesn’t just look good on paper, it works!

Hardware Compatible & Modular
Written in ANS-COBOL and developed to fit a variety of popular databases and teleprocessing monitors, PIOUS manufacturing software runs native in each environment. Modular systems allow PIOUS to interface with your current systems, and to expand as you grow. Up-to-the-minute information is instantly accessible to users, making it possible to totally integrate and control the way you do business.

It Works.
PIOS comprises manufacturing concepts reflecting hundreds of man-years of successful consulting experience, coupled with the latest data processing techniques. This state-of-the-art system is backed by a company with a 15-year history of successful computerized systems implementation. Rath & Strong knows how to take a good management tool and make sure people use it properly by providing thorough training and detailed documentation.

Comprehensive Manufacturing Control With Modular Systems
- Master Production Scheduling
- Material Requirements Planning
- Inventory Control/Accounting
- Shop Floor Control
- Cost Management
- Purchasing Management
- Bill of Materials
- Customer Order Entry
- Computer Generated Standards

For more information about PIOUS, call 1-800-527-5915, or write to Linda Smith, 4835 LBJ Freeway, Suite 500, Dallas, Texas 75234.

Rath & Strong
SYSTEMS PRODUCTS, INC.

error; this permits the network maintenance people to track down a CIU that has an intermittent fault or is near external noise that has entered the network.

Several computers are connected to the Cambridge ring, including a PDP-7, two PDP-11s, an experimental computer, a NOVA, and a Computer Automation LS-14. There is also a plotter, and cluster controllers for CRT terminals are in preparation.

FordNet, implemented by Ford Aerospace and Communications, is similar to MITRENET in that the transmission medium is coaxial cable with CATV hardware. The digital channel has a rate of 0.8 Mbps. FordNet is designed specifically for connecting comuters of the PDP-11 family, and the network appears to each connected computer as an equivalent UNIBUS connection. To bring this about, the CIU consists of a CATV transceiver and a digital unit called the UNIBUS micro channel; the latter contains a 4-MHZ Z80 microprocessor with 32K RAM, a UNIBUS direct memory access (DMA) channel, three Z80 DMA channels, two multiprotocol serial input/output (SIO) channels, and programmable countermers. The network control mechanism is CSMA-CD. The CIU in FordNet implements not only the basic, or first layer, network control method, but also a link-level protocol, similar to HDLC, for CIU-CIU communication, and a network-level protocol, based on datagrams, for host-to-host communication.

The 1980 announcement by DEC, Intel, and Xerox states that they will develop specifications for a local network using the Ethernet CSMA-CD method of control. The initially proposed characteristics of this network include a 10-Mbps data rate, coaxial cable medium with 500-meter CIU spacing, and a datagram link-level protocol. It will be interesting to see whether these specifications converge with those that might be adopted by the IEEE National Local Networks Standards Committee, or by other industry groups operating as committees under the auspices of such bodies as ANSI and EIA. There are indications that there will soon be a number of off-the-shelf, more or less standardized local network products offered by vendors, probably emphasizing CIUS. Recently, 3Com Corp. of California offered a "Local Computer Network Vendor List" with technical and price information of some 40 vendors. The announcement mentions not only such well-known firms as Datapoint, GE, and HP, but also specialized firms such as AMDAX, BSR, Interactive Systems/3M, Nestar, Sytek, Ungermann-Bass, and Zilog. Perhaps we will know that local networks have come of age when someone starts a journal devoted to them!

Howard Cravis is a senior member of the professional staff at A.D. Little, Inc., Cambridge, Mass., where he specializes in communications systems engineering studies of voice, data, video, facsimile, and composite communications networks.

Meet A Smart Performer

15" Screen, 132 Characters per Line, 7 x 11 Dot Matrix, Over 100 Operator Selectable Functions in 8 Soft Keys, 4 Page Memory.

Now, you can have all the features of the best terminals on the market in a single unit. All on a large screen with crisp, clear characters. The TAB 132/15. You'll get the kind of screen action you've been looking for.

Bidirectional smooth or jump scroll. Horizontal scroll. Split screen. 19,200 Baud communications. ANSI and DEC compatible. Full range of character attributes and editing features. English prompted set up mode. 24 data lines plus status and prompt lines. And more.

Solve your most demanding applications problems. Boost your operator productivity.

Screen test the TAB 132/15 today. You'll see a smart performance.

Call or write:
Smart Performer
TAB Products Co.
1451 California Avenue
Palo Alto, California 94304
415-858-2500

Distributor/OEM Inquiries Invited

CIRCLE 91 ON READER CARD
Charles A. Lindbergh
where are you now?

On the morning of May 21, 1927, people woke to a smaller world than the one they fell asleep in. One man with limitless courage and a burning vision had taken an existing machine and changed history with it.

The progress of technology is only partly the development of new tools. The rest is the acts of people who took existing tools and accomplished new things with them. That is the business that Computer Sciences Corporation is in.

Today's machines are computers and CSC is looking for people to fly them.

Computer hardware design has evolved at a dizzying pace in the past decade. The possibilities that chip technology and integrated circuitry provide are staggering. What's needed now are architectural and systems engineering methodologies sophisticated enough to realize this new potential.

Computer Sciences Corporation is uniquely suited to a leadership role in these areas. CSC has been and is a pioneer of these skills. Across the earth and far into space, in every imaginable application, CSC's systems have integrated hardware, software and communications to advance the technique of problem solving. In the process, CSC has become the world's leading independent information services company.

The computer is history's most profound tool. Given proper systems design and software systems, it can alter man's relationship with everything he has ever known.

It's the ultimate challenge. Maybe you'd like to help us. If you're good and not afraid to find out how good you really are, you should be in touch with CSC.

The only limitations are the ones you bring with you.

CSC

COMPUTER SCIENCES CORPORATION
Corporate Offices: 650 N. Sepulveda Blvd., El Segundo, CA 90245
An Equal Opportunity Employer

CIRCLE 92 ON READER CARD
Standardized, low-priced components are making this new technology easier to use.

LIGHT THROUGH GLASS

by Bill Stephens

British physicists John Twiss and Ronald Southon demonstrated in the 1960s that light could be transported through a fiber optic cable. They made the fibers by drawing molten glass through a small opening. The light was then transmitted through the fiber, which consists of an optical fiber (or glass) core surrounded by a protective outer layer. When light enters the fiber, it is guided along the fiber by total internal reflection. The light is then emitted at the other end of the fiber as a fine beam of light.

The first practical application of fiber optics was in the 1970s, when researchers at Bell Labs developed the first fiber optic cables for telecommunications. These cables were much smaller and more flexible than earlier cable designs, and they were able to transmit data over much longer distances.

Since then, fiber optics have become an essential part of modern telecommunications infrastructure. They are used to transmit data over long distances, and they are also used in a variety of other applications, including medical imaging, scientific research, and military communications.

Today, fiber optics are used in a wide range of applications, from telecommunications to medical imaging. They are a key component of the modern telecommunications infrastructure, and they are likely to become even more important in the future as new applications are developed.
Between 1970 and 1979, engineers at Corning/Corning Fibers-Worps, the R&D arm, were giving the way for practical use of optical waveguides over long distances. For the first time, large-core plastic fibers with core diameters of several hundred microns were fabricated from gallium aluminum arsenide, silicon, and silicon-oxide clad fibers. The main advantage of these fibers is that they can be handled without special precautions, and they can be used in optical transmission systems. The main disadvantage is that they have a large mode field and cannot be used in short-distance optical transmission systems. However, these fibers are still useful for some applications, such as optical amplifiers and optical fiber sensors.

Parallel development of optical sources and detectors for fiber optic communication has concentrated on achieving practical solid state semiconductor laser diodes (LEDs) and silicon-oxide clad photodetectors (SOAs).

After development of the first gallium arsenide solid-state laser in 1960, the primary goal was to develop a semiconductor laser to simplify construction of the source and make it more practical for communications systems. In 1962, the U.S. Air Force announced solid-state lasers fabricated from gallium arsenide crystals. High-performance, high-repetition rate lasers were developed, and the solid-state laser was used in optical transmission systems.

High-reliability, high-power, high-sensitivity optical detectors are also beginning to play an important role in the fiber-optic revolution. The principle of spontaneous emission, which is the basis of the solid-state laser, has been used to develop optical detectors with high sensitivity and low power consumption. This type of detector is a combination of a semiconductor laser and a photodetector. The light from the laser is used to excite the electrons in the semiconductor, and the resulting current is detected by the photodetector.

Optical fiber technology has provided the means with a high speed of light, a high density of data, and a wide range of applications. The first demonstration of the technology was in the laboratory, but it has since been adopted in real-world applications. The main advantage of optical fibers is that they can be used to transmit data over long distances without the need for repeaters. The main disadvantage is that they are still expensive compared to copper and other transmission media.

The coupling of optical fibers, for example, poses relatively severe optomechanical problems. In principle, the best way to couple light into the fiber is to use a fiber optic connector. However, the main problem is to position the fiber end with a high degree of accuracy. The solution is to use a fiber optic connector that uses a fiber end with a high degree of accuracy.
matched to the minimum attenuation characteristics of the fiber. The .8 micrometer (μm) to .9μm band provides a low attenuation window in which modern GaAlAs semiconductor emitters efficiently convert electrical energy to optical energy. Core diameters typically range from 55 μm to several hundred microns. Small semiconductor sources and accurate alignment techniques are essential.

Lasers and Burrus LEDs have been designed to couple efficiently to optical fibers and are typically pigtailed at the factory to save users the problems of ultra-accurate alignment. Labor-intensive assembly techniques, however, have kept the prices of these pigtailed components high, discouraging their use in high volume applications. Lasers, ranging in price from $800 to $2,000 each, offer the best coupling efficiency achievable and maximum modulation bandwidths, but drive circuitry for the units must usually incorporate some sort of temperature compensation to stabilize power output.

Until recently, the Burrus LED has been the only high performance alternative to lasers where lower cost and simpler circuitry are desired. Coupling efficiency and modulation bandwidth of the Burrus LED is not as good as the laser’s, but prices are lower ($300 to $600) and the Burrus offers better reliability and simpler drive circuitry. Still, the Burrus has retained some of the labor-intensive assembly requirements of the laser, as well as the lifetime problems of a small junction emitter.

SWEET SPOT LED

The Spectronics Division of Honeywell has developed a GaAlAs LED with an integrated micro-optical element (a small glass sphere) for achieving efficient coupling in a "pluggable" optical interface. Such interfaces are highly desirable for applications where less than state-of-the-art fiber terminations may be encountered.

The Spectronics Sweet Spot LED, shown in Fig. 4, is a surface-emitting device with an active area three or four times larger than equivalent Burrus structures, improving lifetime characteristics markedly. The optical element and fiber-source spacing are selected to conserve radiance relative to the pigtail configuration, thus coupling the same amount of power to a selected reference fiber. The Sweet Spot LED, however, projects a "sweet spot" of optical energy at the surface of the device window several times larger in diameter than most high performance optical fibers. This allows alignment tolerances to be relaxed, since placement of the fiber anywhere in the "sweet spot" will couple rated power to the fiber. Pigtail devices must have accurate fiber-to-fiber alignment to couple efficiently. This requires more expensive connectors and more optical expertise on the part of the user. Further, the Sweet Spot structure is compatible with high volume optoelectronic manufacturing methods, allowing comparable Burrus performance at about one-third the cost.

Detectors, a more mature component technology, are available at a variety of price and performance levels. Avalanche photo detectors (APDs) are used where maximum speed and sensitivity are required (primarily telecommunications applications), whereas PIN diodes provide a general purpose low-cost detector for short/medium distance applications. The main disadvantage of the APD is the requirement for high bias voltages (typically 180V to 350V) and temperature compensation circuitry to stabilize photogain. PIN diodes, in contrast, may be operated at bias voltages less than five volts and are inherently stable over a wide temperature range.

Modular fiber optic links also vary widely in performance and price. This allows...
NBI MADE WORD PROCESSING OBSOLETE TODAY.

With the advent of the NBI Office Automation System (OASys), the old concepts of word processing are suddenly obsolete.

NBI OASys provides office automation solutions that can't be outgrown. Because it grows as your needs grow, and allows you to spread increased productivity throughout your office. Work-group by work-group, location by location, as needs arise. And as expansion occurs. With systems designed to fit your applications, sharing information and resources as desired.

Easily, simply, economically. Starting with the NBI System 3000, known as the finest high-performance word processing system in the world, you add the resource sharing capability of the new NBI System 8 and 64, so you can build optimum solutions to your office automation needs. They all use the same powerful operating software, while taking advantage of new breakthroughs in information and text management techniques.

NBI OASys gives you the advantages of stand-alone dedicated systems, plus the benefits of shared resource systems, combined into truly integrated office information networks. Without the high-costs, operational delays, and reliability problems associated with old-fashioned shared logic systems.

It's the perfect combination of capabilities and simplicity.

For more information, call us toll-free at 800/525-0844. In Colorado, call 303/825-8403.

The NBI OASys.
The leader in information processing just ushered in a new era.

What the Office Automation System of the future looks like today.
Fiber optics is well suited for data transmission in a variety of environments.

users to design with fiber optics on essentially a modular basis, plugging in self-contained units with all the components (including connectors) needed to achieve point-to-point electrical-optical-electrical conversions. Exxon's Optical Information Systems Div. offers a family of laser transmitter modules in the high performance category (100MHz bandwidth). Manufacturers such as Spectronics, Hewlett-Packard, RCA, and 3M have developed complete integrated module links for data rates up to 20Mb/s at distances up to 2 km.

Fiber optics is well suited for data transmission in a variety of environments, and has found applications in control, instrumentation, and dp. Fiber optic modem bypass (or eliminator) units offer noise immunity superior to that of conventional wire units, with the capability for much higher data rates. Further, because of the wideband characteristics of the fiber, conventional wire modems are replaced by simpler optical ones, and equalization or line conditioning is unnecessary for long distance transmission.

While most light wave communications applications are digital (another plus for computer-to-computer conversations), analog information is often required for process control or monitoring in industrial environments. In these cases a voltage-to-frequency converter, together with digital fiber optic transmitter and receiver and a frequency-to-voltage converter, can provide accurate, low-noise, temperature stable transmission over a maximum length of 2 km.

**FUTURE OF FIBER OPTICS**

As distributed processing networks develop in the mid- to late 1980s, fiber optics will undoubtedly find widespread use, particularly in short and medium distance applications within a plant site or a single office complex. Local networks tying processing for order entry, inventory control, invoicing, shipping, and normal dp functions will require transfer of large blocks of information at high data rates. Unexpected noise sources and ground loop problems can cause major complications in such systems. The advantages that fiber optics enjoys over wire—low noise susceptibility, low loss/wideband transmission, small size, light weight—will make it an attractive medium. Fiber optics will not replace other transmission techniques; it will be used where it is most useful, and many of those applications are only now coming into being.

Fiber optics will probably figure heavily in such exotic communication systems as the "wired city," where telephone, tv, radio, and mail services would be linked into each home via a single wideband channel. The same system could make it possible to conduct financial transactions remotely but interactively, in which case the electromagnetic security of optical cables will be useful.

Much work remains to be done in next-generation fiber optic hardware, particularly for short/medium distance applications. Cable prices are continuing to decrease, and optical transducers must follow suit for both high speed systems and for low-cost, low-performance applications. The labor-intensive methods of laser fabrication currently used must be streamlined if lasers are to penetrate higher volume sectors of the market. LEDs and PIN diodes must also be improved.

Manufacturers of components must focus on adopting standards, generating better application information, and compiling accurate lifetime/reliability data to allow use of such components as a part of normal engineering design cycles. One step toward that standardization was taken last May, when Dupont, ITT Cannon, and Spectronics announced a point-to-point data link called the HDC Interface. The link is suitable for short-distance, medium-speed applications, and
He just sent an electronic memo to 16 domestic and overseas branches, received the new sales report data, and revised and distributed the wording of a 30-page proposal. All on one network system.

MDS introduces WINC service. Worldwide Integrated Communications.

You're looking at a manager who's on top of the situation. He's got WINC service, the most complete corporate communications system ever developed. Ideal for the organization with widely dispersed locations.

WINC service is efficient intra-company electronic mail. With direct ties to domestic and international common carriers. WINC service is worldwide communications combined with distributed processing. It provides programmability, custom software and a wide range of peripherals.

And WINC service is full-featured, big screen word processing which can be quickly distributed.

With WINC service, MDS assumes the responsibility for fully managing your network. It's easily implemented and highly cost effective.

For the full details, including the unsurpassed variety of terminals and terminal systems available from MDS, mail the coupon. We'll bring you the world in a WINC.

[Form for mailing coupon]
OUT OF THE LAB, UNDER THE STREETS

The best publicized uses of fiber optics for communications have been the big telecom projects undertaken by the common carriers. GTE has two Siecor cables in place in Fort Wayne, Ind., running two miles from a main switching center to an exchange building. AT&T has several installations, the most notable of which is probably the one in Chicago, a mile-and-a-half link that carries voice, data, and video between two Bell offices. Unified Telecom has a 12.3 km link between Carlisle and Mount Holly Springs, Pa. Most recently (last November) and most spectacularly, AT&T received permission from the FCC to install an optical fiber telephone trunk line between Washington and New York, part of the 631-mile Northeast corridor line the company intends to construct.

CATV companies have also been among the leaders in implementing fiber optics. One of the most ambitious projects is the CATV supertrunk installed in London, Ontario. This 322 Mb/s system carries 12 color TV channels and 12 stereo channels over eight kilometers. The system electronics were built by Harris Corp., and the installation uses 10 lengths of six-fiber cable manufactured by Canstar. These higher power, longer-distance applications tend to use different kinds of components than those appropriate for local data communications. Light sources are typically lasers (although LEDs are also in use at AT&T's Chicago installation). Receivers are usually avalanche photodetectors, and cables are of the low-loss, high-quality glass variety.

Smaller systems, by contrast, usually use cheaper plastic-core cable such as the Dupont Pifax. Light sources are generally LEDs, and receivers are PIN diodes or other low-performance components. Designers don't want to pay for capacity they don't need.

One well-known local datacom installation is in the city of Houston. Terminals in the public library are linked to terminals in the firehouse with 3,200 feet of optical cable. These are connected to a Uni...
Right this minute, Epic Data Collection Systems are working round the clock for some of North America’s biggest companies in some of the roughest, toughest environments imaginable.

Assembly-line areas. Machine shops. Foundries. Fabrication plants. Not to mention hospitals, libraries, and a multitude of other applications.

Our data collection systems deliver the goods. In five years and over 80 major installations, we have concluded that our record warrants our offering a service and performance guarantee agreement, the first in the industry.

1. Software: Our terminals and control units will mate with your choice of computer.

2. Storage and Control: If your host computer fails, our redundant control units are designed to continue to collect and hold your data. Your system will remain up and running.

3. Automatic Back-up: If one of our redundant control units goes down, another automatically takes over its functions.

4. Spares/Service Contract: We have a service contract which includes on-site spares supplied at no extra cost, thereby ensuring maximum terminal up-time.

Introducing

Epic Data’s Performance-Guaranteed Data Collection Systems.

Epic terminals accept data from punched or magnetic stripe badges, punched cards, barcodes or through the keyboard. They hold the input data in memory or on cassette, or pass it along to an Epic Data control unit, the host computer or a peripheral device. Each of these functions is available in a separate Epic terminal or in your choice of combinations.

How Can We Be So Sure?

Data collection systems are our only specialty. Over the years we’ve interfaced with everything from truck scales at the input to 16 different makes of computer at the business end.

Because of our extraordinary array of built-in backup features, our systems do perform as specified. So we’re sure of ourselves. We’re hoping, by means of our policy, to make you similarly confident of us.

Reliability in your environment is guaranteed by virtue of our remarkably rugged construction and a multiplicity of built-in back-up features.

How To Get More Information

Call collect or write to us at the location below. We’ll be delighted to arrange a management seminar or a hands-on demonstration. We’ll devise a system that exactly fits your requirements. And we’ll give you straight answers to all your questions.

CIRCLE 95 ON READER CARD

Epic Data
Performance-Guaranteed Data Collection Systems
7250 River Road,
Richmond, B.C. Canada V6X 1X5.
Tel (604) 273-9146 Telex: 043-55701

Regional offices:
Chicago (312) 560-5559
Hartford (203) 651-8724
Los Angeles (213) 693-1273
Mainframe power.

Announcing the HP 3000 Series 44.

Our newest, most powerful computer supports everything in the photograph, including the new HP 2680 Laser Printing System. And you can take delivery on the computer in just 12-16 weeks.
Small system price.

The new HP 3000 Series 44 extends our computer family's performance range dramatically. For a system price starting at just $110,000*

It has the power to handle 4 megabytes of memory, 1.9 billion characters of on-line disc storage, up to 96 terminals, 4 line printers, 7 synchronous data-comm lines and 8 mag tapes.

In five minutes, on-line users can access an IMAGE data base 1,560 times to enter or update orders. At the same time, the computer will respond to 51 inquiries into the data base, and generate formatted reports for all of them, with subtotals and totals. In the background, it can compile a 1200-line COBOL program 1.5 times. And read, sort and report a 9,000-record file twice. It will do all this while giving each on-line user a response in an average of 1.5 seconds!**

Six years of compatible software.

The Series 44 continues the HP 3000 tradition of compatibility. So it will run the software developed for earlier models. Or for smaller members of the current family.

And if you have a Series 30, 33 or III, you can get Series 44 performance and power by exchanging system processor units.

It also has all those other HP 3000 features—including IMAGE data base management and forms management—that make our computer family so easy to use and program. And we've given it an enhanced operating system, MPE IV, to manage the increased memory and discs even more efficiently than previous versions.

What's more, we made the Series 44 so reliable and supportable that you can get it with an extraordinary service guarantee.

Introducing Guaranteed Uptime Service.

This is a new maintenance agreement covering the processor and two discs. It guarantees up to 99% uptime over any three-month period or our service on these critical components is free for the next month.***

For more information about the powerful Series 44 and its remarkable service guarantee, call your local HP sales office. Or write Hewlett-Packard, Attn: Bob Bond, Dept. 491, 1100 Wolfe Road, Cupertino, CA 95014.

---

*U.S. domestic price includes 1Mb System Processor Unit, 50Mb disc, 1500 bpi tape and CRT console.
**Series 44 and 4Mb memory, 3-120Mb disc drives, 1-1600 bpi tape drive, 1-400LPM printer, 24 terminals (terminal activity simulated by HP TEPE program).
***Initially available in the U.S. only.
TIME B SPECIAL SECTIONS GENERATE VALUABLE SALES LEADS

RESERVE YOUR SPACE NOW...IN THE JUNE 8TH ISSUE

PLANNING THE OFFICE OF TOMORROW

TIME B’s special sections on new office technologies offer an ideal advertising environment and a proven five-year track record as a direct response advertising vehicle.

This famous demographic edition of TIME reaches 1,550,000 individually qualified executives in business and government on all levels where key purchasing decisions are made. TIME B is the biggest and the best all business buy available.

† IT’S EFFECTIVE... IT’S EFFICIENT

That’s why industry leaders such as Eastman Kodak, Lanier, Saxon, Xerox and Wang have advertised in TIME B’s business equipment sections year after year. A survey of respondents to TIME’s last section shows:

† TIME offers advertisers a national platform. TIME B inquiries came from every state in the union including the District of Columbia.

† TIME B offers the best coverage of the top 100 metro markets which account for 73% of business equipment demand. Sixty-one percent of responses were concentrated in these high-profit areas.

† TIME B reaches decision-makers on all levels: 31% of respondents were in top management; 28% in middle management, and 38% were professional/technical.

† TIME B covers companies of all sizes, especially hard-to-reach small businesses which make up the high growth segment of your market: companies with less than 100 employees—43%; 100–999 employees—19%; 1,000+ employees—34%.

† TIME B readers come from the entire spectrum of business and industry: service companies—39%; industrial—25%; financial—10%; government—8%; trade—9%; and communications—7%.

A DOUBLY ATTRACTIVE EDITORIAL SETTING

Every issue of TIME B contains the same sharply focused coverage of the world’s week as TIME’s national edition.

This year’s special section—“Planning the Office of Tomorrow”—will be written by a team of four senior staff members of Arthur D. Little. Particular emphasis will be placed on the role of management in all levels of planning: new ways of viewing productivity benefits, investments and risks... the linking of data processing, office systems, communications, engineering and manufacturing automation... phasing in new equipment... training personnel.

SPECIAL BENEFITS FOR ALL ADVERTISERS.

When you advertise in “Planning the Office of Tomorrow,” you’ll receive at no extra cost: two post-paid reader service cards with computerized weekly fulfillment... demographic and geographic analyses of respondents to the section and to your individual ad... full color reprints to send to dealers and prospective customers.

Reserve your space now in the June 8th issue of TIME B. Contact your local TIME sales representative or call Charlie Craig, Business Equipment Supervisor, 1 (212) 841-2831.

TIME—Put TIME B to Work for You

CIRCLE 97 ON READER CARD
Quick change is the norm in the data communications industry, but events actually seemed to accelerate this past year. Fuzzy Koren characters have been using Xerox’s Ethernet in the pages of *Fortune*. Between halves of NFL playoff games, Exxon sent the tiger who used to inhabit your gas tank wandering among chunks of an automated office. Satellite Business Systems has put hardware in the sky, and on the chilly shores of the Bay of Biscay the French telephone monopoly has been hooking up optical cables in the village of Biarritz. AT&T, a good-sized communications firm, has announced a major restructuring. And the Federal Communications Commission has ruled that there really isn’t much difference between dp and telecommunications, two functions that are merging into a single information management marketplace.

Sound like a lot to keep up with? One way to do it might be to attend Data Communications Interface ’81, this year’s version of the world’s largest datacom show. Interface started in 1973 as a nuts-and-bolts modem and multiplexor conference, but as the field has expanded, so has the show. Says Sheldon Adelson, president of the sponsoring Interface Group: “So-called office automation continues to take place within the data communications environment. Thus, Interface continues to broaden its traditional end-user charter to encompass new areas of information resource management. Such functions as the acquisition, processing, storage, retrieval, and communications of information blend into each other in increasingly complex systems.”

Not that modems have been forgotten; the conference continues to emphasize productive use of what’s available off the shelf, as evidenced by a group of sessions entitled Datacomm Interfaces. Attendees will learn how to get more out of modems and muxes as those old standbys are rejuvenated by micros and take on new tasks in network control, protocol translation, and terminal interfacing. There won’t be any dearth of vendors of these products, either. General Datacomm will exhibit, as will Infotron Systems, Micom Systems and others.

Interface has expanded in size as well as in scope over the years. The 1973 show drew 2,000, but recent versions have attracted around 10,000. Because the conference will take place in Las Vegas, site of the extremely successful Interface ’78, the organizers expect a hefty turnout. Over 200 companies will exhibit this year, ranging from big names like the Bell System, Hewlett-Packard and RCA Global to small ones like Tiffany Stand & Furniture.

The keynote this year will be struck by two speakers. William S. Anderson, chairman of NCR, will offer a CEO’s perspective on the directions data communications is likely to take in the ’80s, and Robert C. Hall, president and CEO of Satellite Business Systems, will take a look at banking and communications in the next decade.

People who make the trip across the desert to Interface ’81 can expect to hear a lot about interfaces between different kinds of technology. As communications equipment proliferates, users are becoming increasingly baffled as to how the stuff fits together. Says Peter B. Young, conference program manager: “Integration is the key word at this year’s conference. In our program listings, you’ll find the word used more times than at a Mississippi cocktail party in the ’50s.” Users need to know how to assemble diverse technologies into working systems; in the next decade they will have to manage integration of networks, of hardware, of software.

Highlighting the conference will be 11 special focus seminars, which Interface hasn’t done before. These half-day sessions will feature experts discussing core topics in datacom. Why the new approach? “Like everyone else in this business, we’re always fiddling with our format in an attempt to discover better ways to present the information,” explains Young. The Interface Group held similar seminars at the most recent Interface West conference, and they went over well. But while those sessions lasted all day and cost extra, the special focus sessions at Interface ’81 will be three hours long, and there will be no surcharge. “The whole thing is structured to create a free flow of information,” Young continues. “These sessions tend to be cheerfully argumentative. There’s a lot of spontaneity.”

A preview of the subjects, seminars, and speakers at Interface ’81, the world’s largest datacom show.

Indeed, several of the experts who will be running the seminars plan to bring colleagues with them to broaden the discussions, and also to allow a fair amount of time for questions from the audience. Says Frank Dzubeck, president of Communications Network Architects and the man in charge of the local networks seminar, “You get some nice questions that way. These are management people, a very interactive crowd.” Dzubeck’s panel will consist of four experts. One of them will be Tony Carlson, manager of data networks at the U.S. Senate computer center, who will talk about CATV for data, limited distance modem/twisted pair networks, and Ethernet I.

Einar Stefferud, president of Network Management Associates, will also have some help when he conducts his seminar on office systems planning. Attendees will hear from several users who are in the process of implementing office automation systems. The focus here will be on helping users figure out just what they want to accomplish with the systems they can expect to be building over the next 10 years. “By my reckoning,” reckons Stefferud, “that’s where a lot of people fall down. They don’t recognize the general requirement.” Of course, users can’t buy anything new that will answer all their needs in 10 years—if they want to be up to date at that time. But they can make purchases right now that they can build upon. As Stefferud puts it, “You need an evolutionary strategy of incremental additions as new technology becomes available.”

According to Stefferud, office automation is not a single system, but the achievement of something he calls interoperability between systems. A model of sorts is the way we currently move paper. Letters may be a bit slow, but they travel everywhere because all offices have systems for handling information in that form. Automated offices will be as adept at handling electronically born information. Local networks are the key ingredient in creating that kind of productive environment, and Stefferud’s panel will be talking about how local nets now becoming commercially available can hook up to long-haul public data nets. There will also be some
Eleven half-day special focus seminars will be offered for the first time.

Discussion of the art of training workers to be productive with the new technology.

Dr. Joel Orr of Orr Associates, a Danbury, Conn., consulting firm, is in charge of the special focus seminar on business graphics. Business graphics is already a billion-dollar industry, says Orr, with firms like Merrill Lynch demonstrating daily that organizing information into a bar chart and disseminating it electronically can be worth more than a thousand words. "Using pictures is a denser mode of communication," explains Orr, and he will be telling attendees what special kinds of hardware and software they need to achieve that denser mode.

Dr. Del Hansen, Hewlett-Packard's section manager for fiber optics, will conduct a special focus seminar on his specialty. He and three other experts will discuss the uses of optical transmission in local networks. They will contrast what's happening in fiber optics with the uses of coaxial cable, including Ethernet, and talk about the economic and environmental considerations that determine which transmission technique is best in a given application. Link-level issues will also be discussed, as efforts continue to develop standards both within fiber optic systems and between those systems and other transmission techniques.

International networking is the subject of Leonard Elfenbein's seminar. Elfenbein is president of the Telecomm Systems group; together with Telecomm vice president Clark Okan and Barry McAdam, managing director of the company's British subsidiary, he will present a tutorial on "the whole array of equipment and regulatory considerations" that have to be faced when designing and operating private user networks between nations. There are tariffs to be paid and questions to be answered, such as "Does the local PTT allow transmission of voice and data over the same lines?"

TANDEM SEMINAR SLATED

Ralph Berglund, a contributing editor of DATAMATION, which is a cosponsor of the conference, will team up with Richard Deal of Deal & Associates to conduct the special focus seminar of broadest scope, entitled "Technology for Tomorrow."

Berglund and Deal note that many managers are too busy to follow the vertiginous movement of the datacom industry; they aim to provide a map of information systems' communication technology, with which managers ought to be able to make productive use of the rest of Interface. They'll offer ideas as to which technologies will soon demand consideration and which ones are still too far out to spend a lot of time on. The pair made a similar tandem presentation at the Computer Networks Conference in Houston in January, and Deal says the response was excellent.

Other special focus seminars are Telecommunications System, with John Nuwer of Atlantic Richfield; Datacomm Fundamentals, with Charles Joyce of Network Strategies; Datacomm Building Blocks, with Gil Held, datacomm chief at the U.S. office of personnel management; and Datacomm Network Concepts, with Dr. Phil Enslow, professor of computer science at Georgia Tech.

Integrating Information Resources — no small job, that — is the title of another group that's expected to be well attended. Incompatible systems have a lot of users wondering whether Rube Goldberg is alive and working as a communications consultant. The solution, obviously, lies in the integration of a variety of information at both the functional and technical levels, but how do you accomplish that? Sessions are Emerging Voice/Data Networks, with Ralph DeMent of Distributed Systems Hardware; the CBX as Network Integrator, with Dale Kutnick of The Yankee Group; Integrating Private and Public Networks, with Peter Moulton of Moulton & Co.; and Clearing Network Compatibility Hurdles, with Rubin Gruber, president of Cambridge Telecommunications.

Because so many studies have indicated that there will be a serious shortage of programmers in the '80s, Interface will offer a group called Packaging Software Solutions. Off-the-shelf software packages and firmware will be taking on increasing importance; managers will need to know how to use them. Sessions are Filling the Software Gap, with Andrew Olson, managing director of TEAM International; Operating Systems — the Critical Linkage, with Richard Watson of Lawrence Livermore Labs and Ronald Sandor of the Library of Congress; Integrating Multiple Applications, with Brian Fisher, a consultant to Booz Allen & Hamilton; and Software Tools for Data Base Management, with Gary Audin, president of Delphi, Inc.

Some of the other Interface '81 session groups are Distributed Data Processing Futures, Public Networks, the Integrated Office, Peripheral Highlights, and Issues for the Information Industry. The issues group will feature a session with Howard Anderson, president of The Yankee Group, who will discuss the reorganization of AT&T.

Interface '81 will take place March 30 to April 2 at the Las Vegas Convention Center. Headquarters hotel is the Las Vegas Hilton, with additional blocks of rooms available at other hotels. Registration fee for all four days of conference sessions and exhibit admission is $125; one-day conference/exhibit floor admission is $65. Exhibits-only admission is $10. For registration information, write The Yankee Group, 160 Speer St., Framingham, MA 01701, or call toll-free 800-225-4620.

Las Vegas is warm in March.

—Kenneth Klee
Dear Ma:
Racal-Vadic has the world's first Dual Acoustic Coupler...
1200 bps full duplex and 0-300 bps as well!

Another winner from Racal-Vadic, Ma. It's the world's first DUAL acoustic coupler. The compact VA3413 is fully compatible with Racal-Vadic's VA3400 and your 103/113 type modems. Just think, Ma, a single portable coupler can now handle virtually all originate applications for full duplex 1200 bps and 0 to 300 bps data transmission over the dial-up telephone network.

This is great news for remote terminal users who can, if they wish, instantly step up to 1200 bps full duplex, using the same 103 type protocol, yet can operate at 0 to 300 bps as well. It's two couplers in one! Great features, too. Under microprocessor control, the VA3413 employs a unique scheme for automatic detection of the called modem, making it unnecessary for the user to have to manually select the VA3400 or 103 mode. The unit also has automatic 9 or 10 bit character length recognition.

Where can you obtain the VA3413? Easy, just phone the nearest Racal-Vadic stocking rep or for more information dial 800-543-3000, OPERATOR 500.

Your independent thinking son,

[Signature]

Racal-Vadic
222 Caspian Drive
Sunnyvale, CA 94086
Tel: (408) 744-0810 • TWX: 910-339-9297

Available from these stocking reps...

See us at Interface Booth 1009 & FED DP Expo Booth 113

CIRCLE 98 ON READER CARD
Our new B-900 helps keep the DP department ahead of a growing demand for printout. It's the fastest member of our reliable B Series family of band printers.

Like the B-300 and B-600 models, it has Dataproducts' patented Mark V hammer system at its very heart. The system is virtually friction-free. The result is a remarkable level of reliability.

That reliability is proven, too. With over 16,000 units in the field, our B Series printers have become the industry standard for excellence.

**Fast and easy.**
The B-900 was designed for high performance, printing up to 1100 lpm with a 48 character set. It prints out 900 lpm with 64 characters and 670 lpm with a 96 character set.

All the B Series were designed with the operator in mind. The long lasting ribbon cartridges are easy to load. The bands can be changed in less than a minute. Sophisticated self diagnostics let the operator identify problems and often correct them without a service call.

**The quiet type.**
With fully sound-insulated cabinets, the printers operate at only 60 dBa—even less than the noise level of a

With Dataproducts' B-900 Band Printer, every department gets what's coming to it.
typewriter. These cabinets are available on the B-300 and B-600, standard on the B-900.

A name you can trust.
Dataproducts is the world's largest independent printer manufacturer. For 19 years, we've built printers for the biggest OEMs in the business, putting their names on our machines. These customers make sure our printers live up to some pretty tough standards.

Now our B Series band printers are available with our name on them. Or with your name.
We're here to help.
We have distributors and sales representatives throughout the world.

We'd love to show you how our printers can improve your systems.

Call for more information. Or write our Marketing Department at 6200 Canoga Avenue, Woodland Hills, CA 91365. Telephone: (213) 887-8451.

Toll Free—Calif., (800) 272-3900 ext. 201
Rest of U.S., (800) 423-2915 ext. 201
European Marketing Headquarters: Ascot, England, 990-23377, telex: 849426
MST copies floppies fast—time after time.

Up to 652 Copies Per Hour—On the Fly.*

At last, you can be first. Now you can format and copy in one fell swoop—fast—with the Time Machine™ from MST.

MST's rugged Time Machine is built to survive in a 21 hour-a-day copy production environment.

And you can configure MST's Time Machine to copy 8" and 5¼" disks simultaneously while verifying both copied formats and data.

The Time Machine allows you to download all your format and data information onto an 8" Winchester-type hard disk.

Best of all, it's easily upgradable to handle increased copy requirements.

Call MST today. Because copying floppies is the last thing you should worry about.

* For 5¼" single-sided disks in a four media loader configuration. Up to 464 per hour for 8" single-sided disks.

Media Systems Technology
1616 South Lyon
Santa Ana, CA 92705
(714) 543-8219
A guide for the corporate exploratory team making the initial foray into the uncharted wp wilderness.

TEN OBSERVATIONS ON LIVING WITH WORD PROCESSING

by Bruce Huffine

Trying to keep up with word processing (or its more mature brother, information management) can be a frustrating and humbling experience. To a dper just venturing into this technology, it is doubly hard to get a general view of this new industry and relate it to the more traditional dp world.

With the mounting awareness and growing affordability of wp equipment, more and more companies are entering the evaluation phase and catching up on new introductions. If you are part of the corporate exploratory team making the initial foray into this uncharted wilderness, you should know that other pioneering parties have returned with satisfying results.

Sometime in the distant past, a lot of companies started pushing something called the “office of the future.” In all likelihood, it was probably invented by the same genius who started Betty Crocker’s “kitchen of tomorrow.” In the same way the stove has been enhanced by microwave technology, mag card typewriters have been upgraded with crts, central storage, and communication interfaces to traditional computer hardware. In five years we will all be searching for a way to cope with the inevitable integration of dp with all the information processing disciplines that are evolving.

The mastering of word and information processing only comes with some trial and error experimenting with various combinations of information recipes that meet a company’s needs. During this initial experimental phase, the following observations may give some perspective on the nature of word processing. If some comments seem obvious, or appear to be just common sense, they probably are.

The attempted poetry of a frustrated poet is lighthearted, but the concepts illustrate that this technology requires the same disciplines as traditional dp development.

Like many other things in life, wp can be more than meets the eye.

No. 1—The Color TV Theory

We’re open to change, And known to be pliable, But wp is so new, Can it be that reliable?

Remember Uncle Arnold who said, “I’m going to wait until they get all the bugs out of color tv before I buy one”? Well, he probably never found an absolutely definitive breakthrough that told him it was the “right” time to buy. He probably got tired of watching “Bonanza” in black and white and took his chances along with everyone else.

This same dilemma is prevalent among people considering wp at this time. The unsettling prospects of a whole new set of concepts, end users, and newness of most vendors can make this same thinking sound reasonable, but try and explain that to a user.
If you ask five different people on three successive days to define word/information processing, you’ll get 15 different answers.

If you say “wait a few years,” that user will wait another year, watch the price of equipment fall below his level of spending authorization, call it a “smart” typewriter, and give every office a different model, brand, and color.

Unlike the color tv set, wp equipment does not have the inherent relatively high price, low quality, and unreliability at this stage of its development. Secondly, this technology is too firmly entrenched to go to the scrap heap of fads along with quadrophonic sound and Pet Rocks. In other words, it is easier to get involved than to pretend it doesn’t exist.

As a final solace, some of the more recently announced communication networks have protocols that should allow mixing of competitive equipment, making selection of most equipment viable if large communication networks are in your company’s future.

No. 2—The Distributed Processing Theory

I call it a document, They call it a member, If they change one more word, I’ll never remember.

There’s an adoption of an old saying, that goes “Ask five people what distributed processing is and you’ll get five different answers.” In the diverse as well as rapidly expanding field of word processing, if you ask five different people on three successive days what word/information processing is, you’ll get 15 different answers. Why? Here are a few reasons.

The work activities duplicated or enhanced by wp cover a larger proportion of the corporate population. The net result is a much larger and better educated end-user base than when dp was born.

Enticing and thought-provoking articles and advertisements are appearing in the mass media, generating great interest and, at the same time, creating a highly interpretive and speculative perspective on the exact functions, capabilities, and effort involved in the implementation.

Word processing can, at its basic level, still be described as a “smart” typewriter. With this outlook, some dp professionals can still maintain the position that wp is outside the sphere of their jurisdiction. Whether or not it is now, it will be in the near future.

Soft-loaded programs and resultant packages are redefining the scope of wp equipment faster than cartridges on an electronic tv game. With the expansion of wp software beyond records processing and into commercial languages such as BASIC and APL, we are going to make definitions of wp functions virtually synonymous with dp.

In other words, the question of what wp “does” is getting fuzzier. The catch is to keep all the pieces simple, modular, and fitting together in a well-planned design.

No. 3—The Apples and Oranges Theory

I explain all my problems And you nod and smile, So why are your solutions Always off by a mile?

In information processing, nothing is touted more than the need for “communication.” But with such a wide variety of business people coming in contact with word processing, the level of comprehension and the ability to pick the right dialect when vendors and users get together is critical.

At a recent trade show, I listened to a record manager (end user) and a wp technical advisor engaged in an enlightening discussion. The user was describing a potential application that had nothing to do with word processing. The technical advisor was answering the question in terms of a file management option that was available. This apples and oranges conversation went on for 10 minutes; then they walked away from each other believing they had found a solution.

The nature of wp allows anyone from a file clerk to a heavy dper to get legitimately involved with a wp vendor (and the vendor representatives have their own varied and diverse set of backgrounds as well). Situations such as this one illustrate the continuing need for interpreters to bridge the gap between users who need help defining what they want and suppliers who can understand, demonstrate, and deliver a solution.

No. 4—The Nothing for Free Syndrome

I deleted the files, My objectives were met, So how could I tell It was Mary’s diskette?

As with other kinds of dp, wp has equivalents to the following:

- file security
- maintenance and servicing
- catastrophe planning
- physical file storage
- machine access
- document/file naming conventions and control
- procedure documentation and control
- work priority and scheduling
- training
- retraining
- backup

If a user hasn’t heard of these items, it is wise to let these anything-but-insignificant responsibilities out of the bag slowly. Many vendors help identify and sometimes participate in resolving these design or operating questions. But this overhead time can be proportionally higher than the equivalents in the old version of typewriter and file cabinets. Keep management aware of these costs.

Corollary No. 4—The rest of the iceberg costs money too

Don’t forget the potential costs of:

- installation and site preparation
- startup inefficiencies and support
- special paper/ribbons
- archive/off-line storage (diskettes and cassettes)
- communication lines, modems, multiplexers, etc.
- special office furniture, environment control and carpet static protection
- upgrade/penalty costs
- deinstallation (shudder)

Amazingly, some users think documents are just stored “somewhere.” In most cases, that “somewhere” costs money.

No. 5—Deadly Words

Electronic mail is received In seconds like they said. But there’s no guarantee That it’s delivered or it’s read.

Anytime the words listed below are used, it never hurts to go a little further (most of the time much further) in getting a precise definition. This observation is really a corollary to the apples and oranges concept. The deadly words include the following:

- multitasking
- communications
- computer
- simple
- cost-effective
- “friendly” system
- reliable
- records/list processing
- screen
- clustered systems
- shared logic
- shared resources
- output queuing (spooling)

Corollary No. 5—Deadly Phrases for Deadly Words

- “Can you demonstrate this with a prototype?”
- “I don’t understand. Please explain it again.”
- “Can you guarantee this price/configuration?”
- “How long have you worked in word processing?”
- “How long have you been with this company?”

The moral of Corollary No. 5 is to continue to ask questions until you know
Incredible Power!

The Supermax 790 Network Concentrator

The Supermax 790 is an intelligent network concentrator with incredible power, power that makes data transmission more economical, more reliable and more manageable than ever before.

The Supermax 790 gathers data from over two hundred inputs, concentrating it for efficient transmission at speeds as high as 72,000 bits per second. It distributes it to as many as eight remote control locations in literally hundreds of destinations. The Supermax 790 also ensures that the data is accurate and keeps you informed about everything that has happened every step of the way.

The Supermax 790 offers incredible control over the entire network from your terminal, from your controller, from your data, from your data server. You can monitor and manipulate the data, input and output, all with the same diagnostic controls in your control offices—anywhere, worldwide locations.

The Supermax 790 Network Concentrator is designed for Supermax 300, 500 and 700 Stationary Multiplexers and, of course, other Supermax, 790 units. This allows you to build multiple networks using the most economical equipment in each location—without sacrificing data integrity.

For more information on how the Supermax 790 can meet your data communications needs, call or write today.

Infotron Systems

First in Performance and Reliability
Some users think documents are just stored “somewhere.” In most cases, that “somewhere” costs money.

what is involved, and be specific. Phrasing a question five different ways and always getting the same answer probably indicates the question was understood.

As a footnote, respect the vendor who asks the potential client the last two questions: it demonstrates respect for the apples and oranges problem.

No. 6—The Nothing Up My Sleeve Concept

This little model is
So simple and so neat,
Please sign by the “X”
So my family can eat.

Prototypes are probably the most valuable and revealing method of evaluating equipment. Something can be said for the vendor who will take a particular problem and develop a solution with its equipment. It also aids in tapping the type of organization, talent, and system support that may be available for your use.

The problem with demonstrations is that the text edit show on the publicity flyer and the telephone directory example of records/list processing are really remarkably similiar to those of six other vendors. Wheth­er you are attending a demonstration or presentation of a prototype, a good method of seeing the real difference in equipment is to raise your hand and ask this simple question: “Can you show me exactly how this demonstration was set up?”

The responses from the vendor may vary along the following lines. Judge them accordingly.

• “We’d be glad to show you right now.”
• “We’d be glad to show you in private.”
• “We’ll be glad to show you in two weeks.”
• “We’ll show you when our technical specialist is in town.”
• “You shouldn’t be concerned, we’ll do all of it for you.”
• “It’s so simple that we wouldn’t want to waste your time.”
• “We’d be glad to show you when you sign a purchase order.”
• “I’m sorry, I didn’t hear the question.”
• “I’m sorry, but we’ve run out of time.”

With enough explanation there may be any number of the following involved in the demonstration:

• special programming languages (simple to totally incomprehensible)
• macro procedures (prerecorded responses)
• special software loads
• special access/database techniques
• special software packages in use
• a very simple and easy-to-use set of commands
(Note the deadly words.)

In most cases, the degree of complexity is probably not the most important factor.

You want to know exactly what to expect and to be able to technically train and emotionally prepare the right people to do the right job.

No. 7—The Know Thyself

Commandment

I said keep it simple, No glitter or flash.
So why is this monster Draining all of our cash?

If you have been in outer space for the last five years and have just got a evaluation assignment, be prepared for a shock. Picking equipment from over 100 vendors is like being a lad in a candy store and surprisingly, just as much fun. With the introduction of soft-loaded systems, your main mission will be to evaluate the diverse extra functions and the “style” of equivalent functions on different equipment. Understand and then evaluate the extra software features to determine if they are valuable, usable, and worth the extra cost.

Depending on a number of variables, the myriad of vendors of wp equipment can probably be narrowed down to a manageable number of candidates. For starters:

What your company needs:

• size of company
• number of locations/workstations
• degree of self-sufficiency
• degree of centralization of information processing
• planning/support
• amount of money/capital available
• employee turnover
• intercompany disciplines
• viability of information/word processing centers
• degree of standardization and operator interchangeability desired.

What you might want to rate in a vendor for:

• types of screens
• standalone or clustered workstation concept
• size of vendor
• number of years in industry
• communication capabilities/protocols
• wp/dp bridges
• network plans—short and long term
• software packages
• maintenance performance
• equipment manufacturers (if not its own)
• amount of vendor support
• type and cost of training

How you see yourself and the role of short- and long-term word processing will probably help you rate the relative importance of vendor characteristics. There are many aids and methods to help you arrive at a decision on vendor selection, as well as a number of books, trade journals, and hardware guides that can save you a lot of demonstra­tions, blind alleys, and wasted time.

When you have narrowed down your choices to a handful of vendors, the axiom is “seeing is believing.” Certain vendors will be more than happy to sell you a piece of hardware sight unseen and give you a set of training cassettes to get you on your way. The possibil­ities, options, and operating characteristics are just too varied not to review equipment in detail.

No. 8—Don’t Forget the Physical Laws of Nature

If two days of training Is all that it takes,
Then invest in procedures,
For the day when it breaks.

Wp requires power.
Wp requires space.
Wp requires proper lighting.
Wp can generate heat.
Wp can break down.
Wp can be noisy.

Although these are not earthshaking revelations, improper planning can subsequently yield:

• a skip-rope arrangement in avoiding cables
• fitting a 25-sq.-ft. piece of equipment into a current 20-sq.-ft. space
• asking everyone to take their plants home and rearranging the office furniture because the sunlight and shadows are hampering the readability of screens
• putting equipment in a tight or poorly venti­lated room and realizing there’s a problem when operators pass out from heat prostration
• trying to find typewriters that were stuffed into a closet when a really specialized task is necessary or the wp equipment is down
• finding that the possible noise of the printer or disk drive is making the wp workstation as lonely as the Maytag repairman

No. 9—Don’t Forget the Laws of Human Nature

Whether lights twinkle red,
Or the lights twinkle blue,
When the system goes down,
They’ll come looking for you!

Some of the greatest proposed wp sys­tems have been destroyed by the simplest questions. Human engineering sometimes doesn’t keep pace with technology. Typical questions can be:

On a shared printer:

• Who mounts the paper?
• How do you know which preprinted form to mount?
• Must we have perforated edges on letters?

On documents:

• Do I have to be present when memos are transmitted or received?
• Can I verify successful communication by voice?
Computer terminals.
Carterfone is a leading supplier of top quality computer terminals. A wide range of versatile products, competitive pricing and a network of 45 sales and service outlets across the nation ensure that Carterfone terminals meet the demands of business and industry.

Message switching.
Incotel designs and installs standard and customized message switching systems. These are supplied to international and domestic carriers and large business corporations. And to meet increasing market needs, a new range of smaller switches is also available.

Telecommunications management.
TDX Systems specialises in telephone management and control services for small and medium sized businesses. Savings of up to 25% on monthly telephone bills have been achieved for customers using the TDX Systems computer based tele-management systems.

Worldwide communications.
Carterfone, Incotel and TDX Systems, being part of the worldwide Cable & Wireless Telecommunications Group, are the tip of an international iceberg. And, like an iceberg, the invisible resources are massive.

Cable & Wireless is one of the world’s largest international communications groups, and its expertise spans the entire globe. In over 70 countries, Cable & Wireless has provided all types of specialist communications systems, including the operation of national telephone systems in 13 countries and the public networks in 31 countries.

The Cable & Wireless connection.
What does this mean for you?
Quite simply, it means that when you deal with Carterfone, Incotel and TDX Systems you’re not just dealing with specialists in the American telecommunications market. You’re dealing with companies with a whole world of experience behind them.
Watch out for the vendor who says, "It's so simple that we wouldn't want to waste your time."

On off-line storage:
• Why should I mount this diskette for someone else?
• Why do I have to walk 500 feet to load this diskette?
• Where are the specialized keys (scientific, etc.)?

Miscellaneous comments:
• Everyone wants this workstation at once.
• No one likes this equipment.
• The brown equipment does not complement this office.
• The letters on the screen are too small.
• I like blue, not green, lettering displays.

If a vendor or those evaluating such equipment do not have valid answers to such anticipated questions, a lot of people are going to think the practical side of operating this system is being ignored. There will be enough suspicion without fueling the fires of mistrust.

No. 10—Tunnel Vision Isn't Bad

While eight stations can run
On this system so new,
If you're new at this game,
Just start with a few.

The visibility of wp and its future development make the taking on of more than a rudimentary system a strong temptation. Based on the Nothing for Free Syndrome, just getting the system installed and documented, the training completed, and the system operating in a controlled environment should be the prime objective. In brief, keep these things in mind:

The system eventually involves personnel at all levels. Treat it like another modification of established work patterns, and expect a certain amount of resentment, confusion, resistance, or—at least—a little unexpected excitement. Remember, it's the operators who are going to make this system work.

Getting too many people involved at too early a stage can be counterproductive. It does no good to have some initial team members getting excited about various pieces of equipment that cannot meet short-term and probable long-term objectives. Get key operating personnel involved when the selection has been narrowed down to a final set of candidates.

Wp can ultimately have impacts on organizations of any size.

Buying another relatively inexpensive software package diskette is easy. Trying to develop cost-effective uses may take an inordinate amount of time or detract from more appropriate efforts. It's best to keep in mind that some software comes in small diskettes but has big icebergs. Be on the lookout for tinkering.

Word processing may not be appropriate for your company. It is not the universal solution to all of mankind's information problems.

Keep your first objectives controlled, disciplined and achievable. Success breeds confidence and, it is hoped, more success.

Finally, all these observations tell you that wp takes a lot of planning. Like anything else, you can only spend so much time making sure nothing "slips through the cracks" and there are no "big surprises." Unlike dp, major errors cannot be hidden behind closed departmental doors and glossed over in the monthly highlights. This visibility of both success or failure can slow down implementation to a less than practical pace. Be reasonable in your expectations and prepare the user for the events that usually follow any system start-up. Successful word processing gives the user a tool that most people can't figure how they lived without (remember when there weren't photocopiers?).

Now, if you'll only sign on the dotted line....

Bruce Huffine is associate director, information services, for Charles of the Ritz, Ltd., New York City. He specializes in manufacturing planning and information systems, and is a graduate of the University of Southern California.
Why the new FPS-164 Attached Processor creates such interest

THE FPS-164 IS AN AFFORDABLE ALTERNATIVE TO SUPERCOMPUTERS ... from the company that has revolutionized cost-effective scientific computing

- The FPS-164 is a logical next step based on the proven performance of the established line of FPS Array Processors. The FPS-164 costs just a fraction of what you must otherwise spend for comparable computing power; yet it offers these "big machine" features:

EXTENDED PRECISION • 64-bit floating-point arithmetic provides greater than 15-decimal digit accuracy.

LARGE MEMORY • Main memory is expandable to 1.5-million 64-bit words (12 megabytes) for programs and data. Address Space is 16-million words (128-megabytes), allowing for further expansion as denser memory becomes available.

HIGH SPEED • 12 million floating-point operations per second concurrent with 6-million integer operations per second. Advanced array processor architecture with parallel 64-bit memories, multiple 64-bit data paths, and 64-bit arithmetic elements provides up to 60-million operations per second.

EASY TO USE • Full complement of programming and development software ... ANSI-77 FORTRAN compiler ... extensive math and application library ... plus conventional support software.

And there's more. The FPS-164 features a vectored interrupt structure, privileged instructions, and base and limit registers for multi-user protection. Since it is built on the dependable, proven design concepts that have made FPS the world leader in array processors, it offers a new standard for performance and reliability. In fact, FPS has now placed more than 1,500 38-bit array processors in applications from image processing to simulation, speech processing to seismic data reduction.

The FPS-164 is particularly well suited for solving large-scale scientific and engineering problems such as global weather modeling, structural analysis, multi-dimensional image processing, seismic data reduction using wave equation models, oil reservoir simulation, quantum chemical calculations, nuclear codes, and computer-aided design and analysis.

To learn more about what the FPS-164 can do for you, contact our sales office nearest you, or Carl Haberland, FPS-164 Product Manager, (503) 641-3151.

See FPS Array Processors in operation at the N.C.C. Island Booth 621 May 4-7, McCormick Place, Chicago, Illinois.

FLOATING POINT SYSTEMS, INC.

...the world leader in array processors

CALL TOLL FREE (800) 547-1445
Ex. 4999, P.O. Box 23489 (S 500), Portland, OR 97223 (503) 641-3151,
TLX: 360470 FLOATPOINT BEAV

Circle 111 for more information. Circle 112 for contact by FPS.
When it comes to distributed data processing, Sperry Univac Minicomputers provide an ease of use and flexibility you can't find anywhere else.

Our V77 minicomputer family takes the worry out of DDP—because we offer a unique variety of configurations fitting virtually any DDP environment you may have. Letting you retain central control. And putting problem-solving tools where the problems are.

Take it a step at a time for gradual controlled growth. And you don't have to be planning a large system.
When your mainframe needs upgrading, the lower cost of our V77s can reduce the load on the main system, or handle separate functions. And V77s as communication processors can significantly reduce your remote terminal communications costs.

Our V77 minicomputers are designed to integrate with most mainframe systems installed today. Including IBM, Sperry Univac, and others.

We provide interconnection schemes compatible with virtually all network architectures, including the SPERRY UNIVAC Distributed Communication Architecture (DCA). What's more, we even provide you with an interconnection scheme to public data networks (X.25).

We're not new to DDP. The fact is, our V77 systems are based on technology which was providing DDP solutions long before the term was even used. So you're not taking chances.

Would you expect anything less from a division of the $4 billion Sperry Corporation? After all, as the first ones in the computer business, we've a reputation to uphold. That's why we have over 10,000 field engineers worldwide, servicing equipment whenever and wherever it needs attention.

So if you're considering DDP, call us at Sperry Univac Mini-Computer Operations. We'll listen. And then we'll tell you all about how safe a buy our DDP solution is. After all, we don't want you taking any unnecessary risks.

For more information, write to us at Sperry Univac Mini-Computer Operations, 17900 Von Karman Avenue, Irvine, CA 92714.


Or call toll-free 800/854-7517 (8:00 a.m. to 4:30 p.m. PST). In California, call 714/557-9398 collect.

Sperry Univac is a division of Sperry Corporation.
Cincom introduces Series 80 MANTIS.

Series 80 MANTIS is the first application development system that dramatically increases programmer productivity by eliminating all batch steps in on-line systems implementation.

With MANTIS, the programmer uses an efficient high level command language to develop, test, document, and execute the entire application interactively—all in one sitting. As a result, programs typically requiring 80 hours in batch or 24 hours with DMS can be developed in only five hours using MANTIS.

Running under Series 80 ENVIRON/1® or CICS, Series 80 MANTIS reduces development time for both standard and data base applications. And its ease of use means programmer productivity will begin to increase within hours after installation.

In addition, many applications can be developed directly by the end-user.

Tested and proven in leading data processing organizations, MANTIS is an integral component of Cincom's Series 80, the industry's only fully integrated data base/data communications system.

No other system measures up to Series 80 MANTIS. For a demonstration at your site or at a Cincom Service Center, contact our Marketing Services Department.

User Information Hotline: 800-543-3010
In Ohio: 513-661-6000.
A comparative analysis of currently available data dictionary packages.

by Robert M. Curtice and E. Martin Dieckmann

Recently, there has been a significant increase in the use of data dictionary systems (DDS). These systems are becoming more complex and comprehensive in their updating and reporting capabilities, in the scope of the data and dp environment which they describe, in their extensibility for user-defined descriptions, and in the interfaces between the dictionaries and other software components. The general trend is toward a more active DDS, i.e., one that both describes and controls relevant system design, development, implementation, and operation activities.

This survey covers the primary functions of current data dictionaries for commercially available systems. Each of these systems runs on IBM 360/370, 43XX, and 30XX computers under most operating systems. Those that are database management system (DBMS) implementations, (seven of the nine surveyed), inherit all the characteristics of a DBMS application, including security, report/query capabilities, application program dictionary access, and applicable utilities.

Eight of the nine dictionaries include standard relationships between entity types, such as data elements appearing on records, data elements in transactions/reports/programs/modules, and so forth. Several systems allow the user to define his own entity relationships, and in one (DATACOM/DD), the user defines all the relationships.

All nine data dictionaries have a standard set of entity detail reports and relationship reports. An example of a relationship report is a "where used" list which identifies the transactions/reports/programs/modules in which a data element is used, or a list of which users receive a particular report. In addition to the standard reports, certain systems have special reports, such as a missing information report or a redundant information report.

The functions listed in the charts are as follows:
- **Entity Types.** The fundamental object types directly describable to the dictionary.
- **Entity Characteristics.** Descriptive properties of the entity types which the DDS records.
- **Inputs.** The various ways in which the DDS may initially be populated and the ways in which it is updated. Along with the interfaces mentioned below, this is the primary function that gives the DDS its system control capabilities.
- **Interfaces.** These include database definition, control block and source program data definition generation capabilities, and interfaces with preprocessors and TP monitors. Interfaces with automated software development and database design aids are becoming more available, but are not specifically called out on the charts because they most often involve use of the dictionary and are not strictly speaking part of it.

**Special Features and Number of Installations.** Special features include data transfer utilities, user exit facilities, automatic prefix generation for data elements, and any other unique characteristics not covered in the above four categories.

The Interface diagrams on the charts depict the data flow and control among the various dictionary-related systems which are to be found in a typical dictionary environment. Primarily, the data definition generation and dictionary input features are shown on these diagrams.

The authors have made a full data dictionary wall chart available; for further information, contact them at A.D. Little, Inc., Cambridge, Mass.

Robert M. Curtice heads up the data management unit of A.D. Little, Inc., Cambridge, Mass. His consulting activities involve all aspects of database management, including software selection, implementation, and standards and procedures.

E.M. Dieckmann is a consultant with A.D. Little, Inc., specializing in database management and data dictionary systems.
The 9103
*S-MUX

A smart data concentrator
that sets a new standard
of performance for
datacomm hardware.

**A PIN series product.**
ADABAS DATA DICTIONARY
Software A.G. of North America, Inc.

<table>
<thead>
<tr>
<th>ENTITY TYPES</th>
<th>ENTITY CHARACTERISTICS</th>
<th>INPUTS</th>
<th>INTERFACES</th>
<th>SPECIAL FEATURES AND NUMBER OF INSTALLATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fields, relationships, files, databases, field verification procedures, owners/users, programs, modules, systems, reports, response codes, user views</td>
<td>Names are 3-32 character identifiers</td>
<td>Fixed format card input transactions</td>
<td>ADABAS is the only DBMS interface</td>
<td>600 installations</td>
</tr>
<tr>
<td></td>
<td>Comments are 30 characters per line, arbitrary number of lines</td>
<td>Existing ADABAS database description input capability</td>
<td>ADABAS file definitions generated</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Picture, 99 synonyms, range, edit mask, redefines capability, multiple output pictures for fields</td>
<td>Pull forward facility from standard file element definitions</td>
<td>COBOL data division statements generated with optional prefixes</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Type of file to support user views and standard (master) files</td>
<td>Automatic ripple facility for changes to data elements in multiple file types</td>
<td>Data definition modules for ADASCRIP, ADACOM, and NATURAL generated</td>
<td></td>
</tr>
<tr>
<td></td>
<td>200 descriptors per ADABAS file</td>
<td>Initial load utility available</td>
<td>Supplies data for ADAMINT preprocessor</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Associator (for descriptors) created automatically at file load time</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### DATA CATALOGUE 2

#### Synergetics Corp.

<table>
<thead>
<tr>
<th>ENTITY TYPES</th>
<th>ENTITY CHARACTERISTICS</th>
<th>INPUTS</th>
<th>INTERFACES</th>
<th>SPECIAL FEATURES AND NUMBER OF INSTALLATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data elements, groups, records/segments, files, sets, databases/schemas, areas, sets, subschemas, DMCL, modules/programs, forms/transactions, reports/screens, systems, users, manual tasks, external resource, DBMS specific entities, user-defined entities</td>
<td>Apply to all entities: Control (status, alias, user responsible ... )</td>
<td>On-line and batch free-form keyword update, and batch fixed format update</td>
<td>DDL and control block statement data sets generated for IMS, DL/1-DOS/VS, TOTAL, ADABAS, IDMS, * DMS-1100, I-D-S/II, * S2000, * Mark IV</td>
<td>Automatic cross-reference renaming feature</td>
</tr>
<tr>
<td></td>
<td>Classification (keywords ...)</td>
<td>&quot;Add same as&quot; entity feature</td>
<td>Data definition statement data sets generated for COBOL, PL/1, assembler</td>
<td>Multiple dictionary data transfer feature</td>
</tr>
<tr>
<td></td>
<td>Description (9999 lines of 67 characters)</td>
<td>Rename allows retention of original entity</td>
<td>Run-time call interface</td>
<td>Test data generation</td>
</tr>
<tr>
<td></td>
<td>Name (catalogue, COBOL ...): name plus status define unique entity occurrences</td>
<td>On-line system prompts for missing data</td>
<td>Batch file interface</td>
<td>* Spring 1981</td>
</tr>
<tr>
<td></td>
<td>Data changed</td>
<td>Formatted screens provided for CICS</td>
<td>* Spring 1981</td>
<td>150 installations</td>
</tr>
<tr>
<td></td>
<td>Number of times changed</td>
<td>Data definition extracts from COBOL</td>
<td>75 non-DBMS users</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Version number</td>
<td>Entity &quot;clones&quot; which produce new entity occurrences of a different entity type</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>User-defined characteristics</td>
<td>Unknown entity types supported</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Apply to elements only: Valid values</td>
<td>Dummy members for as yet unentered lower level entities produced automatically</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Attributes (picture, range, redefines ...)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Test values</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*COBOL, PL/I: Assembler data definitions and FDs, subschemas, control blocks for some DBMSs

*COBOL, programs only

* Spring 1981

* Spring 1981
Now You Can Put a TRS-80® Computer In Your Pocket!

Now you can carry computer power wherever you go. And with the TRS-80 Pocket Computer, you can create your own programs or purchase ours. These are available now: Civil Engineering, Aviation, Business Statistics, Games, Personal Finance, Math Drill, and Real Estate.

Look at These Exciting Features! 17-key alphanumeric keyboard. Big LCD display that scrolls left and right for program line entry and editing, and steps up and down for program listing. Programmable in an enhanced, easy-to-learn BASIC language. Built-in arithmetic functions including trig and inverse trig with readout in degrees, radians or gradians) log, exponent, square root, angular conversions, integers, absolute values. Accuracy is to 10 digits and it can handle 2-digit exponents. With array and 7-character string-handling ability you’ve really got a handful of computational power!

Programs and Data Retained in Memory When Power Is Off! The 1424-step memory is automatically partitioned for program and data storage. There’s a 26-data element memory and 48-step reservable memory.

Available Now! Exclusively at our 6000 Radio Shack stores, dealers and Computer Centers. Complete with carry case, manual, batteries for only $249. Optional Cassette Interface, $49. Minisette-9 Recorder, $79.95. Hurry, because everyone will want this sensational new computer!

Nothing Else You Can Put In Your Pocket Can Do All This!

Send Me Your FREE TRS-80 Computer Catalog.

Radio Shack, Dept. 81-A-109 1300 One Tandy Center Fort Worth, Texas 76102

NAME
TITLE

CITY
STATE

ZIP PHONE

*Retail prices may vary from store to store. Optional Cassette Interface, $49. Minisette-9 Cassette Recorder, $79.95.
GOING TO OS WITHOUT UCC-2 TAKES A YEAR OR TWO...AND A GREAT SENSE OF HUMOR.

Because you'll need it. It will usually take the average DOS shop from 18 to 24 months to laboriously — and expensively — convert its two-thousand programs to OS.

But, let's face it: your objective is to get to OS, not to convert programs. And the UCC-2 DOS to OS Transition System takes you there the easy way.

UCC-2 can get the average DOS shop to OS in about six months, including preplanning. It allows DOS programs to run under OS or OS/VS systems without program conversion. UCC-2 has already expedited over 800 conversions — without a hitch. And, with UCC-2, you'll start getting the benefits of an OS operation a full year earlier. And isn't that the reason you started the conversion in the first place?

UCC-2: It's the easy way to OS. In fact, when you stop and think about it, it's the only way. Call us at 1-800-527-5012 (in Texas, call 214-353-7312) or circle 117.

And, while you're at it, ask us about:

A Disk Management System that can save the cost of new disk drives (UCC-3). Circle 119

A PDS Space Management System that eliminates PDS compression (UCC-6). Circle 120

A Production Control System that makes scheduling systems obsolete (UCC-7). Circle 121

A Data Dictionary/Manager that really gets IMS under control (UCC-10). Circle 122

An Automated Re-run and Tracking System that solves your rerun problems (UCC-11). Circle 123

General Accounting software packages. Circle 124

Application software for the Banking and Thrift industries. Circle 125

A software package that reduces hardware failure because it improves vendor responsiveness (UCC Reliability Plus). Circle 126
**DATA DICTIONARY SURVEY**

**DATACOM/DD BRIDGES**

- **DATACOM/DD**
- **DATACOM/DD**
- **SOURCE PROGRAMS**
- **COPYLIBS**

**LOAD**

**UTILITY**

**PREPROCESSOR**

**GENERATE**

**JCL**

**DATACOM/DD DEFINITIONS**

**IMS DEFINITION**

**COPYBOOKS**

*COBOL, PL/1, BAL data definition and FDs; and DATAREPORTER definitions*

---

**DATACOM/DD**

**Applied Data Research**

**ENTITY TYPES**

- Databases, areas, files, user views, records, keys, fields, field groups, systems, programs, modules, authorizations, people, reports, jobs, steps, IMS structure entities, user-defined entities

**ENTITY CHARACTERISTICS**

- Names are 15 character identifiers together with unlimited versions
- Unlimited text descriptions
- Passwords and three statuses for all entities
- Date and time of original entry and of last change for all entities
- Keyword descriptors and up to 15 aliases for each entity type
- User-defined entity characteristics
- Picture, range, alternate picture, initial value for data elements

**INPUTS**

- Fixed format batch or on-line transactions for all updating
- Menu driven update transactions provided
- "Create same as" feature
- COBOL source language and COPYLIB data definition extracts
- COPYDD LIBRARIAN preprocessor statement updates dictionary program data definition relationships
- Inputs from existing data-base definitions

**INTERFACES**

- COBOL, PL/1, data definition data sets generated
- DATADICIONARY controls LIBRARIAN source program updates
- Preprocessor links user views to application programs
- COBOL, PL/1, BAL, DATAREPORTER copybooks generated
- DATACOM/DB definition and IMS structure definitions generated

**SPECIAL FEATURES AND NUMBER OF INSTALLATIONS**

- User ability to create unlimited entity relationships
- User-defined exists
- Dictionary automatically records new entity-type information in itself
- Global status change capability
- 70 installations
"Here are four reasons why we switched to NCR," says Dale A. Dooley of the Iowa Transfer System.

DOOLEY:
The Iowa Transfer System is the first electronic funds transfer system to operate statewide. Over 85 percent of the commercial banks in Iowa are supporting members. We recently installed an NCR 8450 as the central element — the switch — in our network.

NCR's SCHULTE:
It's the element that makes the remote connections, so that every terminal has access to every bank on the network. All across the state of Iowa.

DOOLEY:
Our first reason for going to NCR is monetary. With NCR, our costs are substantially lower than under our previous arrangement.

NCR's SCHULTE:
And at least a bit lower than the other alternatives you explored.

DOOLEY:
Then there is the support we received from NCR and from you, Jim. And NCR's known commitment to EFT.

NCR's SCHULTE:
NCR representatives are specialized. All the people in my group work exclusively with financial institutions. So we are in tune with current financial trends. Other NCR representatives have parallel specialties so they can be more responsive to the problems peculiar to their industries. It's a concept that is working well for us.

DOOLEY:
The third reason is software. Only NCR could provide the switch software we needed when we had to have it.

NCR's SCHULTE:
Not only did we meet the deadline, but the transition to our system was very smooth.

DOOLEY:
Finally, our decision was influenced by the dependable performance of the other NCR systems within the network. And we have had the same experience with this system. Our uptime level has been very high — a critical consideration when you're talking about a network switch.

In the NCR office nearest you, there is an account manager like Jim Schulte who specializes in your industry and knows NCR systems. Learn how an NCR system can help you. Phone him at the local office. Or write to EDP Systems. NCR Corporation, Box 606, Dayton, Ohio 45401.

Dale A. Dooley (left) is executive director of Iowa Transfer System, Inc., in Des Moines. Jim Schulte is NCR district manager.
**Data Dictionary Survey**

**Datamanager Bridges**

- **Data Manager**
- **Generate**
- **DBMS Definitions**
- **Copybooks**
- **Source Compiler Copy/Include**
- **Copylibs**
- **Application Programs**
- **Set Up Facility†**
- **Batch Update**
- **Input Transactions**

*COBOL, PL/1, BAL data definitions and FDs; subschemas, control blocks for some DBMSs
†COBOL, PL/1; programs only

**Datamanager**

**MSP, Inc.**

**Entity Types**

- Systems, programs, modules, files, groups, data items, DBMS definition entities, user-defined entities

**Entity Characteristics**

- Names are 32 character unique identifiers together with status (up to 255 statuses)
- Descriptions are 65,000 lines
- 16 aliases and 15 versions for all entities
- User/owner responsible for
- Unlimited keyword descriptors
- Level, picture, range, alignment, initial value for elements
- User-defined characteristics
- * Release 4.0

**Inputs**

- On-line and batch free-form keyword based command language
- Set default value feature
- Dummy members for as yet unentered lower level entities automatically produced
- Data definition extracts from COBOL, PL/1

**Interfaces**

- DDL and control block statement data sets generated for ADABAS, IDMS, IMS, PL/1-DOS/VS, Mark IV, S2000, TOTAL
- Data definition data sets generated for COBOL, PL/1, BAL, and MARK IV
- Run time call interface
- Batch file interface

**Special Features and Number of Installations**

- User exit facility
- Screen layouts under IMS/DC, CICS
- User-defined syntax allows choice of three additional dictionary structures
- Utilities copy data between physically separate dictionaries

500 installations
Megatek's new Whizzard 6250 raster system makes advanced computer graphics more economical than ever.

You can define your image in a 4096 x 4096 virtual space, with up to eight colors.

The Whizzard 6250 harnesses the power of Megatek technology for your business applications...


The 6250 has its own version of easy to use WAND software. It's upward compatible to WAND 7200, software for our family of advanced systems and terminals.

Real-time dynamics enable you to pan throughout this space, then zoom in with true scaling for added detail.

... for new flexibility in architecture and drafting...

And wherever a visual presentation makes data easier to understand.

Imagine all this technology for far less than you imagined.

Just imagine yourself at the Whizzard 6250 keyboard. Computer creativity has never been so affordable.

At Megatek, we strive to set the standards for technology in computer graphics. Now we've set a new standard for value, too. Introducing our new Whizzard 6250 system.

It gives you graphics power you would expect from Megatek. For far less than ever before. You get the drama of full raster color. High resolution. Sophisticated dynamics implemented in hardware. Local vector memory.

TI Announces Introducing the new

Introducing the new DS990 Models 7, 9 & 29 with fixed and removable disk storage.

If you're looking for ways to get more out of your computer systems, Texas Instruments has got some great things in store for you. Introducing the new members of our DS990 family—the DS990 Models 7, 9 and 29. Powerful computer systems that put the bite on disk storage costs.

New disks for easy back-up.

Flexibility is not forgotten at TI. That's why each of these new DS990 computer systems feature disk storage systems with both fixed storage and a removable cartridge. Fixed disk storage allows easy access to day-to-day information, while removable cartridge disks let users change information when needed. The removable cartridge disk also provides users with a safe, easy, and inexpensive way to back-up information without purchasing another disk drive or magnetic tape drive.

Both the DS990 Models 7 and 9 combine these disks with the power and field-proven reliability of TI's 990/10 CPU. The DS990 Model 7 provides 16 fixed and 16 removable megabytes of disk storage. For greater storage capacity, the DS990 Model 9 includes a disk drive with 96 megabytes of storage—16 removable and 80 fixed. Should you need it, a second identical disk can be added to either system on the same controller for additional storage.

The DS990 Model 29 features a new, low-profile, 60-inch cabinet and offers the processing power of TI's 990/12 CPU—the strongest central processing unit ever developed for a DS99C computer system. With one disk drive, the Model 29 provides 96 megabytes of storage—16 removable and 80 fixed. And you can double your capacity by adding a second drive on the same controller.

New members of a proven family.

The DS990 Models 7, 9 and 29 fit right into the DS990 computer family. So you can upgrade your system at any time with a minimum of cost and effort, they're upward-compatible with the other members of the DS996 family—from the microcomputer-based Model 1 to the highly advanced Model 30.

With proven software.

As members of TI's versatile DS990 family, the new Models 7, 9 and 29 are available
Extra Storage for
Family.

with proven software, including COBOL, BASIC, FORTRAN, RPG II and Pascal. They also have valuable time-saving software utilities, including a powerful data base management system with query and report-generation facilities as well as TIPFORM, TT's uniquely efficient screen-formating language. Word processing software is also now available to let these systems perform a wide variety of office-oriented tasks.

With our communications software and hardware, these new systems will easily fit into your existing distributed processing environment. IBM 3780/2780 batch communications as well as 3270 interactive communications let our systems talk to other systems whenever information needs to be shared.

Worldwide service
and support.

Every member of our DS990 family is backed by an extensive service organization with field locations worldwide. Our customer representatives are skilled professionals with technical educations, formal TI equipment training, and in-field experience.

As a TI customer, you can take advantage of a wide variety of service and maintenance plans so you can pick the plan that meets your business needs.

By dialing our Customer Support Line, for example, you can talk directly with a selected staff of senior engineers and programmers at our computer headquarters in Austin, Texas. So your questions can be answered quickly and directly.

Also among our varied services are fully staffed Education and Development Centers in Austin and Chicago, which provide a wide variety of classes on the use of TI computer hardware and software. We even offer special classes designed for the needs of our OEMs.

For more information about our new DS990 Models 7, 9 and 29, contact the TI sales office nearest you, or write Texas Instruments Incorporated, P.O. Box 1444, M/S 7884, Houston, Texas 77001. In Europe, write Texas Instruments Incorporated, M/S 74, B.P. 5, Villeneuve-Loubet, 06270, France. In Asia Pacific, write Texas Instruments Asia Ltd., 990 Bendeemer Road, Singapore, 1233.

For fastest response, call our inquiry response center at 1-800-257-7850 (in New Jersey, call 1-800-322-8650). Please refer to code #100-F.

We put computing within everyone's reach.

Texas Instruments
INCORPORATED
CIRCLE 129 ON READER CARD
With so many matrix printers on the market today, it may seem tough to find exactly the right one for your application. Some models may offer the speed you need, others the communications flexibility and still others the forms handling capability. But no printer offers all the features you need... until now.

The OS180 matrix printer provides the total package of performance features and reliability required for applications such as CRT slave copy, remote terminal networks and small to mid-range systems. Not a "hobby-grade" printer, the OS180 is a real workhorse designed to handle your most demanding printer requirements. And pricing on the OS180 is hundreds of dollars below competitive units.

High Speed Printing—Bidirectional, logic-seeking printing at 180 cps offers throughput of over 200 1pm on average text. A 9-wire printhead life-tested at 650 million characters generates a 9x7 matrix with true lower case descenders and underlining.

Non-volatile Format Retention—a unique programming keypad featuring a non-volatile memory allows the user to configure the DS180 for virtually any application. Top of form, horizontal and vertical tabs, perforation skipover, communications parameters and many other features may be programmed and stored from the keypad. When your system is powered down, the format is retained in memory. The DS180 even remembers the line where you stopped printing. There is no need to reset the top of form, margins, baud rate, etc.... it’s all stored in the memory. If you need to refigure for another application, simply load a new format into the memory.

Communications Versatility—The DS180 offers three interfaces including RS232, current loop and 8-bit parallel. Baud rates from 110-9600 may be selected. A 1K buffer and X-on, X-off handshaking ensure optimum throughput.

Forms Handling Flexibility—Adjustable tractors accommodate forms from 3"-15". The adjustable head can print 6-part forms crisply and clearly making the DS180 ideal for printing multipart invoices and shipping documents. Forms can be fed from the front or the bottom.

If you would like more information on how the DS180’s low-cost total printer package can fill your application, give us a call at Dataspouth. The DS180 is available for 30-day delivery from our sales/service distributors throughout the U.S.

CIRCLE 63
### IDMS IDD

**Entity Types**

| Data elements, records, files, schemas,† subschemas,† areas,† sets,† DMCL,† systems, subsystems, programs, modules, entry points, users, tasks, reports, transactions, screens, logical-physical, physical-logical, maps, messages, destinations, queues, classes, attributes* |
| Names are 1-32 character identifiers together with version number (default to highest version number) 40 char. descriptions Unlimited length definitions/comments Unlimited keyword descriptors (40 characters each) Prepared/revised by name User name and responsibility for (create, modify, delete) Synonyms for data elements, records, files User-defined characteristics and values using class and attribute entities Range, initial value, redefines, picture and alternates for elements |

**Entity Characteristics**

| Free format Dictionary Data Definition Language (DDDL) using keywords: ADD, MODIFY, DELETE, EDIT (for text definitions/comments) commands User-defined syntax feature available Set Globals (default) feature for repetitious values "Create same as" feature COBOL, PL/1, RPG and BAL precompilers register program database usage into dictionary Data definition extracts from COBOL, PL/1 source and COPYLIBs schema and subschema compile update dictionary |

**Interface with**

| IDMS is the only DBMS interface Precompiler statements copy subschemas, control blocks, non-IDMS data definitions, and procedures from dictionary into COBOL, PL/1, RPG, and BAL programs Interface with IDMS-DC at SYSGEN Interface with OLQ (run time) and CULPRIT Schema and subschema compilers derive some input from dictionary |

---

*†These entity types are in the dictionary via DDL, not DDDL; included in reports and may be deleted, but no other dictionary features

*COBOL, PL/1 source only

†Subschemes, control blocks, procedures, non-IDMS data definitions

---

**Special Features and Number of Installations**

| Prefixes automatically generated for elements of a record type 200 installations |

---

**DATA DICTIONARY SURVEY**

---

**MARCH 1981 149**
**DATA DICTIONARY SURVEY**

**IMS DB/DC BRIDGES**

![Diagram of IMS DB/DC BRIDGES](image)

---

**IMS DB/DC**

International Business Machines Corp.

<table>
<thead>
<tr>
<th>ENTITY TYPES</th>
<th>ENTITY CHARACTERISTICS</th>
<th>INPUTS</th>
<th>INTERFACES</th>
<th>SPECIAL FEATURES AND NUMBER OF INSTALLATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Systems, programs, jobs, modules, dictionary users, transactions, databases (physical and logical), segments, elements, PCBs, PSBs, plus user-defined entities and attributes</td>
<td>Names are up to 31 character identifiers plus status, subject, and occurrence (synonyms) qualifiers</td>
<td>Batch forms or keyword command language</td>
<td>DL/1 only DBMS interface</td>
<td>Generates the following:</td>
</tr>
<tr>
<td></td>
<td>Status can be production or 29 levels of test</td>
<td>On-line update via on-line commands or interactive display forms facility with IMS DC or CICS</td>
<td>DL/1 DBDs and PSBs</td>
<td>GIS/VS DDTs</td>
</tr>
<tr>
<td></td>
<td>Aliases for all entity types</td>
<td>Data definition extracts from COBOL or PL/1 copy libraries</td>
<td>Stage 1 SYSGEN inputs</td>
<td>COBOL, PL/1, BAL data definitions</td>
</tr>
<tr>
<td></td>
<td>Up to 999 lines of 40 character descriptions per entity</td>
<td>Loads from existing DBD and PSB libraries</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Up to five sets of 999 lines of 80 characters of free text per entity</td>
<td>&quot;Copy same as&quot; entities</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>User defined attributes can apply to any entity</td>
<td>Input from database design aid</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Picture and initial value for elements</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
It's simple. Howe's Information Management Station provides the vital link between people, electronic equipment and office space. The end result? A more comfortable and efficient working environment. Versatile configurations of stations assure space efficiency. Two work heights, for writing and keyboard use, mean minimum fatigue and maximum comfort. A unique wire routing system provides unobtrusive channeling from equipment to electric outlet. And shelves and mobile pedestals provide active storage. Most importantly, the Howe IMS is designed to adapt to ever changing electronic equipment, assuring productivity for years to come. For details on the Howe Information Management Station, write: Howe Furniture Corp., Dept. 13, 155 E. 56th St., New York, NY 10022. Or call collect: 212/826-0280. Showrooms Nationwide.
S2000/80 IDD BRIDGES

$COPY PREPROCESSOR STATEMENT
COPYLIB

COBOL PROGRAM

DATA COLLECTION PROCESSOR

DDDL

XDD PROCESSOR

S2000 DATABASE

COMMAND FILE

SCHEMA GENERATION

DESCRIPTION COMMAND

DATABASE DEFINITION

SPECIAL FEATURES

Interface between multiple copies of the dictionary available

S200 IDD
Intel Systems Corp.

ENTITY TYPES
Data elements, records, files, databases (schemas), subschemas, users, programs/ modules, systems/ applications, work units, work structures, work areas, user-defined entity types

ENTITY CHARACTERISTICS
Names are up to 250 character identifiers
Comments are arbitrary length
Source, user and owner for all entities
Version number, status, and dates for all entities
Keywords and synonyms for all entities
Range, initial value, picture, alternate picture for elements
User-defined characteristics

INPUTS
Dictionary Data Definition Language (DDDL) using keywords
Extensive update transactions provided
"Create same as" feature
S2K LOAD utility for initial dictionary load
Collection processors read COBOL programs, copybooks and database definitions and produce DDDL
On-line update also thru QUEST or QUBE or PLEX transactions

INTERFACES
S2K is the only DBMS interface
GENERATE COBOL command generates data description, subschema, and control block copybooks from dictionary for loading into COPYLIB.
GENERATE SCHEMA generates database definition
DML Preprocessor $COPY command copies from COPYLIB into COBOL programs with recursive copy feature

SPECIAL FEATURES AND NUMBER OF INSTALLATIONS
32 installations

*DT = definition table
†Data definition, FD, subschema, COMMBLOCK
MRP Software Evaluations for Minicomputers

Manufacturing Software Systems, founded by Oliver Wight and Darryl Landvater, now offers professional evaluations of MRP software packages for many popular minicomputers.

Evaluations help save time and money, prevent costly mistakes.

Clear, in-depth, point by point descriptions of required system functions include MRP, Master Production Scheduling, Shop Floor Control, Capacity Requirements Planning, and Purchasing. The Evaluations are intelligent alternatives to wading through confusing terminology and volumes of vendor documentation.

Objective Evaluations based on what works in manufacturing.

No theory or speculation about what might work, these Evaluations are based on years of experience working with successful Class A MRP users.

Evaluations for popular minicomputer packages.

The list of Evaluations includes packages for IBM System/3, System 34, System 38, Hewlett-Packard 3000, Univac 90, Honeywell 62/64, Data General Eclipse, ICL, DEC PDP-11, and others.

MSS is tackling some of the practical problems of implementing MRP. For more information and a complete list of Evaluations, write us or call (802) 878-5254.

Oliver Wight, President
Darryl Landvater, Vice President
Christopher Gray, Vice President

Manufacturing Software Systems Inc.
P.O. Box 278
Williston, Vermont 05495
(802) 878-5254

CIRCLE 132 ON READER CARD
"Major evolution" is the only way to describe the remarkable series of innovations in Convergent™ systems.
And it has some important implications for the computer OEM.

Amegabyte minicomputer.
Convergent's "distributed intelligence" architecture replaces the conventional central processor with a powerful 16-bit processor at each workstation.

So workstations share peripherals and data, but not processing power. The result is unprecedented responsiveness, with the ability to support complex and diverse applications operating on the same data base, simultaneously.

The ultimate OEM building block.
Convergent hardware and software are totally modular, with multiple upgrade paths. A stand-alone system can be converted to local networking—without software modifications. Multiplex™ card slots (standard equipment) let you simply plug in custom interfaces.
The multi-tasking operating system is specifically designed to be built upon,
and supports five powerful languages (COBOL, FORTRAN, Pascal, BASIC, and Assembler), ISAM search/merge, and much more. Industry-standard communications protocols include 3270, 2780, and 3780.

Exciting end-user appeal.
The Convergent workstation is designed with total sensitivity to the physiological and psychological needs of the operator. The simple, elegant package establishes the ideal spatial relationship between eye, screen, keyboard, and the built-in document holder. Heat and noise output are negligible, and every aspect of the operator interface is entirely "friendly."

A new standard for the '80s.
Distributed intelligence has long been discussed as desirable.
Convergent Technologies has made it a low cost reality. And its advantages are so compelling that the majority of computer systems will eventually adopt it. Convergent is delivering now.

You can learn more about our computer of the future by requesting complete information today.

Now is the time to re-think your position in the computer market.

Convergent Technologies
Where great ideas come together.
CINCOM Systems, Inc.

**TOTAL DATA DICTIONARY**

**ENTITY TYPES**
- Data elements, files, reports, transactions, programs, systems, databases, users, source documents

**ENTITY CHARACTERISTICS**
- Eight-character entity name identifiers
- 25-character entity descriptions
- Multiple versions supported
- Alias data element names supported

**INPUTS**
- Formatted input for initial load facility
- DDL scan utility for conversion of DDL statements
- COBOL source program scan utility to load relationships between data elements and programs
- Socrates label dictionary conversion facility
- Free-form keyword parameter ADD, CHG, DEL input
- Establish and use default values for attribute feature

**INTERFACES**
- TOTAL is the only DBMS interface
- DDL Generator Facility

**SPECIAL FEATURES AND NUMBER OF INSTALLATIONS**
- Two data element entity types with a conversion utility to establish other entity occurrence and relationship between occurrences
D.P. Documents... organize and control them in any environment with the DOCU-MATE® filing system.

A single filing method for all documentation, records and reports. Think about the time and expense involved in the creation of data processing documentation, records and reports and you'll see the importance of organizing these vital information assets so they are under the control of management. Until recently, this problem of organization was compounded by the many sizes and shapes of documents which created an almost impossible filing, retrieval and referencing problem. Now, the DOCU-MATE filing system solves the problem by providing a single filing method for all documents regardless of their size, shape or location within the information network.

Combine DOCU-MATE filing with open office plan.
If your existing or planned office is designed with panel supported work surfaces, a wide range of DOCU-MATE filing components designed to coordinate with most popular panel systems is available. You can get the advantages of functional organization with filing capability that enhances the aesthetics of your design.

Combine DOCU-MATE with contemporary office furniture.
DOCU-MATE work station filing equipment including: cabinets, documentation organizers and mixed media open shelf files coordinate beautifully with furniture from leading manufacturers. You can plan work stations that provide both a modern crisp appearance and the functional efficiency of organized filing and referencing.

Build total DOCU-MATE filing environments.
While you can integrate DOCU-MATE filing into your existing office plan; you can also create total DOCU-MATE filing environments. A full line of specialized filing work stations, chairs, documentation organizers, cabinets and open mixed media files lets you plan environments that precisely meet the needs of the people involved.

Coordinate work station and library filing.
With the DOCU-MATE center hook filing and drop filing principle, you can build a total filing network involving group libraries and files and central libraries. Every imaginable type and size of document can be filed interchangeably at every location. You can even intermix sizes and shapes in the same filing equipment. And, since DOCU-MATE filing is designed for both high density, high security filing and high reference filing you can plan filing areas to meet the needs of the people who must work with them.

Send for our free 20 page brochure. Circle the readers' service number or write direct.
Wright Line Inc., 1600 Gold Star Blvd., Worcester, MA 01606
### UCC TEN

**University Computing Company**

<table>
<thead>
<tr>
<th>ENTITY TYPES</th>
<th>ENTITY CHARACTERISTICS</th>
<th>INPUTS</th>
<th>INTERFACES</th>
<th>SPECIAL FEATURES AND NUMBER OF INSTALLATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>All 37 IMS-DL/1 entities, including: Databases, segments, fields, programs, modules, applications, jobs, PSBs device, line group, message segments, formats, physical terminal, logical terminal, user-defined entity types</td>
<td>Names are eight character identifiers together with a sequence number Descriptions are arbitrarily long Keyword descriptors are arbitrarily long 255 versions per entity, each may be development or production Picture, alternate picture, justification, occurs, aliases for fields</td>
<td>On-line update using MENU (fill blanks), IMS transaction format Batch update in IMS transaction format Fixed format forms and transaction routines provide updates Input edit features Automatic keyword building facility Single entry definition automatically generates related IMS definition Create same as feature Set default values feature COBOL, PL/1 source data definition extracts Existing DBDs, PSBs, MFS control blocks, STAGE I SYSGEN conversion utility provided</td>
<td>IMS only DBMS interface Generates DL/1 DBDs PBs, PCBs, SSAs, MID, MOD, DIF, DOF Generates GIS/VS DDTs Generates COBOL, PL/1, BAL data definition copybooks Generates Stage I SYSGEN inputs Generates message format service control blocks Interfaces available to MARK IV, RAMIS, ASI-INQUIRY Preliminary ADL Support Above generations possible for a given version</td>
<td>Old/new SYSGEN comparison feature Entity definitions without relationship definitions for design activity Structure transport utilities provided User exits provided Prefixes may be generated for data elements in dictionary Supports field sensitivity 300 installations</td>
</tr>
</tbody>
</table>
Imperial Chemical's Network...

... is also a Tran Network.

With sales measured in £ billions sterling, Imperial Chemical Industries Ltd is one of Britain's largest corporations, and one of the largest chemical producers in the world. Its operations stretch from London to Kenya's Lake Magadi (whose shores are one of the country's top foreign currency earners) to Sydney, Australia (site of the nation's largest single-controlled chemical complex), to Sri Lanka, the West Indies, Turkey, China, Japan, the U.S. and many more countries - 150 in all.

If's businesses comprise nine large manufacturing divisions in the United Kingdom and more than 300 associate or affiliate firms worldwide. All operate with some degree of autonomy, but corporate planning and coordination are handled by the company's head office.

By 1979, the conglomerate's formidable computing resources were running into telecommunications problems. The numbers of terminals and point-to-point communications lines were increasing explosively and very long lead times were being experienced in acquiring telephone lines.

Corporate specialists decided that a switched digital network would help, and the resulting facility now links to a wide range of computers, including IBM, Amstrad, DEC, Burroughs, and Prime systems. Eventually these machines will be accessed from terminals throughout Western Europe as well as the U.K.

Applications already on the network include scientific/engineering processing, accounting inquiry/response, and many more. Planned uses include electronic mail, interactive graphics, and other "office of the future" functions.

Tran has installed integrated networks for chemical firms, telephone companies, educational and financial institutions, government agencies and private industry in the United States and other nations. Simultaneously, performing X25-compatible packet, circuit, and facsimile switching,tranetworks are unmatched by any others in the world.
Did you know that our Shared System could communicate with your computer?

Want a typing system that “talks 3780”? No Problem
Want a typing system that “talks TTY-ASCII”? No Problem
Want a typing system that can communicate with your computer today and tomorrow? No Problem

Lanier standalone and Shared System typewriters are capable of interfacing with your existing computer.

Announcing Data Communications Options for the Lanier No Problem* Shared System

In fact, Lanier’s data communications options offer interactive or batch communications through phone lines directly to your mainframe computer, enabling the manipulation of data using standard word processing functions.

And as communication needs become even more sophisticated, Lanier is dedicated to grow with you.

What does this mean to you? The best of both worlds. Without software or hardware changes
in your present system, the data communications capabilities of your computer can be combined with the benefits of a Lanier No Problem Shared System.

**The power of sharing**

The heart of the Shared System is its Central Memory Unit. The CMU lets all your No Problem typewriters share mathematical calculation abilities, list merging, automatic repagination, standard document assembly, global search and replace, line drawing capabilities, and more.

Want to type and edit over 250 different characters on the screen? No Problem. Even the Greek alphabet and math symbols can be typed and printed quickly and easily.

But what about printing? There are several printers and over forty type styles to choose from.

While a typist types, the Shared System can simultaneously print, do list merging and more. It saves time and money by getting your work back faster. You can even share printers.

And the Shared System has remarkable record-keeping facilities. You can store over 30,000 pages. Your typists save time by reducing and often eliminating frequent media handling.

**The best investments are No Problem**

The Shared System is better than a good investment. Sharing starts to pay for itself right away.

Typists can work independently, or they can share the burden of larger typing jobs by working together to get the jobs done on time.

**Shared System, both have the ability to communicate with your computer, now and in the future. That's the Lanier commitment.**

**Service and support are No Problem**

When we install a Shared System, we do more than just plug it in and leave. We offer No Problem blanket protection for your equipment and for your people. That means service and support when you need it. Just give us a call. In most cases, we'll be there before the day is out.

Want to know more about our family of No Problem typewriters? Ask for a Shared System demonstration and you'll find out how it can solve your office problems.

Send us this coupon and we'll call immediately to set up an appointment. Or call toll free: **(800) 241-1706.**


©1981 Lanier Business Products, Inc.

Lanier today. No Problem tomorrow.

Lanier Business Products, Inc.
1700 Chantilly Dr., NE, Atlanta, GA 30324

**Yes, I want to see the Lanier No Problem Shared System in action.**

Name
Title
Phone
Best Time to Call
Firm Name
Address
County
City
State Zip

What kind of typing or word processing system are you using now?

Lanier Business Products, Inc.
1700 Chantilly Dr., NE, Atlanta, GA 30324

CIRCLE 138 ON READER CARD
You don't get the lion's share of the market by pussyfooting around.

You get it by building the most reliable tape and disc controllers available. Our very first production units built in 1975 are still going strong.

Wespercorp controllers work, right from the moment they're installed.

That's because we thoroughly test and document the performance of all of our controllers under actual operating conditions before they leave the factory.

You get it by building one of the best service organizations in the business.

Should you ever need service, we'll be there fast. Anywhere in the world. We even fly our own airplane, so you won't have to wait.

Wespercorp controllers fit DEC (LSI-11, PDP-11) and Data General (NOVA and Eclipse), and Perkin Elmer (Interdata) computers. We can fill orders in 30 days ARO. Sometimes even faster.

Get the complete story on our entire line. Call or write us today.

Wespercorp, King of the Jungle, 14321 Myford Rd., Tustin, CA 92680.
Ph. (714) 730-6250.

WESPERCORP
Number 1 in controllers.

CIRCLE 139 ON READER CARD
The new ADM-5 Dumb Terminal® video display from Lear Siegler is the latest addition to a great American tradition. A tradition that has consistently delivered data terminals of the highest caliber. Not the least of which is our Dumb Terminal series. And now, Lear Siegler brings you a totally new Dumb Terminal with visual attributes and limited editing.

The ADM-5 is human engineered to provide all the performance you'd normally expect in a conversational terminal. Plus just the right combination of operator conveniences and capabilities typically found only in more expensive editing terminals.

Conveniences that make it easy on the operator. Reduce input errors. And increase all-around efficiency and throughput. Plus special added capabilities for those handy performance extras—without the added price.

The ADM-5 is a great new general purpose terminal made right here in the good old USA. And is designed to suit the majority of applications. And the price will suit you too. Only $995.

(Quantity 1)

At Lear Siegler, we're keeping alive a tradition of excellence. And that's American as apple pie.

The day your computer choked.

The input was too much to swallow. Bit by byte the capacity of your equipment was exhausted and by now, so are you. Maybe it’s time to replace that computer with a larger one... maybe not.

We can show you a similar case where, by designing a new component, we increased the capacity of our client’s existing equipment. Or, if necessary, we can acquire the new equipment you may need under an attractive lease arrangement and re-market your present machines.

We’re F/S Computer Corp., a total asset management company. We do more than just leasing. Our technical depth and worldwide marketing capabilities can maximize your equipment investment and our parent’s massive financial resources assure success.

Currently, we manage over $400 million in central processors, related peripherals and electronic business equipment.

So, wake up to F/S Computer. Call Jim Hartnett, vice president-general manager, and trade your nightmare for a pleasant reality.

F/S Computer Corp.
One of the Asset Management companies of FSC Corporation

1000 RIDC Plaza, Pittsburgh, PA. 15238
(800) 243-5046
In Conn. call (203) 226-8544

CIRCLE 141 ON READER CARD
SOFTWARE STILL A SORE SPOT

Applications development is still one of the industry’s thorniest problems.

As the demand for information continues to skyrocket, the computer industry is increasingly under pressure to come up with new and better applications development tools. A quantum leap forward in applications development is clearly needed. But so far, that Herculean jump is still a hop and a skip.

Applications development remains one of the dp industry’s thorniest problems. Since the ’50s, when higher level languages emerged, there’s been only slow, piecemeal progress. Some headway has been gained through the recognition of the need to structure a program. Positive strides have also been made in data base management, on-line program development, and program and system debugging.

Summing up the small successes to date, one software specialist complains, ‘We’re still hung up on our COBOL-type higher level languages. We keep on hacking away at efficiency improvements within these languages. As a result, we haven’t been able to provide professional programming people with tools that will significantly increase their productivity, nor have we been able to accommodate a wider variety of non-technical users.’

Meeting the needs of the novice is the ultimate goal of systems researchers and designers. Economic necessity appears to be the main force behind this trend—the ever-shrinking programming pool pulling in ever-increasing salaries is the major catalyst.

The first big advance on the user-friendly front came with the birth of BASIC. But like BASIC, most recent developments are aimed at easing the job of the programmer or dp expert, and not at helping the non-dp user. When true user-friendly systems become a reality, people outside the dp domain will either be able to deal with programmers, or become programmers themselves to get their jobs done.

IBM, as well as a score of other savvy system suppliers, has set its sights on the user-friendly target, and has task forces looking into the problem. In the meantime, the mighty mainframer has come up with “applications enabling” aids—all of which are tailored to specific systems and directed primarily at the professional dp user. Some new applications enabling tools will be unveiled by the company before the end of the year. These systems, currently available in Europe, will be procedural and, in some cases, will require APL.

One key to IBM’s strategy in this area lies in packaging. Says an IBM insider: “We keep working toward the packaging of things to make them with less options, so there’s less chance of going wrong. We used to say everything was speed, accuracy, and flexibility. Now we’re saying speed and accuracy through rigidity.”

IBM’s General Systems Div. is particularly interested in developing user-friendly wares to broaden its first-time user base. In an attempt to capture bigger chunks of this unsophisticated dp market, GSD offers products
such as the Business Report/Application Development System (BRADS). Designed to run on the 5110 and 5120 desktop computers, this system allows users to tailor and specify common business applications such as personnel, inventory, and sales analysis.

Some companies have zeroed in on the applications development dilemma from an automatic program generation angle. On the scene since the '50s, program generators haven't achieved much progress in cracking the problem. Occupying a low-key position in the marketplace, these tools tend to deal with a certain class of standardized applications that are needed on an infrequent basis. Using them to generate arbitrary systems is still very difficult, given the current state of the art.

The ultimate system touted in this area is of course the applications generator. No one believes, however, that this system will answer absolutely every applications need. Some industry practitioners feel though that applications generators could be a big boon if designers build them to certain specifications. The two most important criteria are to make sure the documentation for the generation is automatically produced by the machine, and to make sure the structure of the generated programs is created in a way which allows easy modification and extension.

The consensus among industry experts is that the day of true and successful applications generation is a long way off. There has to be a tremendous amount of research, they feel, before such systems become viable. In the interim, a different and promising type of research is under way at the University of Michigan.

Headed up by Dr. Daniel Teichroew, a professor of industrial and operations engineering, the ISDOS (Information Systems Design & Organization System) project was kicked off in 1967. It's sponsored by users and manufacturers in the U.S., Europe, and Japan. Some of the more heavy-duty backers include IBM, AT&T, Univac, Burroughs, and NCR.

The R&D work under the ISDOS project is aimed at finding ways to improve the system building methods of organizations. To achieve this, the researchers have concentrated on the front-end of the systems life cycle. That often overlooked phase, according to Teichroew, is where most of the problems and potential payoffs lie.

This front-end focus led to the development of the Problem Statement Language/Problem Statement Analyzer (PSL/PSA) system. PSL is an interactive tool for the systems analyst. The data base contains the complete description of the desired system from the logical side. Now Teichroew's team is working on giving the software designer the same kind of aid that PSL provides the analyst. Ultimately, Teichroew hopes to come up with tools that go "all the way down the stages in the systems life cycle."

Teichroew's work is important because it delves into the systems analysis phase rather than the programming stage, where most of the attention until recently has been centered. More than an idea dreamed up in an ivory tower, PSL/PSA is aimed at a broad class of applications, and has been installed around the world on most of the medium and large scale machines and operating systems. The first operational installation of the system was in 1973 at AT&T Long Lines. Teichroew says IBM has an "extensive" research, as well as applications, interest in PSL. And Univac, he reports, is using it to develop systems software, such as operating systems.

Many people believe the new applications development frontier with the most potential is nonprocedural languages. Dp veteran Teichroew claims the label of nonprocedural is "irrelevant." What you need to be able to do, he explains, "is describe a system in enough detail so people who have to understand it can in order to make design decisions."

Most industry watchers view nonprocedural languages as the next quantum
jump in the applications development world. Today the bulk of applications programming is done in procedural languages that were created in the '50s and '60s. To break away from the restrictions inherent in these languages, dp technologists are recommending a move toward nonprocedural, which would almost allow users to go from the preliminary design stage into programming.

The economic pressures on the dp field seem to make this a reasonable route. To get there, however, there has to be much more research. There also has to be a general recognition of the need for such an approach on the part of the industry as a whole, and the professional societies and academic circles in particular. So far, this research and recognition have not been forthcoming.

Even IBM has not given the nonprocedural notion the push many observers feel it deserves. If the concept indeed represents the much sought after step forward, then why isn't IBM solidly behind it? The answer, according to one industry pundit, lies in that company's profit-oriented roots. "IBM," he quips, "is driven by the balance sheet. When it starts hitting its ability to sell and install machines, then it will do something about it."

---

DEFINING THE PROBLEM

Too often today, poor front-end and problem analysis has resulted in throwaway systems that don't meet end user needs. Various structured methodologies on the market can help avoid these pitfalls. One of the more promising approaches, called the Structured Analysis and Design Technique (SADT), is being offered by SofTech.

By involving all the people in a company with a particular problem—real or perceived—SADT tackles the requirements definition chore. Under the methodology, these people are taught to think systematically. To aid in this, SofTech has devised a simple graphical language consisting of rectangular boxes and arrows which serve as diagrams for the problem refining process. A collection of these diagrams hooked together creates a model that brings into much sharper focus the requirement parameters.

A key part of the SADT methodology is the author-reader cycle. Two basic types of people are involved in this feedback process. One is the "author" or structured analyst who actually writes the diagrams after interviewing the "readers." This second reader group is made up of company experts who know the particular applications area, or are authors who've worked on related systems.

---

"The big problem is that an application is seldom what it seems. Even the people who need it don't know what they need."

With this deceptively simple statement Douglas Ross, chairman of the board of SofTech Inc., goes right to the root of the applications development dilemma.

Experts all agree that the hardest part of the applications development cycle comes right in the beginning, when end users have to decide if they indeed have a problem that the dp shop can help solve. This sticky stage is usually referred to as the problem or requirements definition phase. It's at this pivotal point where most of the trouble in applications development occurs.

Too often today, poor front-end and problem analysis often results in throwaway systems that don't meet end user needs. Various structured methodologies on the market can help avoid these pitfalls. One of the more promising approaches, called the Structured Analysis and Design Technique (SADT), is being offered by SofTech.

By involving all the people in a company with a particular problem—real or perceived—SADT tackles the requirements definition chore. Under the methodology, these people are taught to think systematically. To aid in this, SofTech has devised a simple graphical language consisting of rectangular boxes and arrows which serve as diagrams for the problem refining process. A collection of these diagrams hooked together creates a model that brings into much sharper focus the requirement parameters.

A key part of the SADT methodology is the author-reader cycle. Two basic types of people are involved in this feedback process. One is the "author" or structured analyst who actually writes the diagrams after interviewing the "readers." This second reader group is made up of company experts who know the particular applications area, or are authors who've worked on related systems.
"SADT is a great way to get your head together before you start designing a system."

Both author and reader teams are given special training in the SADT graphical language and technique. Because everything is on paper, this training allows the reader-expert to comment in writing on what the author-analyst has prepared. The papers are pushed back and forth until agreement is reached.

The SADT approach has been on the market for over five years. SofTech’s Ross says sometimes a company using the methodology is surprised to find it doesn’t even have a problem. “But more often,” he adds, “it shows a company has a bigger problem than it thought, and in an area it didn’t realize.”

The SADT user base continues to grow. One satisfied customer is DuPont, which has been using the product for over two years. The company, which has used SADT to model the functional requirements of a profit sharing system, is now using it to pinpoint requirements for systems development.

Another SADT client, Chemical Bank of New York, has been successfully tapping the methodology since June 1979. To help the bank assess a revised dp need to centralize its personnel and human resources data base, SADT is currently used in designing a financial control system.

Adam Reisner, manager of structured techniques at Chem Bank, describes SADT as “a great way to get your head together before you start designing a system.” He says that the use of SADT in the requirements definition phase on one particular project “helped us spot that management lacked a clear understanding of what they wanted the system to do. So we shut the whole project down.”

While SADT seems to be a good tool for uncovering what the problem is or isn’t, some people object to the mountains of paperwork it spawns. Others complain that it is expensive and complicated. On the last point, Michael Conner, general manager of SofTech’s Commercial Systems Div., explains that “part of the problem with SADT is that it’s very disciplined and requires training experience and a lot of hard work. And many people don’t like to work or think.”

“No structured methodology,” Conner points out, “is going to replace thinking. If people aren’t going to think and really try to evaluate what they’re doing, nothing is going to help them.”

—LR.

**LETTING GEORGE DO IT**

The business of information systems is an adjunct to the business of the corporation

The folks at Hercules, Levi Strauss, Alcoa, and Purolator have learned a lesson: there is far more to information systems than hardware and software.

Their teacher is Ivan George, who has shown them that the business of information systems is merely an adjunct to the business of the corporation, which is, as Karl Marx took great pains to point out, making money.

George, a former operations researcher at Manchester University and management consultant in South America, has devised an applications development tool called PRISM—People/Resources/Information Systems Management. Its purpose is to attack information problems as part of the overall business of the company, not as individual entities or systems.

“In this field,” a respected industry consultant notes, “we’ve been trying to solve management problems in data processing that should never have gotten to dp, and dp ends up with egg on its face.”

Not if the company has George as its chief cook.

“Nobody integrates people and information into a common structure,” says George, now president of Deltacom Inc. of Southampton, Pa. “When you don’t do that, you can’t even have serious problems. The moment you relate information to computer programming and what computers can do, you’re 360 degrees away from what the business can do.

These companies may have leading edge information systems, but they’re not in that business.”

So George doesn’t want to hear what a company’s computers can do for it. He wants to hear what a company wants its business to do and where it wants it to go. Then, using the operations methodology, software, and database capabilities George devised at Manchester and applied during his years in South America, PRISM creates a matrix of the entire company. The technology allows the client to look at the strategic management areas of the company, then relate those to the functions and activities that have to be carried on efficiently and cost-effectively in order to make a profit.

“The information is developed against a matrix to support the business,” George explains. “Then it’s assigned into the organizational structure, depending on how the company wants to handle the information. You build information systems to support the business, not to support an individual or particular function.”

They’re true believers at Hercules and Levi Strauss. Hercules was undergoing a major reorganization in 1977, part of which was to make changes in the timeliness and responsiveness of its information systems approach. In addition, it needed assistance with an organizational analysis of one of its major business centers which was being relocated.

“We were looking for a methodology to take us from identification to definition,” director of systems development Chet Nordrum says, “and we had to back away from the traditional technical approach because of...
Many printers can give you good print quality on a first copy. The real challenge is to give you that same quality, copy after copy, on multi-part forms.

Obviously, most printers can't. The further they get from the first copy, the more their quality fades. But, as you can see here, the quality of Printronix' sixth copy continues sharp and clear.

This superior quality is achieved through a simple printing mechanism quite unlike any other. It forms characters by printing one dot row at a time, overlapping rows vertically and horizontally, while maintaining uniform hammer impact energy. The result is unequalled print quality and characters that appear solid.

This same design approach also requires fewer moving parts, eliminates most bearing surfaces, and employs simple hammer drive circuits. All of which means there's less to go wrong. And that's why Printronix can give you a full one-year warranty, not the 90-day warranty typical of most other printers.

For more information on the complete line of Printronix printers, call: (714) 549-7700. Or write:

Printronix Inc.,
17421 Derian Ave.,
P.O. Box 19559,
Irvine, CA 92713.
I'm Bob Sharkey. I'm in Manufacturing Operations at Inmac, and I am not crazy. We've built a big business on a very simple premise: Giving you what you need, when you need it.

"Need disks, tapes or floppies? We have them compatible with almost every mini and micro computer made. You need ribbons? We have ribbons compatible with 753 different printers. You need cables and connectors? We have 538 different kinds—in stock, ready to ship.

"We'll custom build cables to your specs. We'll give you any length you want. We can help you connect your CPU to virtually any peripheral you choose.

"And those are just a fraction of the more than 1000 computer-related products we stock and sell. I might get an ulcer trying to keep track of all that stuff, but I don't think I'll have to
eat a catalog sandwich.

"Call my bluff. Next time you have a problem getting what you need, call Inmac. We give you a sure-fire guarantee on anything you buy from us. You have 45 days to decide that you're fully satisfied. If you're not, we'll give you a replacement, refund or credit. And no hassle.

"We'll give you fast delivery. We have regional distribution centers, so we can deliver to over 90% of the computer sites in the U.S. within two days—by regular surface transportation. Or if you need it tomorrow, we'll get it to you tomorrow.

"Call us. Ask for our free catalog. Better yet, give us an order. All we need is your company P.O. number. Our hotline numbers are listed below."
Discussions about programming languages often resemble medieval debates about the number of angels that can dance on the head of a pin.

the lack of communication between users and dp professionals.

“We came across Ivan, and we essentially bought his body and soul for a year and a half. PRISM does a good job of identifying user requirements in terms the user puts down. It allows the user to be a systems analyst. And it has real value in non-dp situations as well. Other methodologies assume it’s a dp or computer problem. If they find it’s not, they back off, and that’s unfortunate for them and us.”

At Levi Strauss, planning manager Donna Rund needed help determining the scope of an information system to support one of the company’s divisions that is expected to quadruple in size. With the help of PRISM she got the answer, then went on to tackle in-depth, long-range systems planning for another, larger division.

“At six weeks, we’ve had great success with PRISM,” Rund says. “The biggest problem is that analysts tend not to think in business terms. It’s a process of changing the way you think. Managers don’t have the same problem. Analysts get frustrated, but I expect that.”

“It’s an extremely useful tool, but unless you have an inside person who understands it, it would be difficult to implement. A company has to be ready.”

—Willie Schatz

REBEL WITH A CAUSE
Challenging existing theories of programming

When John Backus laid it on the line to the computer industry two years ago, he received the treatment usually reserved for radicals and heretics. He became a rebel with a cause.

“It’s been a very strange thing,” Backus says with a chuckle. “I delivered a paper in 1973 with the same ideas and it was fairly well received. But the one I did in 1978 sank into a well of silence for a considerable time. A few people said they liked it, but it didn’t arouse much interest.

“I expected it, though. It was fairly radical, and you don’t expect everyone to agree with radical remarks.”

Not even when they’re spoken by the winner of the National Medal of Science for 1975 and the Association for Computing Machinery’s (ACM) Turing Award for 1977. All Backus did, mind you, was challenge every existing theory of programming that had been developed over the previous 30 years.

“Discussions about programming languages often resemble medieval debates about the number of angels that can dance on the head of a pin instead of exciting contests between fundamentally differing concepts . . .”—that was one of his kinder assessments of higher level languages in his Turing Award lecture. “Fat,” “weak,” and “obese” were among his other descriptions.

Now, however, the “radical” is attracting more and more believers. There are obviously many people out there who agree he’s not still crazy after all these [30] years [with IBM].

“Interest is growing quite a lot,” Backus admits with a trace of satisfaction. “MIT is having a conference next year to discuss this. All of a sudden there’s lots of interest. I guess it took people a long time to get used to the idea.”

The idea is that high level languages are hardly what they appear. Backus argues that they take too much of everything—time, money, and energy—and give back nothing but headaches. In their place, he offers a “functional” style of programming founded on the use of combining forms for creating programs.

“I maintain that the kind of languages I’m talking about are much higher languages than what’s commonly called ‘high’ or ‘very
The most efficient way to get this chart... is with 4 statements instead of 400.

SAS is a powerful software system that can increase your productivity. In the programming task shown here, 4 SAS statements produced the same chart as 400 COBOL statements. That's a typical example of how SAS can help you produce results faster.

But there's more. SAS can increase productivity two ways.

First, SAS has a complete library of pre-written programs which can be used by all levels of employees for routine jobs. With a few English-like commands almost anyone can use SAS for data analysis, market research, financial reports, summary statistics, charts, plots, personnel reports and many other jobs.

With SAS handling all that, programmers are free to use SAS a second way—as a higher-level programming language. Unlike most other software systems, SAS is not limited to pre-written routines. A programmer can use SAS to eliminate the tedious steps in a complex task.

However it's used, SAS increases productivity because SAS saves time. With SAS you'll be telling the computer what you want instead of how to do what you want.

Running interactively under TSO and in batch, SAS is now saving time at more than 2,000 OS/VS and VM/CMS installations. There's another nice thing about SAS. The cost. You can add SAS to your dp staff for about 1/4 the cost of a new person. And after the first year it's even less than that.

To find out more, just write or call. It could be the beginning of a very productive relationship.

SAS Institute, PO Box 8000, Cary, NC 27511, 919/467-8000.

In Europe: SAS Institute, The Centre, 68 High Street, Weybridge, Surrey KT 13 8BL, UK. Telephone 0932-55855.
But that's a picnic compared to the high level languages, Backus explains, dubbing today's so-called higher level languages "low level."

Backus sees three problems with current languages, all resulting from what he calls "the von Neumann bottleneck." He proposed that phrase based on his distaste for the current method of changing memory by pumping single words back and forth through the tube connecting the memory and the cpu.

The "word-at-a-time" problem occurs because most languages depend on picking up individual words from the memory and combining them by some expression. "It's incredibly clumsy," Backus insists, "because it doesn't permit you to look at the datas as a whole entity."

But that's a picnic compared to the difficulties he finds with composition and combining them by some expression. "You'd really like to do is to have a lot of useful programs sitting around that you can put together to build a bigger one," he says. "But composition won't allow that, because if I take two programs written without knowledge of each other the result is almost certain to be gibberish. And to make a specific program general you have to make all these complicated statements."

These two dilemmas compound the third difficulty of von Neumann languages—recursive definitions, in which a function is defined in terms of itself.

So what would Backus want? Basically, a brave new world which would be functional rather than nonprocedural. Backus defines the latter as languages which allow you to state the properties the desired program must have and which say what you'd like to do without saying how.

"The functional theory changes things because programming, in my language, doesn't use names," he explains. "You just give it the argument itself. Since it doesn't name anything, you can apply it to any function without changing it. You just have to physically wheel up the thing you're going to do it to and then it can do it. You can be applying three functions at once. It doesn't care."

"The problem with the old styles comes from the fact every program is working on the store, so in that world of programming it changes one store into another store. And that's all it can do. Whereas in my world, programs do not map stores into stores. They map things into things. Conventional programming tells you how to combine objects to get new objects. Mine tells you how to take two programs and get a new program."

The industry, however, has been reluctant to get with Backus' program. It is having mental and physical problems.

"One of the hardest things is to break the mental set of the last 25 years," the 55 year old Backus sighs. "Writing a program in my style requires you to think in entirely different ways than you're accustomed to. It's very mind-boggling. It violates the most ingrained mental practice of all."

"I find every time I'm trying to write a program I tend to write it so it will do things serially, whereas in my language I can write a lot of things in parallel. It just takes a long time to retrain yourself. But I'm gradually de-brainwashing myself."

Slowly, he's doing likewise to the doubters and resisters. If he could just produce a working system based on his language, the physical problem would be solved as well. Since his language doesn't have a memory, it's historically insensitive. But even Backus concedes the need to have a memory that will give users a different answer tomorrow than it did today. He is currently wrestling with those technical difficulties at the IBM laboratory in San Jose and at his home in San Francisco. In a year, possibly two, he expects success.

Then his brave new world is achievable? "Oh, yes," he says enthusiastically. "But you wouldn't like a 100% functional language because it couldn't say 'save this.' You would have to retain the old languages. You'd have a real computing system based on functional language. The system just has to have the ability to communicate with a file of information, and it can do that by sending a message created by the application of its function input."

He's not holding his breath for the day when it's as common as the telephone, though. Backus may be a theoretician, but he's also a pragmatist.

"I think this will be the next quantum leap," he grudgingly admits, "but I'm biased. Still, there's nothing out there that could be the next quantum leap. But don't quote me as saying I think it's the wave of the future. I don't. It remains to be seen."

"And, he adds stoically, "it's too early to tell.""
Low-debris Tyvek
guards diskettes against
data drop-out.

Unlike paper, TYVEK virtually eliminates sleeve debris.

Sleeve debris can cause loss of important, often irreplaceable information. That's why you should specify super-clean TYVEK® spunbonded olefin...it's your best choice by far to protect diskettes.

Unlike paper, it is made of continuous fibers that resist abrasion breakdown. Also, TYVEK is produced with no fillers, binders or coatings that can generate microscopic charged or abrasive particles.

Don't take chances with paper. Protect your data with TYVEK.
For more information, write:
DuPont Company, Room 38470,
Wilmington, DE 19898.

Protect your diskettes with sleeves of TYVEK.

*DuPont registered trademark. DuPont makes TYVEK, not diskette sleeves.

CIRCLE 148 ON READER CARD
Maintaining the optimal environment means planning for the present with an eye toward the future.

HOT & COLD DATA CENTERS

by James E. Hasseut

Like it or not, the dp manager is responsible for the entire operation of the data center. Unfortunately, responsibility for performance includes many specialized fields such as air conditioning, fire protection, and security. To assume that all the specialists in these fields will design and install the best systems is risky. This article focuses on the problems associated with maintaining an optimal thermal environment for your data center.

The proper environment for a data center is not comprehended by the term "air conditioning." Air conditioning connotes people comfort; "process cooling" is a better term because it indicates the difference in computer hardware cooling.

There are four considerations in establishing the design criteria for the selection of equipment:

1. Specific hardware requirements: Have a copy of the installation planning manual that is supplied by each hardware supplier. The designer needs this information; it is often found in the book with all of the specification sheets for the hardware. The specification sheets (Fig. 1) indicate wide ranges of temperature and relative humidity for all the hardware. However, each manufacturer has a recommended temperature and humidity for maximum up-time. In addition to temperature and humidity, most manufacturers identify the maximum permissible humidity of air under the floor and coming up into the equipment. Parameters of thermal shock are also identified. These last two items are most often missed and are the major causes of computer down time.

2. Cooling load of the room: Fig. 2 shows a simple cooling load calculation form which will help in identifying the capacity of the required cooling equipment. The example shows a data center of 2,000 square feet located, for security purposes, in the center of a subbasement. This load calculation form will be filled out by the designer, combining the details of hardware watts (or tons per hour) with the heat equivalent of lights, people, outside air. As one might expect, the largest load comes from computer hardware.

Experience indicates that the minimum capacity of the process cooling equipment should allow for a 30% growth of computer hardware for that room.

3. Redundancy: The minimum capacity for the cooling equipment, in this example, would be 219,850 btus an hour. However, all the equipment will fail someday, and for that reason, the actual process cooling selection should include one more cooling system to serve as a redundant system.

4. Heating needs of the building: Another criterion which will affect the selection of a process cooling system is whether the heat from the data center can be used to heat another part of the building. We will discuss this option further.

When analyzing a data center's environmental requirements, a manager should consult these sources of free, competent advice: the professional designer retained for the project, the site preparation specialist representing the hardware manufacturer, the building's plant engineering and maintenance department (which can often help avoid unnecessary equipment duplication and mistakes); the local utility; user groups, many of which have published information on aspects of data center design and maintenance.

HOW TO CONSERVE ENERGY

1. Reduce the ventilation air quality. Outside air that is brought into the data center must be cooled and dehumidified during warm weather and heated and humidified during cool weather. While cool air would be a benefit in reducing the cooling load, the cost to humidify it outweighs the cooling gain.

By reducing the amount of outside air to about 1% of the air in circulation, rather than the 15% usually associated with comfort air conditioning, most of the energy used to heat and humidify the outside air is saved.

In a 5,000 sq. ft. data center, the air in circulation would be about 30,000 cubic feet per minute (cfm). Based on process cooling standards, there would be a maximum of 1% or 120 cfm. An air conditioning system would call for 2,000 cfm to meet most local ventilation codes.

2. Use a vapor barrier to minimize infiltration/exfiltration. Ceiling tile, for example, should be replaced with a tile designed for data centers. The back of the tile should be coated with a vapor barrier, a plastic sheeting that prevents the migration of moisture out of the data center. If the data center has a high moisture content in the summer and low moisture content in the winter, you have a "loose" room. Exterior walls, particularly, must prevent moisture entry into the room during the summer months as well as the moisture leaving during the winter months.

3. Minimize system dehumidifying. Almost all cooling systems take out moisture (dehumidify) while they are cooling the air. Very little moisture should be getting into the room at any time of the year, so any dehumidification being done by the cooling process will have to be put back by the humidifier. Limit the amount of dehumidification whenever possible.

The temperature of the chilled water in chilled water systems should be variable so that in the summer a water temperature of about 45°F will be needed for any dehumidifying. In the winter, the temperature should be raised to between 50°F and 52°F. Leaving the water temperature 45°F year 'round will result in excessive dehumidification and expensive rehumidification.

Almost all direct expansion (compressor) systems do some humidifying, particularly air-cooled systems operating during outdoor temperatures of between 75°F and 80°F. Direct expansion systems used in these process-cooling applications should be operated at higher condensing temperatures and pressures than normal air conditioning systems to minimize their dehumidifying effect.

4. Operate cooling systems at peak efficiency. Simple, normal maintenance will keep the operating costs down and minimize downtime. Filters and humidifiers should be inspected regularly and cleaned or changed as needed.

5. Reduce the cost of humidifying. Humidification is required most of the year to replace moisture that migrates out of the room as well as moisture removed by the cooling process. Winter ventilation must also be humidified.

Two common ways to humidify air are by flashing water into steam by electricity, and evaporating water from a special dispensing surface.

The electric humidifier requires about 1,000 btus per pound of water while the evaporative panel type needs only 80 btus per
"Stat Mux"

A Data Mover Product from DCC

Our STAT MUX can reduce your communications costs by combining multiple costly circuits into one circuit, and improve reliability with error-free transmission. DCC's Data Movers currently service major operating U.S. Networks.

The CM-9100 Statistical Multiplexer offers:

- 4 to 32 subscriber lines
- Synchronous or Asynchronous input protocol
- X.25 Level 2 support
- Built-in diagnostics
- Optional High Speed backup line
- No impact to existing terminals, computers, or software
- Many other standard and optional features
- Immediate delivery

Thirty-day free trial

For further information, or details about our new 30 day free trial offer, contact the Data Communications Marketing Department.

Digital Communications Corporation
A MACOM Company
11717 Exploration Lane
Germantown, Maryland 20767
(301) 428-5600 TWX 710-828-0541

Atten: Data Com Marketing
Please send me more information on DCC's Data Movers.

Name ____________________________
Address __________________________
City ____________________________ State__ Zip __________

Digital Communications Corp.
11717 Exploration Lane
Germantown, Maryland 20767

Call our authorized representatives:
- Albuquerque, NM (505)-235-5100
- Atlanta, GA (404)-455-1035
- Austin, TX (512)-454-1579
- Boston, MA (617)-459-2578
- Chicago, IL (312)-398-7600
- Cleveland, OH (216)-247-5129
- Columbia, SC (803)-798-8070
- Dallas, TX (214)-661-9633
- Dayton, OH (513)-293-6082
- Detroit, MI (313)-459-9150
- Durham, NC (919)-683-1580
- El Paso, TX (915)-392-2415
- Ft. Lauderdale, FL (305)-776-4800
- Houston, TX (713)-681-0200
- Huntsville, AL (205)-833-8560
- Los Angeles, CA (213)-594-4574
- Melbourne, FL (305)-723-0766
- Minneapolis, MN (612)-941-8997
- Nashville, TN (615)-482-5761
- New Orleans, LA (504)-626-9701
- New York (New Jersey) (201)-445-5210
- Orlando, FL (305)-425-5505
- San Francisco, CA (415)-964-4335
- Seattle, WA (206)-527-4730
- Tallahassee, FL (904)-878-6642
- Tempe, AZ (602)-967-4655
- Tulsa, OK (918)-252-8646
- Wash. DC (301)-428-5600

CIRCLE 149 ON READER CARD
Simple, normal maintenance will keep cooling systems at peak efficiency, will keep the operating costs down and minimize down time.

 pound. In addition, the electric humidifier heats the same air stream that needs to be cooled.

On the other hand, the evaporative panel humidifier contributes to the cooling of the system by cooling the air stream.

Since there is no electric service to the humidifier, installation costs are lower and the costs associated with electrical maintenance are saved. Evaporative humidifiers are also fail-safe in that they cannot overhumidify. The electric humidifier will continue to generate steam as long as the humidistat calls for moisture. If the humidistat sticks "shut," excessive moisture will adversely affect the hardware, cause corrosion, tape-stick and card-feed failure.

6. Reduce the cost of "reheating." There are times during the operation of small data centers when the room temperature is satisfactory but the moisture content is too high. In order to bring the moisture out, the air temperature is reduced. This air must be reheated during this "dehumidification only" period.

In the past, this reheating was done with an electric coil. However, the waste heat from the compressor that is running to provide the cooling can be used to provide all the needed reheat.

7. Reduce the cost of providing cooling. When the outdoor temperature is 55° F or below, it is possible to cool the data center by using the naturally chilled coolant instead of by running the compressors.

The savings are impressive. For instance, in a 5,000 sq. ft. computer room located along a weather belt which includes New York, Indianapolis, and Kansas City, the 10-year savings would be approximately $200,000.

8. Use rejected heat for the building heating needs. In the previous example, the heat of rejection from the compressors and condensers in the process coolers heated the coolant to about 110°F to 115°F. This warm coolant would normally be pumped to the dry coolers, where it would be reduced in temperature and sent back to the process coolers.

TROUBLESHOOTING PROBLEMS

A variety of problems may confront existing data centers. Here are half a dozen common difficulties and the methods that can be used to cope with them.

1. Room will not hold temperature and humidity: This is usually the result of having too much outside air coming into the room. You can be sure this is the cause when the humidity increases when it rains and decreases when the cold weather comes. If it isn't obviously an oversized outside air system, then look for (a) little or no vapor barrier used during construction; (b) air passing into the hung
Next Time You Travel On Business, Don't Let Important Things Wait.

You're away on business for a few days. You come back with a pile of crucial stuff. Work you took with you, or picked up out of town. Now it has to be finished—fast. Your secretary goes crazy, or goes elsewhere. And you wonder why it has to be this way. It doesn't.

Now when you're away from the office, you're really not. You can send important items back from your hotel, overnight.* Or on to another office, overnight. Or to any of 13,000* U.S. places, overnight.

Think of what that means. You'll never have to put off an important trip. Or come back before you should. Because any work needed back at the office gets back overnight, in a Hotel Pak.

There's never been a convenience like Hotel Pak, ever. You can send anything from contracts to computer parts, briefs to blueprints, samples to securities. It's inexpensive. You can charge it to your room or credit card. And it's as easy as sending out your laundry. Once you use Hotel Pak, business travel will never be the same again. Thank goodness.

How Hotel Pak works and where to find it is all in a kit that's yours for the asking. Mail the coupon now. Or call 800-238-5355. In Tennessee, 800-542-5171.

FEDERAL EXPRESS
When it absolutely, positively has to be there overnight.

*Monday through Friday, Saturday delivery by special request only, and at an additional service charge. Areas served, delivery times, and liability subject to limitations in the Federal Express Service Guide.
When a room will not hold temperature and humidity, it is probably the result of too much outside air coming in.

1. Room temperature and humidity are not held: (a) the room ceiling and into the chamber where it is being dissipated; (c) holes through the walls or floors, such as unsealed cable entry, exhaust fans, etc. Using air from the building's central air conditioning is often a problem because of its improper moisture content—too low or too high.

2. Room temperature has been rising steadily with time: In most cases it is because additional equipment has been purchased and installed, thus adding an increased sensible cooling load which the cooling equipment cannot satisfy. Not only must more cooling be supplied, but this means there is not enough cooling equipment to provide backup in the event of failure.

3. Humidity too low: The humidifiers may not have been maintained, resulting in malfunctioning floats, burned out heaters, dirty evaporative media, etc. This happens frequently because of the inactivity of the humidifier during the summer.

If the humidity is too low at the time, it is possible that the humidifier needs maintenance, or that the cooling coil is taking out more moisture than the humidifier can handle. As more equipment is added to the data center, the cooling equipment is working at full capacity more often and the humidifier never has a chance to catch up. Additional process cooling is then required.

4. Humidity too high: This happens when the humidistat malfunctions and keeps the humidifier on all the time. The steam grid or heated pan humidifiers can cause this problem. The evaporative panel cannot over-humidify.

5. Temperatures constantly too low: Some rooms are controlled using wall-mounted thermostats. Look for heat producing hardware that has been moved under the thermostat recently. The thermostat continuously calls for cooling and lowers the temperature of the entire room. Either change the stat location or move the hardware. Check the setting on the thermostat.

6. Room has hot spots and cold spots: Some air rebalancing is necessary to provide air outlets at the heat-producing equipment. Usually relocation of floor grilles or perforated tiles will solve the problem. If overhead distribution is being used, the outlets cannot easily be relocated; a change in the air outlet quality may be accomplished.

The designer has many opportunities for energy conservation at his disposal: reducing ventilation air quantity, using a vapor barrier, minimizing dehumidifying, maintaining performance at peak efficiency, using evaporative panel humidifiers with hot-gas water heating, using glycol cooling at low outdoor temperatures, and using rejected heat for other building needs.

Suppliers of process-cooling equipment will prepare an energy analysis of various types of systems (air cooled, water cooled, glycol cooled, chilled water).

JAMES E. HASSETT

Mr. Hassett is vice president, planning, with AC Manufacturing Co., Cherry Hill, N.J. He has served as an energy consultant in the dp and educational industries. Hassett is the author of Process Cooling for the Data Center Environment, and has been in international marketing and management in the commercial and industrial heating and air conditioning business for 25 years.

© DATAMATION
Now, a cooling system designed for the mini.

The mini-MATE™

Because mini-computers generate heat, cooling is necessary to insure the up-time of both equipment and personnel. Here is the perfect solution:

The mini-MATE is a precision spotcooler, complete with humidity control. It is compatible with any mini-computer installation. Each unit is a self-contained, modular system, flexible to meet any growth requirement. The mini-MATE is controlled by solid state electronics to insure precise, maintenance-free operation. A unique compact design offers one-man installation and service to minimize cost.

Space required for installation? NONE — It is mounted completely recessed overhead, within the 2' x 4' opening of a standard ceiling tile. To further reduce costs, the need for ductwork has been eliminated.

Contact Liebert, world's LEADING manufacturer of Computer Room Air Conditioning Systems. Now, together with its subsidiary, CONDITIONED POWER, a complete line of air conditioning and power systems is available to meet the special requirements of any mini-computer installation.
See the new TermiNet® 2000 printer or other quality GE printers at these authorized dealers.

ALABAMA
Huntsville (205) W.A. Brown Instruments 883-4600

ARIZONA
Phoenix (602) Data Access Systems 944-9660

CALIFORNIA
Los Angeles Metro (213) Alatibus Data Communications 537-0830
Carterfone Communications 342-6540
Consolidated Data Terminals 970-1030
Contiental Resources 638-0454
Data Access Systems 538-4100
David Jamison Carlyle 277-5952
Sacramento (916) Consolidated Data Terminals 924-1644
San Diego/Orange County (714) Carterfone Communications 514-2510
Data Access Systems 979-2157
David Jamison Carlyle 640-0355
Schweber Electronics 556-3880
San Francisco Bay Metro (415) Carterfone Communications 245-9020
Contiental Resources 249-9870
Data Access Systems 244-3772
Schweber Electronics 496-0200
San Francisco Bay Metro (415) Alatibus Data Communications 923-6300
Consolidated Data Terminals 638-1222
Data Access Systems 872-1811
David Jamison Carlyle 835-9820
IOWA
Cedar Rapids (319) Schweber Electronics 733-1417
KANSAS
Kansas City (913) Loonam Associates 888-2124
KENTUCKY
Louisville (502) Loonam Associates 499-2820
LOUISIANA
New Orleans (504) W.A. Brown Instruments 626-9901

MASSACHUSETTS
Boston Metro (617) Alatibus Data Communications 990-0226
American Computer Group 437-1400
Contiental Resources 275-0850
Data Access Systems 769-6420
Schweber Electronics 275-3100

MICHIGAN
Detroit Metro (313) Alatibus Data Communications 562-6688
Carterfone Communications 967-1303
Data Access Systems 589-1409
Data-Tron 354-6424
Schweber Electronics 275-6100

MINNESOTA
Minneapolis Metro (612) Data Access Systems 854-4600
Loonam Associates 811-1616
Schweber Electronics 941-5280

MISSOURI
St. Louis (314) Loonam Associates 427-7272
NEBRASKA
Omaha (402) Loonam Associates 333-3302

NEW JERSEY
North Jersey-NYC Metro (201) Carterfone Communications 575-8300
Contiental Resources 654-4900
Data Access Systems 221-8880
David Jamison Carlyle 946-1699
FICOMP 238-5492
Schweber Electronics 227-8880
South Jersey-Phila Metro (609) Continental Resources 234-5100

NEW YORK
New York Metro (212) Alatibus Data Communications 688-2615
Carterfone Communications 344-7311
Contiental Resources 695-2206
Data Access Systems 566-9301
Digital Associates 509-2406
Schweber Electronics 516-334-7474
Rochester Metro (716) Data Access Systems 377-2080
Schweber Electronics 424-2222

NORTH CAROLINA
Durham (919) W.A. Brown Instruments 682-2383

OHIO
Cleveland Metro (216) Data Access Systems 473-2431
Data-Tron 585-8421
Schweber Electronics 464-2970

OKLAHOMA
Oklahoma City (405) data-Tron 947-3797
Tulsa (918) 742-5673
OREGON
Beaverton (503) Data Access Systems 644-8600

PENNSYLVANIA
Philadelphia Metro (215) Carterfone Communications 333-5000
Data Access Systems 667-8135
Fax 548-1303
Schweber Electronics 441-0000

Pittsburgh Metro (412) Alatibus Data Communications 922-8483
Data-Tron 243-8421

SOUTH CAROLINA
Columbia (803) W.A. Brown Instruments 796-8070

TENNESSEE
Oak Ridge (415) W.A. Brown Instruments 482-5761

TEXAS
Austin (512) Tel-Tex 451-8201
Dallas Metro (214) Alatibus Data Communications 358-4151
Carterfone Communications 630-9700
Data Access Systems 256-5536
MRC Industries 247-6341
Schweber Electronics 661-5010

WASHINGTON
Seattle Metro (206) Carterfone Communications 575-1607
Consolidated Data Terminals 883-0100
Data Access Systems 682-5965
Schweber Electronics 784-3600
Tel-Tex 868-6000

Quality that will make a lasting impression.
Someday other printers might give you all this.

Today, only the General Electric TermiNet® 2030 does.

Compare the standard features of the TermiNet 2030 printer—the 30 cps machine with 1200 baud capability—to the competition, including their options. You’ll see why it’s today’s best printer value.

throughput leader: Logical bidirectional printing, combined with 50 cps catch-up rate, improves your productivity.

1200 baud capability: Sends and receives data at 1200 baud (9600 baud with Text Editor or Line Buffer Option), yielding significant operating cost savings for many applications.

640 character buffer: Up to five times the capacity of comparable standard model printers gives you the capability to operate efficiently at 1200 baud.

practical display: Advanced LED information display indicates printer status, print position, and self-test/diagnostic readouts—all in plain language.

powerful options
• 300 baud modem
• 16,000 character line buffer
• 32,000 character text editor

Someday other printers might give you all this.

Today, only the General Electric TermiNet® 2030 does.

Quality that will make a lasting impression
Cyberex's Megawatt Range UPS has a brain that's never asleep at the switch.

For a closer look at the heart of each power system, visit the LogCenter of Cyberex's Microcomputer Uninterruptible Power System (UPS). The LogCenter maintains the function of key components, monitors input power variations, load effects and other input functions, before they cause a power disturbance or trip protective action, and tells the problem to a remote annunciator (shown above) which prepares a time-stamped, hardcopy printout. This list of events is in chronological order for the resolution of the problem, and the resolution is easy and quick. Because the system is totally automatic, a complete solution to problems is available with minimal or no human intervention.

Component damage that can result in costly downtime.

Cyberex's Megawatt Range UPS provides the utmost in reliability and assures you disturbance-free, well-regulated power regardless of power input fluctuations. It delivers maximum power availability, superior system performance and complete compatibility and reliability at lowest total cost. This 100% solid-state Megawatt Range UPS combined with low and medium power UPS, line voltage regulators, and static switches makes Cyberex the single source to solve computer power problems.

For more information, contact Cyberex, Inc. (714) 660-8110. Brea, California 92620.
6th COMPUTER FAIRE
Conference & Exposition On
Intelligent Machines for Home, Business & Industry
SAN FRANCISCO CIVIC CENTER  APRIL 3-5, 1981

THE BIGGEST
Don't miss the largest microcomputer-related conference and exposition in the United States.

BUSIEST
"...teeming with people, new products, conferences, and good parties..." — InfoWorld

MOST CAPTIVATING &

FASCINATING
Hear more than 100 speakers, on as many subjects. This is an idea-sharing conference, and you just might come back as a speaker next year.

MICRO SHOW & CONFERENCE
"...wild mix of exhibitors and attendees ...some of the brightest microcomputer scientists and applications engineers, as well as a horde of personal and business computer buyers...a place to learn of the future as well as profit from the present." — Robert Lively, The Sizzle Sheet

IN THE UNITED STATES
"...the West Coast Computer Faire... draws people from all over the country, and around the world..." — Dr. Adam Osborne “From the Fountainhead”

...AND THE WORLD?
"...Computer Faire appears to be heading for international status, perhaps reaching the size of NCC and WESCON..." — Dr. Adam Osborne, “From the Fountainhead”

MORE THAN 100 CONFERENCE SPEAKERS
Take Your Pick of Conference Sessions
For Example:
- Tutorials for Novices
- Tech Talks for Experts
- Low-Cost Business Computing
- Public Information Utilities
- Legal Aspects of Computing
- Inexpensive Educational Computing
- Biomedical Applications
- Computer Graphics & Art
- Computer Music
- Unusual Applications
- Microcomputing for the Physically Impaired
- Social Implications of Computers
- Simulation Applications & Exotic Games
- Users Meetings, e.g.: Apple, TRS-80, Commodore, Forth, etc.

Conference Proceedings Will Be Published & Available at the Computer Faire

MORE THAN 400 EXHIBITS
SAN FRANCISCO
Civic Auditorium and Brooks Hall
(Largest Convention Facility in Northern California)
Friday, April 3rd 9am - 6pm
Saturday, April 4th 9am - 6pm
Sunday, April 5th Noon to 5pm
Registration Includes Conference Program & Exhibits All 3 Days

ON-SITE REGISTRATION: $10

FREE! SILICON GULCH GAZETTE SUBSCRIPTION
Get a free subscription to the Silicon Gulch Gazette. Keep in touch with the microcomputer industry and the 6th Computer Faire. Loaded with news, gossip and tidbits about Silicon Valley (just down the road from the office). Latest information on speakers, exhibitors, special features of the 6th Computer Faire.

COMPUTER FAIRE
333 Swett Road Woodside, CA 94062 (415) 851-7075
Dear Faire Folks: I don’t want to miss anything.
Please enter my name to receive the Silicon Gulch Gazette, for FREE!

Name ____________________________
Address ____________________________
City ____________________________ State ____________ Zip ____________

— Dr. Adam Osborne, “From the Fountainhead”
At Telex, our service commitment has one key objective: you and your computer needs. That's why when you buy or lease any one of the broad range of Telex products, you get more than computer equipment. You're investing in a nationwide service network of over 750 highly trained computer engineers and technicians. A network designed to serve you small companies as well as large. Whether in Los Angeles, Des Moines or New York.

The Telex Service Company routinely provides extensive classroom and lab instruction for field engineers. And 24-hour Dispatch Service for you, the customer. New product training and updated review programs help keep you working day and night. And when you do need us, our on-line Dispatch Service expedites parts and personnel when and where you need them — 24 hours a day, 365 days a year.

Providing Telex customers with the best service possible is more than just an attitude. It's a commitment. The total resources and experience of Telex stand behind every product we sell, East or West, North or South. Big or small.

The innovation continues... TELEX
With low initial costs for micros, local school districts and even small groups of teachers are now buying them for use in classrooms.

CAI CATCHES ON

by Deborah Sojka

"CAI is not just another computer application; it has the potential to shake up the entire school system and revolutionize education." At least that's the opinion of David Moursund, a professor at the University of Oregon and president of the International Council for Computers in Education (ICCE), an organization that provides information to teachers and others interested in CAI (computer-assisted instruction).

Although CAI has been on the computing scene for the past 20 years, most people remember it as a broken dream. Today, CAI advocates such as Moursund are working to mend the dream—and succeeding. According to current research, approximately 15% of all U.S. public schools are using computers in applications directly involving students. In 1979, nearly 6% of all U.S. public schools were using either CAI or CMII; grades 1 through 12 spent about $70 million on micros and related equipment, and higher education spent over $40 million. This year, the figure for primary and secondary education is expected to top $150 million.

It is not surprising, therefore, that more hardware manufacturers are beginning to view the CAI market as a profitable one. In the '78-'79 academic year, six manufacturers aimed micros at the education market. In the '79-'80 academic year, there were 25 companies; this year will see over 100 competing vendors. The entrants include Commodore, Control Data (with Micro-Plato), Apple, Radio Shack, Texas Instruments, DEC, Honeywell, NCR, Burroughs, Wang, 3M, Siemens, Sinclair, and Ontel.

While minis are still abundant in CAI, the availability of micros has accelerated market interest, primarily because the cost per student hour has decreased to $1.50 (traditional education costs about $2 per student hour).

In the '60s and '70s, although CAI was heralded as the "savior" of education, it was an idea whose time had not yet come, primarily because of the high cost. In 1965, the cost per workstation was about $50,000; in 1975, the price dropped to $5,000; by 1985, it will be about $1,000. In the early years, therefore, it was difficult, if not impossible, for an educational institution to implement CAI without additional financial aid.

In 1972, after publishing a report entitled "Factors Inhibiting the Use of Computers in Instruction," the National Science Foundation (NSF) awarded $16 million in development money to the two most promising CAI programs. The grantees were Control Data's Plato system at the University of Illinois ($10 million) and the MITRE Corp.'s TICCIT (Time-Shared Interactive Computer-controlled Instruction Television) at Brigham Young Univ. ($6 million). NSF also funded smaller programs, and continues to do so, mostly at the university level.

Today, with the low initial costs, local school districts and even small groups of teachers within a school or within a discipline are buying micros for use in classrooms. Moreover, experience has proved that computers in the classroom are quite successful in inspiring high motivational levels in the students. The Irving Elementary School in Highland Park, N.J., purchased an Apple in December '79, and a second one in March '80. Ronald Erikson, the principal, said, "We can't keep the kids away from the computers. They are far more interested in learning than ever before." Erikson predicted that students at Irving who are using CAI will be able to learn two years' worth of curriculum in one year.

Erikson also spoke of an elementary school in nearby Newark, N.J., where, if students miss a certain number of school days, they forfeit their time on the computer. Not only has this urban school experienced improved attendance levels, but students are coming to school early to get machine time.

It is interesting that these two examples are elementary schools. Traditionally, universities are easily sold on the advantages of CAI, secondary schools are where the action is, but elementary schools are harder to convince.

FEAR OF BEING REPLACED

This is not only because of cost. Early CAI advocates, in their zealotry, presented the computer-assisted instruction concept to the prospective faculties in a manner that confirmed the fears of teachers—that computers were going to replace, not assist, them. Compounding this inherent resentment, most teachers were not sufficiently oriented to or trained on computers—an oversight that, if rectified, might have alleviated apprehension. Computer "illiteracy" among teachers, administrators, and students is still an obstacle, but one that many vendors are confronting directly. For example, the latest Apple promotion effort includes a computer literacy training package with the first micro purchased by a school.

One other approach to easing the entry of computers into the classroom is the work of organizations such as MECC (Minnesota Educational Computing Consortium). MECC was created in 1973 as a statewide computer service organization to plan, coordinate, and deliver all computer services to its members. MECC members are the public school systems of Minnesota, the University of Minnesota, the state university system, the state community colleges, and the State Department of Education.

MECC has a time-sharing system that services over 2,000 terminals, linking 90% of all Minnesota schools. At any given time, about 350 terminals are active. Time-sharing services are purchased by MECC members; coordinators or consultants are available at no cost to assist in workshops, conversion, and...
Acceptance of CAI by educators and the development of good courseware are inextricably mixed.

MECC purchases hardware in large quantities to get lower prices for its members.

An interesting aspect of MECC is that its communications network costs are met by a direct appropriation from the state legislature. MECC also offers a library of over 950 micro programs for elementary through college levels.

Charles Lund of the St. Paul Public School System was on the original team that created MECC, and is a firm believer in the concept of developments. MECC is a powerful, proven educational tool; yes, it is teaching whether it is done by computer or garage outfits. Many of these small companies consist of one person who owns a micro and is developing programs—a professor, engineer, computer hobbyist, or computer professional.

A number of older courseware finns, such as Science Research Associates (SRA), Chicago, Ill. (an IBM subsidiary, purchased in 1964) are still heavily involved in courseware development. SRA and Atari have entered into an agreement in which SRA will develop the courseware. Apple Computer Corp. is arranging a special agreement with Bell & Howell Co.—the first major package they're producing is GENIS, a combination student/ teacher package.

SRA is also developing computer literacy programs to run on Apples, and Tandy/Radio Shack is working on courseware for its TRS-80s. McGraw-Hill's Edutronics and Osborne Book Co. subsidiaries will soon begin marketing packages at the advanced Simulations and Games and Learner Profile levels. Not to be outdone, Houghton Mifflin has introduced "The Answer," a system operating at the Helps level of CAI. One publishing-house-turned-courseware-developer believes that within five years, computer-related sales to primary and secondary schools will equal one-third of its sales at those education levels.

Funding courseware development is still difficult, except in commercial cases, where industry can examine the issues, then make appropriate financial decisions. Presently, funding for courseware development programs originates 70% from local districts, 20% from federal grants, and about 10% from state governments. Some statewide leaders are Minnesota, Oregon, and Michigan.

Organizations such as Micro Sift, in Portland, Oregon may be able to improve courseware quality. Micro Sift is sponsored by the National Institute of Education, and is a project of the Computer Technology Program section of the Northwest Regional Educational Laboratory. It is a clearinghouse for micro courseware at the elementary and secondary school levels. Micro Sift also develops applications for micros in the classroom; collects, distributes, and evaluates courseware from the educational standpoint; and provides its findings to publishers and other developers.

The Micro Sift project began in December '79, and will run until December '82, upon reapproval of funding by the National Institute of Education. During its first year, Micro Sift's major efforts were to design field tests and evaluators' guides for micro courseware. Its next major project will be to establish a nationwide network of centers of education instructional facilities to support evaluation work.

Micro Sift will evaluate any package that is offered on the market. Typical evaluation consists of submitting the package to a regional CAI specialist, who evaluates it and selects two or more teachers in the grade level of the package who will also evaluate the package. Micro Sift provides an Evaluators' Guide and the related instruments; a Developers' Guide, for standards of micro-based materials; a quarterly newsletter containing answers in the form of a general information sheet in the field; a quarterly publication of the courseware evaluations that have taken place; and a newsletter that discusses micro courseware developments and needs.

So much for the broken dream. The only caveat is to remember our past. Yes, CAI represents a fast marketplace for hardware vendors, particularly micros; yes, it is a powerful, proven educational tool; yes, cost is no longer an obstacle. But the old bugaboos—public understanding (computer "literacy") and good software (or "courseware")—still, as usual for most computer applications, lag at least two years behind the capabilities of the machines.

*Cognitive Diagnostics. Developed by John Sealy Brown, Xerox's Palo Alto Research Center. Brown's work showed the existence of at least 50 "bugs," or cognitive errors, that students may have while learning the fundamentals of a subject. Computers are used to conduct individual testing and diagnostics.

Simulations and Games. A popular market for computer toy manufacturers. A computer is programmed with multiple variables from which the student is taught to choose; the computer then calculates the implications of each choice.

Learner Profiles. Finally getting beyond the experimental stage, profiles will be on the market this year. Testing to discover how an individual learns; testing reveals such variants as right or left brain dominance, dyslexia, and other individual learning patterns.

Deborah Sojka is a member of the articles staff at DATAMATION.
The RCA Perfect Fit.

Whatever your needs, nobody can offer more ways to solve your equipment and service problems than RCA. Nobody knows more about communications. Nobody has more experience.

Need faster telecommunications? Our upgradable, microprocessor-controlled CRTs give you EPROM program storage. Up to six pages of display. An optional I/O port for your printer. Pick your protocol: 8A1, 85A1, 83B3, 40/1, 40/2, 40/3. Or pick your VT 100/VT 52 application. We also supply protocols and applications customized to your needs.

We've got a teleprinter that's just your speed. Choose from a complete range, 10 to 120 cps. Including Teletype® Model 43's and GE TermiNets.**

Need more reliability? We can take over all your maintenance needs. Your equipment or ours. We staff 180 full-time RCA service centers with the best communication specialists in the business.

Need a way to pay for it? We've got flexible finance packages to fit your budget.

Whatever you need, RCA can give you the perfect fit. We've been doing it for over 20 years. Mail the coupon today. Or call our nearest regional office.

*Registered trademark of Teletype Corp.
**Registered trademark of General Electric Co.

RCA Service Company, A Division of RCA
Data Services, Bldg. 204-2, Route #38
Cherry Hill, NJ 08002

I'm looking for the perfect fit for my system.

☐ Have an RCA Communications Specialist call me.
☐ Rush me details on: ☐ RCA CRT's Protocols
☐ GE TermiNets ☐ Teletype Model 43
☐ VT 100/VT 52 Emulation ☐ Teleprinters
☐ RCA maintenance packages

Name/Title __________________________
Company __________________________
Address ____________________________
City/State/Zip _______________________ 
Telephone ___________________________

CIRCLE 154 ON READER CARD
WE DIDN'T INVENT DISTRIBUTED DATA PROCESSING. WE MERELY PERFECTED IT.
THE ONLY DDP SYSTEM THAT COMES COMPLETE: DATA GENERAL'S ECLIPSE SYSTEM.

Since its inception about five years ago, conservative estimates place the amount of money business has invested in DDP to be an astonishing three billion dollars.

Astonishing, particularly when one considers that almost all of it has gone for systems that, to put it mildly, are incomplete.

In point of fact, it's lamentably rare to find any DDP system that doesn't suffer from one form of this malady or another.

Some manufacturers have seemingly mastered the hardware but are all too wanting in software. While others are reasonably sound at software but at best only fair when it comes to communications.

However, there is one company with worldwide software and service support whose systems are operating in over 75% of the Fortune 100 companies, as well as countless other companies throughout the world, that offers through a unique combination of power, function and flexibility, the most comprehensive approach to Distributed Data Processing in the industry. Data General.

What specifically is it about Data General that allows us to claim superior DDP capabilities? Simply this: ECLIPSE® Systems supply more of the key ingredients for successful Distributed Data Processing at the same place and the same time than any other system you can buy.

For example, ECLIPSE® Systems utilize the widest and most comprehensive range of software available. Instead of the traditional heavy, complex software that takes too much time to manage, Data General has dedicated a large part of its Research & Development resources over the past 12 years to provide you with easy-to-use, quality software, with sophisticated and simplified programmer productivity tools.

Software such as our Advanced Operating System (AOS), a modern, proven operating system designed for the interactive environment; ANSI-standard Interactive COBOL with easy-to-use display extensions; PL/1; INFOS® file system; a CODASYL compliant DBMS; and AZTEXT™ word processing. All of which helps you get your applications up and running faster, while measurably helping to reduce the time spent on enhancements and maintenance.

ECLIPSE Systems have the most comprehensive proven-in-use communications capability available and working today. Not only RJE and 3270, but also networking software based on X.25 protocols that have been successfully implemented in our customers' accounts for years.

And with Data General you get compatibility across our product line. This gives you the benefit of using your Data General software expertise on each successive distributed data processing application without costly program rewriting or programmer retraining.

There is a wide variety of sizes to choose from, ranging from a 1 to 4 terminal system to a 128-terminal mainframe-size system. And the selection of terminals and storage devices is, without question, unsurpassed in the industry.

If you have new applications or you want to distribute out of the mainframe environment, and you want the power, function and flexibility that allow you to implement, enhance and maintain applications not just on time, but in budget, contact our local office or write to Data General, 4400 Computer Dr., Westboro, Mass. 01580.

You'll discover our solution to DDP is the most comprehensive in the industry because our thinking is the most comprehensive in the industry.
Most installations have a 2-3 year backlog of unimplemented applications

RAMIS II is a complete information management system. It integrates an English-like nonprocedural language with a flexible DBMS. The DBMS permits the easy integration of data from a variety of sources, while the nonprocedural language lets you tell the computer what you want done without having to say how to do it.

Users report that RAMIS II systems can be implemented in 1/5 the time it takes using procedural languages such as Cobol or PL/1. This translates into a productivity gain of 400%!

Because RAMIS II systems are simple to set up and modify, there is no need to develop elaborate specifications in advance. In fact, users report that basic requirements can be agreed upon and a prototype implemented in 1/3 the time it normally takes just to develop the specs. The data structures and reports may then be modified and enhanced in an evolutionary manner until the system is fully operational.

Eliminating programming also eliminates the need to talk about programming. This frees the user and dp staff to concentrate on the problem rather than the code—which results in both better communications and a better system.

In business, to stand still is to fall behind. More cost effective hardware, an increasing demand for computerized applications, and the decreasing availability of applications programmers means even bigger backlogs unless more powerful, more productive software is used.

For more information call or write today for a free RAMIS II factbook.

For more information call or write today for a free RAMIS II factbook.

Name _____________________________
Title _____________________________
Company __________________________
Address ___________________________
City _______________________________
State _______ Zip _________________
Phone _____________________________

Mail to: Mathematica Products Group
P.O. Box 2392, Princeton, NJ 08540

CIRCLE 170 ON READER CARD
Transforming "show biz" into real project payoffs.

ASSURING QUALITY
QUALITY ASSURANCE

by Stephen L. Stamm

The concept of software quality assurance (SQA) has reached maturity over the past decade, although not without difficulty. There is a widespread opinion that the payoff on most SQA programs is marginal at best and that quality assurance is really a form of "show biz," and certainly not worth much of an investment.

Since 1978, the software quality assurance program outlined here has been in active use for military programs at GE's Space Div. The principles of SQA, however, are broadly applicable, and an SQA program drawn up for the commercial sector or for dealing with small projects would have functional similarities throughout. In the past, SQA programs have been accepted only because they were part of the contract. Also, with the science of measuring software still in its infancy, it is sometimes difficult to determine the effectiveness of an SQA program. The guidelines and philosophy expressed in this article show a user how to get something for his money without going over the funding estimates given.

The primary purpose of the SQA program is to assure that the delivered software meets all the requirements of the contract or end user. And, to help secure contracts, its secondary purpose is to define and implement specific measures which will assure that the delivered software is a high quality product, e.g., that it incorporates the features necessary to achieve testability, maintainability, reliability, etc. In the typical organization, this responsibility is given to an SQA group which, working with 3% to 5% of the project funding, is expected to perform independently. It is unrealistic to expect anything other than superficial results from this approach.

An independent audit of the software at any point in the development cycle must be conducted in depth. But this capability requires a resource which is a significant fraction of the development effort itself. No project can afford this either in the expenditure of funds or in the utilization of technical personnel. A person who is capable of performing a good in-depth audit is willing to do this occasionally, but doesn't want to make a career of it—he'd rather be developing his own software. Another negative aspect of an SQA group working on a project as an independent entity is that it is likely to suffer from an outsider image and be viewed as an enemy that doesn't really understand the problem. The atmosphere created is hardly conducive to achieving an effective SQA program.

The practical approach to achieving viable SQA is to make it a part of everybody's job. Each element of the software development process involves QA aspects with which each member of the development team must identify to obtain the desired high quality product. Quality can't get added to the "recipe" by someone else later on in the process; it has to be included at each step. In this approach, the primary job of the SQA group is to produce the SQA plan and then to manage it. Managing does not require high level software development expertise, and becomes far less difficult and costly to staff properly than previously described methods. The typical elements of the "SQA is Everybody's Job" approach are shown in the table, which presents the specific SQA roles of each of the generic performing organizations spread over the duration of the project in terms of the development cycle phases.

THE SQA PLAN

The first order of business is for the SQA group to define its requirements by preparing the project SQA plan. The presentation of all QA aspects of the development process in a single plan assures an integrated approach (e.g., design practices) and complementary rather than conflicting QA features in the test program and the configuration management system. The SQA plan must include at least the following topics:

- **Organization**: the organizational approach to implementing the SQA program includes the definition of the roles and responsibilities of each group in the project organization. The independence of the SQA group must be clearly established.
- **Requirement Traceability**: this defines the methodology to assure that all requirements in top level specifications are satisfied in the lower-tier specifications, and sets up the verification of all requirements through traceability to test plans.
- **Documentation**: the documentation to be produced must be defined to assure formal, controlled communication among the project organizational elements; standards for the preparation of the documentation; and the measures to be applied to assure compliance with the standards.
- **Software Engineering Methodology**: the application of the quality-related software engineering methodology on the project must be defined (e.g., structured walk-throughs, software development folders), and provisions for monitoring compliance must be set forth.
- **Training**: the requirements for certifying the software development personnel's knowledge of the QA measures to be applied to the project must be defined.
- **Formal Reviews**: a definition of the reviews to be conducted and the methodology to be applied must be made to assure readiness, smooth interface with the customer, and maximization of the benefits to be derived from each review.
- **Test Program**: as the keystone of SQA, the SQA plan must specifically define the measures for technical review of the test plan/procedures and compliance with prescribed testing standards; the role of the SQA group in conducting the tests and certification of the results; the system for reporting test discrepancies; the "requirement for retest" decision process; measures to assure control of special test software; and measures to assure control of hardware used to test the software.
- **Configuration Management**: the QA considerations that place requirements on the project configuration management system include a software library with control procedures to assure unambiguous identification of the products and prevention of unauthorized modifications; definition of procedures for the generation, disposition, tracking, and closeout of design and test discrepancies; and a configuration audit prior to delivery of the products.
The practical approach to achieving viable software quality assurance is to make it part of everybody's job.

<table>
<thead>
<tr>
<th>DEVELOPMENT CYCLE PHASE</th>
<th>SYSTEM ENGINEERING</th>
<th>SOFTWARE DEVELOPMENT</th>
<th>TEST AND INTEGRATION</th>
</tr>
</thead>
</table>
| Requirements Definition  | • Requirements traceability  
  • Technical review of specs  
  • Prepare SW Rqts Rev. (SRR) | • Prepare Programming Standard Document (PSD)  
  • Develop/Implement Programmer Training Plan | |
| Preliminary Design       | • Requirements traceability analysis  
  • Technical review of specs and Interface Control Documents (ICD) | • Complete PSD  
  • Initiate SW Development Folders (SDF) | • Trace test requirements to test plans |
| Detail Design and Code   | • Technical review of specs and ICDs  
  • Technical review of test plans  
  • Tech. Rev. of CDR Mat'l | • Trace requirements to design implementation  
  • Conduct structured walk-throughs  
  • Prepare Critical Design Review (CDR)  
  • Maintain SDFs | |
| Test and Operations      | • Technical review of test procedures  
  • Prepare Discrepancy Reports (DR) | • Technical review of test procedures  
  • Prepare DRs | • Trace test plans to test procedures  
  • Conduct test readiness meetings  
  • Conduct post-test meetings  
  • Prepare DRs |

Production of a high quality product must start at the front end of the development process. The precise definition of the software system requirements in terms of the functions to be provided, together with related performance parameters (e.g., timing and sizing), is absolutely essential. Quality will be judged by the user after delivery, so there must be no uncertainty or ambiguity about what he will get: user disappointment is tantamount to poor quality. During the requirement definition phase, the primary contribution to producing a high quality product is a strong system engineering group. It must work with less easily defined requirements, such as portability and reliability, which might subsequently result in specific design standards.

The quality mechanism used to assure that the requirements have been met is a formal software requirements review (SRR). This mechanism is especially rewarding because it is self-stimulating and self-motivating. Few people want to make fools of themselves in public. However, the review can be no better than the capabilities of the reviewers, and the SQA group must assure adequate participation in and preparation for the review. It is especially important that the eventual operators of the system participate in all such reviews and that appropriate action items are formulated during the presentation.

During the requirement definition phase, it is important to put into place the means for producing the high quality product (code, database, and documentation). Primarily, this requires two things: the definition of what high product quality is, and programmers who understand and are capable of working to these definitions. Each programmer must be provided with a copy of a programming standards document (PSD). But then, with strong management support, the software development group must run training sessions on the content and application of the PSD. The SQA group, for its part, must certify that each programmer participates in this training activity.

As the project moves on to product design, a large contribution to assuring the quality of the end product is made during the preliminary design phase. Before the detail design of a software module is begun, each programmer must have a precise and detailed
The quality of the software product is strongly dependent on the ability to test it, and during the development process it is necessary to look ahead a bit and assure test-ability. The test group must trace the module requirements into the preliminary test plans it is preparing, and then feed back any special design requirements needed to implement the test plan. Its contribution to product quality starts much earlier in the development cycle, yet it is the most difficult time to apply specific quality measures. The detail design and code phase should be met with the application of a combination of quality-oriented mechanisms. Because they are so complex, we have learned that special attention must be given to the development of software interfaces. The bulk of this work must be done by the software development group, but to assure a sharp focus on this activity, the responsibility for the interface control documents (ICD) is placed in the system engineering group. In this way, at least two people are working toward the timely and complete definition of the interface details with the system engineers and are providing an in-depth review function on a continual basis. When the software design is complete, another formal review must be conducted and successfully completed before huge amounts of resources are committed to the subsequent coding and testing efforts—the critical design review (CDR). This review assures that there is a well-defined design in place, with a minimum risk of subsequent redesign or inefficient application of the expanding programming team. The CDR achieves a top-level review of the product's quality at this point in the development cycle. It is initiated in this phase by the cognizant programmer, and one of the first things to be included are the module requirements/environment/interfaces. So, the SDF provides a specific mechanism to assure that the required communication has been achieved at this very personal level. The SQA group audits the SDF initiation when it actually occurs.

At the start of the preliminary design phase, the top-level specs assume a degree of sacredness, and a formal change control procedure must be established. This is done best by having program management create a board to rule on changes, called either the engineering review board (ERB) or the change control board (CCB). The board must provide the means for making rational and integrated change decisions and not degenerate into an administrative function—a change-processing paper mill. Quality objectives will be met only if program management creates a real working board consisting of top-level organizational representation, a board that actually makes changes rather than just record decisions made elsewhere in an undisciplined and invisible fashion.

The preliminary design phase ends with another formal review, the preliminary design review (PDR), which has the same objectives as the software requirements review described previously.

"Quality must be built in; it can't be tested in" is an overworked cliché but nonetheless true. This next phase is a critical period in the development cycle, yet it is the most difficult time to apply specific quality measures. The detail design and code phase should be met with the application of a combination of quality-oriented mechanisms.

The detail requirements/environment/interface definition is performed by the software development group. To evaluate the quality of this activity, considerable technical expertise and an intimate understanding of the system level requirements are needed. The only practical approach is to apply the system engineering group to this task. It has defined the top level requirements and must now evaluate the software development group’s response to these requirements, resolving any difficulties arising from interpretation and intent.

We have found that an effective mechanism to establish the desired clear communication with the programmer is the software development folder (SDF). The SDF documents the life history of a module from the time its requirements are defined until it is released to the test group. It is initiated in this phase by the cognizant programmer, and one of the first things to be included are the module requirements/environment/interfaces. So, the SDF provides a specific mechanism to assure that the required communication has been achieved at this very personal level. The SQA group audits the SDF initiation when it actually occurs.

At the start of the preliminary design phase, the top-level specs assume a degree of sacredness, and a formal change control procedure must be established. This is done best by having program management create a board to rule on changes, called either the engineering review board (ERB) or the change control board (CCB). The board must provide the means for making rational and integrated change decisions and not degenerate into an administrative function—a change-processing paper mill. Quality objectives will be met only if program management creates a real working board consisting of top-level organizational representation, a board that actually makes changes rather than just record decisions made elsewhere in an undisciplined and invisible fashion.

The preliminary design phase ends with another formal review, the preliminary design review (PDR), which has the same objectives as the software requirements review described previously.

"Quality must be built in; it can't be tested in" is an overworked cliche but nonetheless true. This next phase is a critical period in the development cycle, yet it is the most difficult time to apply specific quality measures. The detail design and code phase should be met with the application of a combination of quality-oriented mechanisms.

Because they are so complex, we have learned that special attention must be given to the development of software interfaces. The bulk of this work must be done by the software development group, but to assure a sharp focus on this activity, the responsibility for the interface control documents (ICD) is placed in the system engineering group. In this way, at least two people are working toward the timely and complete definition of the interface details with the system engineers and are providing an in-depth review function on a continual basis.

When the software design is complete, another formal review must be conducted and successfully completed before huge amounts of resources are committed to the subsequent coding and testing efforts—the critical design review (CDR). This review assures that there is a well-defined design in place, with a minimum risk of subsequent redesign or inefficient application of the expanding programming team. The CDR achieves a top-level review of the product's quality at this point in the development cycle. It is initiated in this phase by the cognizant programmer, and one of the first things to be included are the module requirements/environment/interfaces. So, the SDF provides a specific mechanism to assure that the required communication has been achieved at this very personal level. The SQA group audits the SDF initiation when it actually occurs.

At the start of the preliminary design phase, the top-level specs assume a degree of sacredness, and a formal change control procedure must be established. This is done best by having program management create a board to rule on changes, called either the engineering review board (ERB) or the change control board (CCB). The board must provide the means for making rational and integrated change decisions and not degenerate into an administrative function—a change-processing paper mill. Quality objectives will be met only if program management creates a real working board consisting of top-level organizational representation, a board that actually makes changes rather than just record decisions made elsewhere in an undisciplined and invisible fashion.

The preliminary design phase ends with another formal review, the preliminary design review (PDR), which has the same objectives as the software requirements review described previously.

"Quality must be built in; it can't be tested in" is an overworked cliché but nonetheless true. This next phase is a critical period in the development cycle, yet it is the most difficult time to apply specific quality measures. The detail design and code phase should be met with the application of a combination of quality-oriented mechanisms.

Because they are so complex, we have learned that special attention must be given to the development of software interfaces. The bulk of this work must be done by the software development group, but to assure a sharp focus on this activity, the responsibility for the interface control documents (ICD) is placed in the system engineering group. In this way, at least two people are working toward the timely and complete definition of the interface details with the system engineers and are providing an in-depth review function on a continual basis.

When the software design is complete, another formal review must be conducted and successfully completed before huge amounts of resources are committed to the subsequent coding and testing efforts—the critical design review (CDR). This review assures that there is a well-defined design in place, with a minimum risk of subsequent redesign or inefficient application of the expanding programming team. The CDR achieves a top-level review of the product's quality at this point in the development cycle, e.g., the completeness of the documentation,
The quality of the software product is strongly dependent on the ability to test it.

adherence to the more easily audited standards, and traceability of functional requirements to the design implementation. The CDR, however, is not a suitable mechanism for reviewing the lowest-level detail of the design, which is where the quality must be built in. To achieve this, the structured walkthrough has been found to be very effective. In this informal (typically around a table) minireview setting, the programmer can lead several reviewers through the complete design, making it possible to evaluate testability, operability, maintainability, transportability, etc. The vital task of the SQA group is to prepare the plan for this activity (module, date, participants) and to make sure that it is performed. Otherwise, the informality of the process can slip into lip service exercises or into continual rescheduling—finally past the date of product delivery.

The process of code-and-debug is not usually amenable to close scrutiny or audit. Because of the softness of the software, management visibility can become completely lost and product quality can suffer. Special measures must be employed to avert this situation and to assure that the programmer does not work in isolation. The structured walk-through technique is employed again after successful compilation has been achieved. This means a line-by-line review, the only way to check for adherence to coding and code documentation standards. The experience of senior people and the fresh approach and more recent academic training of the junior staff members can be used very profitably at this point.

During this code-and-debug period the software development folder (SDF) should also be maintained, even if it is a very difficult discipline to impose on the typical programmer. But the SDF is the best management defense against the "trust me" syndrome and forms the basis for the subsequent preparation of the formal test procedures and users' manuals. Without good source material in the SDF, there is seldom the time or the inclination for high quality in subsequent documentation.

COMPLETE REVIEW OF SDF

The SDF must always be available for review and audit. Prior to turnover of a module to the test group for formal testing, a complete review of the SDF is conducted by the software development group supervisor and the SQA representative. The goal here is to provide documented evidence that the module is adequately debugged before the turnover occurs. After the SDF is certified complete, it is placed in the software library.

The design of the test program is finalized during this phase. The system engineering group has the responsibility of reviewing these plans and assuring that the test program will indeed verify all the software functional and performance requirements. The SQA group audits this review and any discrepancies that are to be resolved.

Software quality assurance must involve, of course, much more than testing, and the SQA group must not be a part of the test group, which is a separate organizational entity. As we now describe the elements of the SQA program used during the test phase of the development cycle, we will further note that the SQA role in actual testing is minor.

This arises again from the fundamental differences between hardware and software, i.e., the "softness" of test items. In software testing there are no gauges to monitor or traces on a scope to analyze; there isn't even any noise! The quiescent atmosphere of the software test is not the place to expect much in the way of SQA activity. The significant SQA tasks are performed before and after the test is run.

This realization, that SQA has very little to do with the actual testing of the product, is fundamental to implementing an SQA program that really works. Unlike hardware QA, a successful software QA program must focus on methods and techniques that contribute to the software quality rather than on conducting the test.

The first important SQA measure in the test process is to identify what is being tested and to define precisely the test environment. These are configuration management (CM) functions. The project management must include these SQA requirements in the CM system. This is usually achieved by establishing a controlled software library, and all software test articles (code and database) with appropriate version identification are drawn from this library. Formal testing of other than controlled software is meaningless.

The next SQA measure is to define the test precisely before it is run, especially the success/failure criteria, and to achieve a prior agreement by all interested parties, including the end user. This is done by having the test director from the test and evaluation group conduct a pretest readiness meeting, at which the test procedures are modified to become the agreed-upon procedures that will be used in the test, and subsequently controlled as a part of the CM system.

The SQA function during the test is to make sure the procedure is being followed precisely or that changes are documented properly. After completion of the test, the test director conducts a post-test meeting and the SQA representative assigned to the test certifies the correctness of the test report, which includes the discrepancy reports (DRS) resulting from the test. At this meeting, each DR is assigned to the proper individual for resolution and subsequent reports to the ERP/CCB. The SQA representative monitors DR closure activity.

The discrepancy reports provide one excellent measure of the product quality, and it is the responsibility of the SQA group to analyze this data and prepare statistical reports. Examples of product quality data that might be used by management to identify weak points include:

- Examples of product quality data that might be used by management to identify weak points include:
  - Examples of product quality data that might be used by management to identify weak points include:
  - Examples of product quality data that might be used by management to identify weak points include:
  - Examples of product quality data that might be used by management to identify weak points include:
  - Examples of product quality data that might be used by management to identify weak points include:
  - Examples of product quality data that might be used by management to identify weak points include:
  - Examples of product quality data that might be used by management to identify weak points include:
  - Examples of product quality data that might be used by management to identify weak points include:
  - Examples of product quality data that might be used by management to identify weak points include:
  - Examples of product quality data that might be used by management to identify weak points include:
  - Examples of product quality data that might be used by management to identify weak points include:
  - Examples of product quality data that might be used by management to identify weak points include:
  - Examples of product quality data that might be used by management to identify weak points include:
  - Examples of product quality data that might be used by management to identify weak points include:
  - Examples of product quality data that might be used by management to identify weak points include:
  - Examples of product quality data that might be used by management to identify weak points include:
  - Examples of product quality data that might be used by management to identify weak points include:
  - Examples of product quality data that might be used by management to identify weak points include:
  - Examples of product quality data that might be used by management to identify weak points include:
  - Examples of product quality data that might be used by management to identify weak points include:
  - Examples of product quality data that might be used by management to identify weak points include:
  - Examples of product quality data that might be used by management to identify weak points include:
  - Examples of product quality data that might be used by management to identify weak points include:
  - Examples of product quality data that might be used by management to identify weak points include:
  - Examples of product quality data that might be used by management to identify weak points include:
  - Examples of product quality data that might be used by management to identify weak points include:
  - Examples of product quality data that might be used by management to identify weak points include:
  - Examples of product quality data that might be used by management to identify weak points include:
  - Examples of product quality data that might be used by management to identify weak points include:
  - Examples of product quality data that might be used by management to identify weak points include:
  - Examples of product quality data that might be used by management to identify weak points include:
  - Examples of product quality data that might be used by management to identify weak points include:
  - Examples of product quality data that might be used by management to identify weak points include:
  - Examples of product quality data that might be used by management to identify weak points include:
  - Examples of product quality data that might be used by management to identify weak points include:
  - Examples of product quality data that might be used by management to identify weak points include:
  - Examples of product quality data that might be used by management to identify weak points include:
  - Examples of product quality data that might be used by management to identify weak points include:
  - Examples of product quality data that might be used by management to identify weak points include:
  - Examples of product quality data that might be used by management to identify weak points include:
  - Examples of product quality data that might be used by management to identify weak points include:
  - Examples of product quality data that might be used by management to identify weak points include:
The Crunch.

High-volume information processing comes easy to Wang Virtual Storage computer systems. Virtual memory management gives each VS user a full megabyte of logical address space for big-program development and execution. Multiple Input/Output Processors work independently to break the I/O bottleneck, buffering the CPU for faster throughput. And our sophisticated VS instruction sets cut through complex tasks with ease.

Expansion is easy, too. The VS family lets you grow from 6-user support on the VS 50 to 32 users on the VS, to 128-user support on VS 100 systems. Use up to 2 million bytes of main memory and 4.6 billion bytes of mass storage. And get an eight-fold increase in processing speed with the VS 100's 32-bit processor, 64-bit data path and 32K-bytes of integral cache memory. While protecting your software and peripheral investment every step of the way.

 Unsqueezed.

But Wang VS systems aren't just powerful computers. They're complete systems that make computer power ingeniously easy to use. Our programming aids, for example, let you create a data entry screen as easily as writing a word processing document. Our Symbolic Debug utility lets you test and modify COBOL, BASIC, RPG II and Assembler programs at the source level. And our menu-driven file management facilities let you set up files, process transactions, generate reports and establish field-level security controls — interactively.

In all, Wang VS systems give you more easy ways to use computer power than any other system marketed today. Word processing, phototypesetting, electronic mail and telecommunications are all VS system options.

Call us. And let your local Wang Representative show you how to apply the crunch. Without getting caught in the squeeze.

Send Solutions.

☐ Send more information on the Wang VS.
☐ Show me the VS in action.

Name
Title
Company
Address
Telephone

Mail to: Wang Laboratories, Inc., Lowell, MA 01851 (617) 459-5000 DP112/D31

Making the world more productive.

CIRCLE 157 ON READER CARD
The key to a successful software quality assurance program is to assign a realistic role to the SQA group.

spots in the software implementation process are the number of DRS, the frequency distribution of DRS by type, the mean time of closure, and the DR rate as a function of product life. The analysis of DRS continues while the product is being used in its operational environment. This information is especially useful for the definition of subsequent product improvements or the design of new products.

A further measure of product quality is simply the extent to which specific code has been exercised. Tools are available to analyze the frequency with which paths are executed. The most important result of these analyses is to uncover code in the final product that has never been executed in the formal test program. It must then be determined if there is a hole in the test program, a flaw in the design, or simply some superfluous code that is about to be delivered. The SQA program should require the application of code analysis tools which support the measurement of the software quality as part of the test program.

The major SQA milestone during the test phase is a configuration audit conducted by the SQA group prior to shipment of the product from the factory. Through this audit, the company management and the customer are provided data to decide if the software is of sufficient quality to ship to the operational site. Specifically, the configuration audit accomplishes the following: 1) the product to be shipped is compared with the documented configuration identification represented by the applicable specifications and manuals; 2) the test results and DR dispositions are reviewed to verify that the product meets its specified performance requirements; 3) the product to be shipped is compared with the tested configuration; 4) any requirement not verified by testing is verified by comparison with appropriate detail/design documentation; and 5) all open items that are to be resolved after field installation are identified.

WINNING SQA PROGRAM

Software quality assurance can be made a useful ingredient of a software development project. The elements needed to achieve a successful SQA program must include the following:

• An SQA plan that has high project visibility, that specifically defines the SQA program at a level of detail suitable for implementation, and that has the wholehearted support of project and company management.

• A project organization that distributes the SQA program responsibility, placing the SQA tasks where the capability really exists.

• The application by the programming staff of special software engineering techniques specifically targeted at enhancing product quality.

• Measurement of the effectiveness of the SQA program and, if possible, of the quality of the product.

• Finally, SQA personnel as an integral part of the project team (dispel the “outsider” image). Even if they are assigned to the project by a boss who has an independent line of communication to top-level company management, quality compromises can be resolved prudently.

The key to a successful SQA program is to assign a realistic role to the SQA group. They first define the project’s SQA program and then manage its implementation. But they do not create quality in the product — that’s a part of everybody’s job.

More than digitizers!

Turnkey computer-aided drafting systems suited to your needs starting at under $50,000 — complete!

While it is true that Summagraphics is the world’s largest manufacturer of digitizers, our interest in computer-aided drafting systems does not stop there.

Our Datagrid II system comes in configurations of hardware and software that give you the capabilities you need without forcing you to pay for frills you’ll never use.

Datagrid II is available for remote job entry situations where all that is required is preprocessing graphic inputs for communication or recording. It is also available in totally stand-alone configurations complete with plotter or for use with your existing plotter.

Systems are already at work in such varied applications as PCB and IC layout, mechanical drafting, mapping, schematic diagrams and a host of others.

Before you invest in any CAD/CAM system, you should investigate the real values offered by Datagrid II. Tell us what your needs are, and we’ll send you complete information — free.

CIRCLE 158 ON READER CARD

200 DATAMATION
ADR's integrated software expands productivity and progress at Wright Schuchart, Inc.

ADR's integrated software improved DP services. According to Jim Orgill, Director of Data Processing, "We've been on a fast track for the last year-and-a-half in improving our DP services. We've been able to accomplish with a very small systems development staff what other companies might require 30 or 40 people to achieve. We couldn't have come so far so quickly if it weren't for ADR software. We have DATACOM/DB and DC, DATADICTIOARY, DATAQUERY, ROSCOE and The LIBRARIAN and plan to add other ADR products in the near future.

ROSCOE reduced turnaround time from two days to 12 minutes.

According to Ron Higgins, Manager of Technical Services, Wright Schuchart had been experiencing two-day turnaround in testing. "A programmer would keypunch his deck, submit it to operations and wait for a printout. After we installed ROSCOE, turnaround time went down to 12 minutes."

ADR product integration made job 10 times easier.

"We brought in ROSCOE and The LIBRARIAN about a year ago," Mr. Higgins went on. "They worked so well together that when we looked into a DBMS we asked ADR to be part of that review. One of the vital reasons for choosing ADR was the fact that they build integrated products. It didn't make sense to us to get a data dictionary from one supplier and a data query from another. We wanted software designed to work together, a good example being DATADICTIOARY's integration with The LIBRARIAN. I honestly feel that ADR's integrated products made our job at least 10 times easier."

Better support from ADR than any other vendor.

"After ADR installed the initial products," Mr. Higgins continued, "everything worked fine. Then we accidentally clobbered the system. ADR could have told us it was our problem, not theirs. Instead, they came back, reinstalled the software and re-educated us. We've received better support from ADR than any vendor I've ever dealt with."

Instant information with ADR Data Base Management software.

"We're now beginning to make effective use of DATACOM/DB and DC, DATADICTIOARY and DATAQUERY," Mr. Orgill stated. "For example, when the payroll clerks want to find out what construction job one of our thousands of workers is on, they just use DATAQUERY to get the information from DB. Before they'd have had to go through stacks of old reports which could take forever."

Productivity climbing.

"Productivity is increasing tremendously," Mr. Orgill concluded. "I give the credit to my staff and to ADR products."

95-year old Wright Schuchart, Inc., is as much a Seattle landmark as the city's famous space needle, which the company built. The 50th largest U.S. contractor is a leading builder of high-rise office buildings, paper mills, and nuclear energy facilities. The company's DP department employs 21 people, operates an Itel AS4, 3330 Model 11 disk drives, has eight terminals inhouse and three at remote construction sites.


For more information, contact:

APPLIED DATA RESEARCH
The Big Difference is our integrated network
Route 206 and Orchard Rd.
CN-8, Princeton, NJ 08540
Telephone (201) 874-9100

CIRCLE 159 ON READER CARD
You don’t have to take our word about Maxell Floppy Disk quality.

Ask the people who made your system.

Maxell Floppy Disks are either expressly specified or recommended by many major disk drive manufacturers. We’re also relied upon by a growing number of 8" and 5 1/4" Floppy System owners. They find our Floppy Disks do everything possible to bring out the maximum performance of their systems. And they find our disks do this consistently.

Are we better than others? Will a box of ten Maxell Disks always contain ten disks that produce high performance results every time? We think so. We certify each one. We maintain extraordinary quality control. So they all meet or exceed the most critical industry standards.

But please ask the manufacturer of your system to double check our recommendation. See your computer products supplier. Or write to us for more information. We recommend dealers write to us about the opportunities Maxell Business Products offer.
by Hesh Wiener

Whatever else might be said about the IBM 370 generation, one thing stands out as true: more money was lost on leasing these machines than on any other computers in history. The losses were not only those of leasing companies. Lenders, insurers, investors, and users shared in the problems. All of the parties were surprised by the disaster.

Although part of this story begins in July 1970, when IBM introduced the first large mainframes in its 370 series, the roots of the leasing debacle that was to occur some 10 years later reach all the way back to 1688, when Lloyd's Coffee House opened in London. Some might argue that the 17th century is too recent a time to begin unfolding this story, because it has to do with people who want something for nothing, who want to make wealth materialize out of thin air. If this is so, the story is as old as humanity.

It's not the kind of story that ends with a happily ever after, because for some of the individuals and some of the organizations embroiled in the 370 leasing mess, the foreseeable future includes adjustments to substantial monetary losses and, possibly, bankruptcies. It also includes scores of lawsuits, and some smugness and snickering from the fortunate, who now claim their safe situations are the result of foresight and wisdom.

There are as many questions as there are answers in this story, as well as a few tentative conclusions and bits of information that might help computer users, leasing companies, banks, and so forth. But the main lesson from the experiences of those involved in the financing of IBM 370s is that a lot can go wrong with seemingly sound business arrangements, and a lot can happen that ought not to happen: when big money deals blow up, you have to be pretty far away to escape unharmed.

Into the valley of death rode the Fortune 500

For all practical purposes, Itel is dead. Oh, it's possible the San Francisco leasing company will come back to life, after spend-
Right up until the 4300 announcement, computer leasing seemed to be a gold mine.

ing some time in the limbo of bankruptcy. But if you want to lease a computer, Itel is not going to come into your office and make the slickest pitch in the world, the way it did 10 years ago, the way it did until recently. Now, things are different. The company's 1979 annual report leads off with a letter to share-holders from chairman of the board James H. Maloon:

"1979 was a year of immense and tragic change for Itel. The effects of that dis- ruption continued into 1980. A myriad of problems arose from the collapse of the company's computer-related business. . . ."

Stockholders reading the letter are brought quickly to the bottom line. The company was in hock to the tune of $1.2 billion after losing $443.3 million during the year. Another $50 million-plus went down the drain during the first nine months of 1980—and so the report goes, with parentheses and footnotes galore.

I tel's troubles involve dozens of the world's leading companies, because Itel's portfolio of leased computers sits in an archipelago of high class data processing shops, the very places where a lot of the world's big money is collected, counted, and disbursed. Itel's debts were incurred with some of the biggest and smartest banks in the industrial West. Itel's shares, both common and preferred stocks, have been held by investors-individuals and institutions—whose records on Wall Street otherwise stand as testimony to generally prudent investment.

So what happened?

The money went away.

Ask not for whom the Lutine bell tolls, it tolls for thee

Everyone knows Lloyd's of London is the most prestigious insurer in the world. Why, Lloyd's is practically synonymous with big insurance. For nearly 300 years, from the time of its humble beginnings as a coffee house to its present situation in imposing quarters on Lime Street, London address, the organization has prospered by taking risks that no other organization would take. More importantly, Lloyd's has grown great and fa- mous by transforming risks into probabilities, by assessing the chance that the unforeseen might or might not occur. When it comes to guessing about the future, Lloyd's lays it on the line—for a price.

During the 370 generation, Lloyd's made what could be the most interesting and tragic bet in its history: Lloyd's set odds on the rate of technological progress. Specifically, Lloyd's set a price on its assuming the key risk in computer equipment leasing: the chance that some machinery would bring in rents greater than the cost of buying, financing, and placing the gear in the hands of users. It was an enormous bet; Lloyd's ac- cepted millions in premiums against a chance that hundreds of millions might be paid out. Lloyd's lost.

Currently, Lloyd's says computer equipment lease insurance will cost it about $400 million. This is the third upward revisi- tion of its loss estimates and, the insurer says, very possibly the last. On the other hand, Itel, the largest single claimant under the policies, figures it will be asking Lloyd's for some $310 million. Both Lloyd's and Itel think that Itel's problem will represent something like half the total loss. So, depending on the ac- curacy of various estimates, Itel's share of the red ink and the total value of Itel's valid insur­ ance claims, there is still room to speculate about the ultimate magnitude of the catas­ trophe.

At the same time, some of the compa- nies that insured transactions will not have to make any claims at all, or will make only relatively tiny claims. On these policies, Lloyd's stands to come out ahead, just the way it had hoped all along.

Nonetheless, the problems of insured leases are only part of the picture. Whoever invested in IBM 370 equipment, whether as a purchaser, lessee, lessee, banker, or insurer, stands to lose big if it did one thing—got in late in the generation.

Values in wonderland

The losses incurred in 370 generation computer deals stem, in large measure, from the precipitous decline in used equipment values. The gap between what people ex­ pected machinery to be worth and the price placed on that equipment by the market has grown very wide; it has engulfed thousands of mainframes.

Losses have also been incurred on cer­ tain leases of peripheral equipment, both IBM and non-IBM. These losses have been markedly less, because the worth of peripherals has not fallen, relative to expecta­ tions, nearly as much as that of mainframes. Used computers come down in price whenever new computers offer users more for their money. There are other factors, to be sure, but the biggie is price/performance— the cost of a computer per unit of work it will do. The other factors are chiefly those that af­ fect the price/performance of a system in an operational context, such as the amount of power it consumes and the amount of space it occupies. And the attitudes of users count as well. For a number of reasons, users will take a newer machine, all other things being equal.

For example, a 370/168 that might have cost $4 million from IBM in the middle of the last decade can be bought on today's used market for well under 10% of that amount. A 370/148, worth about $750,000 in 1977, can be had right now for under $35,000, less than 5% of its original cost. Anybody who thought that computers ought to be written off over, say, seven years, and who had figured de­ preciation in a straight line will find that the market for used computers disagrees sharply and painfully with the accounting figures.

A similar situation exists for lease rates, which do not track sales prices exactly but tend to relate over the long haul to sales prices. That 370/168, once commanding a monthly rent well over $80,000 (and that with the user making a four-year commitment) can be had on a short lease for less than $20,000 a month. A 148, once $12,000 a month, might now bring a lucky lessee a couple of grand.

The 370/168 has been succeeded by the 3032 and 3033, the 3032 by the 3033-N, and the 3033 by the 3081. Each new machine has been a better value than the one it re­ placed. Similarly, the 4341 has given way to the 4341s, cheaper by a long shot than the computers of the last decade.

Today's problems are in marked con­ trast to the situation among lessors, users, and financiers a few years ago. In the second half of the 1970s, right up until the 4300 an­ nouncement, computer leasing seemed to be a gold mine. Fortunes were made, and some of the companies that made them actually got to keep the money. Even today, after some hard times, you won't have much trouble finding success stories in the third-party leasing business. And it's a safe bet that the next generation of computers will make some new people rich, although there will doubtless be

THE LUTINE BELL

The Lutine Bell hangs in the Great Hall at Lloyd's, the Underwriting Room. It's been there for a long time, about 80 years. When there is momentous bad news to be announced to the underwrite­ ers, the bell is struck once. When there is some very important good news, the bell is struck twice.

The bell was originally the ship's bell of the French frigate La Lutine, which was captured by the English navy at Toulon in 1793 and thereafter re­ named the H M S Lutine. The Lutine served as a cargo ship, hauling gold and silver, among other goods. And it was a cargo of precious metals that filled the Lutine when, on Oct. 10, 1799, it sank in a storm off Terschelling while at­ tempting to make its Yarmouth-Ham­ burg run. All hands were lost. Lloyd's, which had insured the ship, paid in full for its cargo.

Several salvage operations took place after the sinking, and in 1859 the bell itself was raised from the bottom of the sea. Some time later, the bell was in­ stalled at Lloyd's.
failures. To understand how all this can happen, you've got to understand a little about the way leasing is done.

The loan arranger

Most computer leases involve a financing method called tax leveraging. This means that the lease includes a party who nominally holds title to the machinery or gets the benefits of title, but who does not actually put up anything like the total cost of the gear. The difference between the amount contributed by this so-called equity owner and the actual cost of buying the equipment is borrowed from a bank or other lending institution. The way debt is used to increase the financial power of the equity owner's investment is called leveraging, just the way a company borrowing money to supplement its shareholders' equity is said to be leveraged.

The purpose of leverage in a computer lease is to increase the tax benefits available to the equity investor; tax breaks are the equity partner's payoff, hence the term "tax leveraged lease."

In addition to the equity partner and the lender, a leveraged lease involves a so-called packager, the party that sets up everything and goes to the user. Itel was a packager. The packager's profit is a fee for making all the arrangements, plus, after the parties that put up the money get theirs back, a share in any extra revenues the equipment might bring in.

The user gets cheap financing. This is because the equity partner doesn't get interest, only tax benefits and a share in the value of the equipment at the end of the term of the deal. The only interest the user has to pay is the interest on the loan. Typically, the equity partner will put up from 20% to 25% of the price of new equipment that is to be leased, meaning the user has to incur interest charges only on a portion of the price of the gear. Interest is only paid on 75% to 80% of the cost of the deal, which becomes a big discount.

Tax leveraged leasing was the name of the game, and the leasing companies were able to do pretty well in the business. But they wanted more.

The grow-grow years

Back in the mid-1970s, the leasing companies felt they could grow to be very large financial institutions. This involved getting lots of equity investors and borrowing lots of money. And it also meant that the leasing companies had to find lots of customers. There was no shortage of users who wanted a discount on the IBM equipment they needed, but there was a little catch.

Users didn't want to take really long leases. They didn't want to be locked in with a machine for, say, seven years, but the leasing companies were able to set up inexpensive deals only if users would sign for relatively long lease terms. IBM was giving customers a break on terms of only four years; the leasing companies wanted to compete.

The answer was obvious: the leasing companies would have to offer users four-year deals at favorable rates.

So the lessors went to the banks and told them their loans would be safe, that once one user was through with the machine, there would be another to rent it, particularly at the cheap rates made possible by leveraged leasing. Whether or not the banks trusted the leasing companies to make good didn't matter. A government rule, designed to prevent the banks from taking certain financial gambles, prohibited loans based on the faith lessors asked for. The rule is called Regulation Y.

In essence, Regulation Y says that banks can put up money for transactions like leveraged leases, but the lessors have to agree to pay enough so that nearly all of the loan will be cleared. The amount the users would have to sign up for, when all rentals were counted up and interest was figured in, amounted to something like 80% of the value of the deal. This stopped the leasing companies cold. Users were not willing to pay either high rentals for short terms or lower rentals for very long terms. Users wanted low rentals and short terms.

Somebody had to come up with a way either to get bigger investments from the equity partners—thus lowering the size of the bank loans—to change the attitudes of the users, or to enable the banks to finance short leases and still get around Regulation Y.
Up the rental stream without a paddle

Imagine this: the risk involved in leasing computers might be explained in a way that could be insured. The insurance would protect against problems the banks might have getting their loans repaid. With the risks removed, the banks could lend money on computer deals and still satisfy Regulation Y. The leasing companies, with credit assured, could compete and grow. This is what happened.

While the most visible organizations involved in the leasing of 370 generation equipment were big-name financial organizations, such as Itel and Decimus, the first insurance policy from Lloyd's was issued to a smallish peripheral equipment lessor in Dallas, Surety Industries.

Charles (Chris) Christopher, according to an account published in the Washington Post, started Surety in 1971 after having worked as an encyclopedia salesman and as a representative of Combined Insurance Company of America. Somehow, in 1973, Christopher got in touch with Lloyd's of London, or, more accurately, with a Lloyd's broker, Peter Nottage. From this meeting came an insurance policy that was to define the financial practices of computer equipment leasing during the 370 generation.

Christopher’s career has had its ups and downs. In the early leasing days he was caught bugging a meeting held by Peter Nottage with some of Christopher’s potential competitors. But whatever the merits of Christopher’s character, one thing is clear: he has to be counted among the most creative thinkers ever to play a role in computer finance.

Peter Nottage is also an independent thinker. The firm in which he is a partner, Adam Brothers Contingency Ltd., is an insurance specialist dealing in policies that provide protection under unusual circumstances. If you wanted insurance against rain on the first day of the PGA tournament, for instance, you might well end up in the offices of Adam Brothers, in London’s St. Helen’s Place, across a desk from Nottage. If he could properly define the risk you proposed, it would very likely be insured by Lloyd’s.

Rings of the Lloyd’s

Everybody knows you get unusual insurance at Lloyd’s. Some people know that most of Lloyd’s business is routine—policies covering ships, airplanes, cars, and the problems common to business. Few people know that you can’t simply approach Lloyd’s for insurance. It takes connections.

For insurance to be underwritten at Lloyd’s, it must first pass through a number of agents or brokers. Typically, you or your company will obtain insurance by going to your nearby agent. Then the agent will go to a
Lloyd’s broker, who represents Lloyd’s the way your agent represents you. Lloyd’s broker then presents the policy to the underwriters on the floor of Lloyd’s, where it is accepted, rejected, or returned for some changes.

Lloyd’s is not really an insurance company; it is an association of insurers grouped into syndicates: wheels within wheels. The risks at Lloyd’s are ultimately borne by individuals who have agreed to accept unlimited personal liability for risks they undertake. This means that the people who are members of Lloyd’s—they are known as “names”—can go flat broke. There are hundreds of these names, and each name can join one or more syndicates. The syndicates often specialize in one type of insurance. Each syndicate elects a leader with the authority to make commitments for the syndicate’s names. The leaders have enough experience and wisdom to justify the names’ placing their personal fortunes at risk. When an insurance risk is presented to Lloyd’s, syndicate leaders decide whether or not to sign up their groups for a portion of the risk. The presentation to syndicates is handled by Lloyd’s brokers, people like Peter Nottage.

All of this can become very complicated, but it has worked remarkably well for 300 years. The unique arrangement at Lloyd’s has made it the premier insurance market in the world, but premier does not mean perfect.

In any event, Chris Christopher was able to get over the hurdles and work out with Peter Nottage, and therefore with Lloyd’s, an amazing insurance policy.

Slapping on the risks

In late 1973, Peter Nottage stated, in simple form, the nature of the risks involved in computer leasing. That statement boils down to an insurance policy that says underwriters agree to “indemnify the Assured for their loss sustained in respect of their said obligations assumed . . . in consequence of the termination or nonrenewal of any declared Lease Agreement . . .”

The initial policy filled only a couple of pages of what is called a “J” form at Lloyd’s; it was quickly nicknamed the “J” policy. The underwriters viewed the situation of the lessors as requiring insurance against what is called a contingency. In this case, the contingency was the event of lease cancellation. If a computer were leased for seven years under terms that permitted the user to return the machine after, say, four years, the policy served to protect the lessoring company and its financial backers from possible losses. The policy wasn’t quite that simple, of course, and it grew more lengthy as time passed.

Among the key terms in the insurance agreement was a provision requiring that the
IBM announces major advances in a major product.

Series/1 phase two.

IBM is proud to announce a series of hardware and software enhancements so significant they mark a new chapter in the history of Series/1.

We've made one of our most versatile computers even more versatile.

The Hard Facts

We've added a new processor that has more storage capacity and greater price/performance. A new, lower-cost processor/diskette unit that fits in a rack or sits on a desk.

A new family of higher-quality printers designed to meet a variety of needs, from lower price to correspondence quality and remote printing options. A new multifunction attachment feature that reduces the cost of attaching I/O devices.

And more. For less.

The Soft Facts

Series/1's software advances make it ideal for tying together your information systems into a low-cost, flexible network.

Now both the Realtime Programming System and Event Driven Executive operating systems have Systems Network Architecture (SNA) at a high level of interface. This makes it easier for Series/1 to talk, in IBM's communications language, to System/370 and the 4300 and 303X processors.

And IBM's new high-speed "data ring" can let up to 16 Series/1s in a local network communicate with one another at up to two million bits per second.

These new communications advances, combined with our already extensive facilities to attach Bisynch, Asynch and X.25 devices, significantly expand Series/1's capabilities as a flexible, powerful distributed processor.

And two more major advances—the Communications Facility and Communications Monitor—can help manage communications for you. So you'll be able to concentrate more on applications processing.

In addition, Series/1's Realtime Programming System and Event Driven Executive systems now have enhanced COBOL, Indexed Access Method support and other operating systems services to improve ease of use and performance.

The Established Facts

Because Series/1 is a modular system, you can use any of the wide variety of Series/1 offerings as building blocks to tailor an overall hardware solution to your exact requirements.

Whether you have specialized needs like communications networking, industrial automation and energy management. Or more general needs, such as commercial processing and data entry. Or the need to tie together existing data processing and operational systems.

Series/1 can handle these jobs, and more, on either a local or distributed basis.

No job is too remote for IBM service, because it's available across the U.S.A.

For further details, call your IBM General Systems Divisions representative or write us at P.O. Box 2068, Atlanta, Georgia 30055.
Had Lloyd's viewed the computer leasing risks as some sort of financial guarantee, the insurer would have been prohibited from getting involved.

The situation becomes more difficult when it comes to insurance against business problems. Lloyd's, in insuring against the contingency that computer leases might be canceled, had to work things so that the assured or the loss payees would not be tempted to let things fall apart. That’s where the due diligence clause comes in.

When insurance relates to business matters, it may not always be insurance in the strictest definition. There is a related business called the writing of financial guarantees; Lloyd’s is not in that business. A financial guarantee might be a policy supporting some specific future price for a commodity, an agreement that works the way an option does. If you want to keep a lid on the price you have to pay for cocoa at some future date, you buy a purchase option. It entitles you to acquire the foodstuff at a specified price and at a specified time. If, when you need cocoa, it is more costly than your optioned level, you exercise the option. If not, you let the option lapse. The cost of the option is your premium.

Had Lloyd’s viewed the computer leasing risks as some sort of financial guarantee, the insurer would have been prohibited from getting involved. There is a rule at Lloyd’s’s date. From Nov. 25, 1936. It says Lloyd’s can’t make bets that fail a certain test. “The test to be applied by the Financial Guarantee Board in deciding whether an insurance is a violation of the Financial Guarantee Agreement is whether the happening of any one or more of the following events, viz.: a) the financial default or insolvency of any party; b) the financial failure of any venture; c) the shortage of receipts, sales or profits of any venture; d) lack of support will cause a loss to become payable under the insurance, or brings into operation a peril or contingency insured against which will cause a loss under the Policy, unless it is a condition of the insurance that any loss recoverable must be a direct result of a specified contingency, which is not precluded under the term of the agreement.”

In other words, Lloyd’s can only insure against specific possibilities, and it cannot insure against bad business practices. Under the “J” policies, if an insured company goes bankrupt, or if a key party in the lease goes under, Lloyd’s may be off the hook. Some press accounts of the Lloyd’s “J” policy matter, including the one in the Washington Post, imply that coverage of computer leasing risks was really a financial guarantee, that the situation insured against was a decline in computer values, a general business situation, not the ability of the leasing companies to recover the funds of investors. The fact is that the policy was carefully reviewed by insurance experts at Lloyd’s; it was accepted as a legitimate contingency risk. Losses at Lloyd’s and the unhappiness of individuals who may have had to take the losses has raised some questions that might never have surfaced if Lloyd’s had come out ahead.

A LEGENDARY TALE OF LLOYD’S

One unrecorded day, an underwriter whose pipe had become gummy and charred from excessive use during the tense activities that occur daily at Lloyd’s attempted to clear his smoking apparatus by knocking it a couple of times on his heavy ceramic ashtray.

On hearing the two claps of pipe on porcelain, all the underwriters in the Great Hall ceased working, stood up, and applauded.

Limehouse views

In the Lime Street offices of Lloyd’s, the opinions of Peter Nottage regarding the “J” policy were accepted by underwriters with great enthusiasm back in 1974, if the amount of risk taken and the level of premiums can be said to mirror the underwriters’ assessments. All told, the various policies issued by Lloyd’s covered equipment that when new cost well over a billion dollars. And the odds placed on the contingency covered by the policy, the odds Lloyd’s set on the lessors’ deals failing to work out, were very long. Lloyd’s had figured that the leases were safe.

In one policy issued to Surety in 1974, Lloyd’s placed a $6 million limit on its liability; the premium paid for this coverage, which was to be in force for a five-year period, was $120,000, or 2% of the maximum risk. Inel, which had insured risks of nearly $380 million, paid Lloyd’s premiums of about $8.6 million, or 2½%. Other policies bore higher premiums and had other conditions to limit Lloyd’s possible losses, but the premiums peaked in the range of 5% to 6%. In other words, Lloyd’s considered the odds against losing as anywhere from 20:1 to 50:1. Lloyd’s did realize that the risks on leases get worse as a generation gets older. By 1977, Lloyd’s felt the situation was getting too chancy. Certain “J” policies were no longer written; the following year, Lloyd’s stopped accepting the rest of these agreements.

By this time, problems had begun to show up, but the eventual magnitude of the leasing industry rout was not yet apparent.

The rate at which mainframes have sunk in price during the past few years seem to be much faster than the rate of declining IBM 360 values. Today, it seems obvious that computers, like other electronic gadgets, are part of a trend toward much more for much less. And competition in the industry, which helps drive prices down, appears to be stronger than ever, with IBM-compatible companies in the fray, along with IBM’s older adversaries and IBM itself. Computer rentals can’t buck the trend.

This was not so obvious in the middle of the last decade. So Lloyd’s acted in ways that implied the bankers and leasing companies knew what they were doing and all the insurer had to do to make out was to underwrite the aggregated risks. Simultaneously, the bankers and investors and lessors behaved as if they all thought Lloyd’s understood the situation. In the 370 generation, the leasing business was saying that its portfolios of equipment could be managed for the duration of the financial agreements, past the termination point and on into the 1980s.

Most of the leases written in 1975, 1976, and 1977 under “J” policies have reached their four-year walk points. The rentals the 370 machines can bring in are a lot lower than they were when the computers were new. They are much less than any of the parties to the leases had figured on. Even if a lessee is happy keeping his rented machine, he is going to offer a very low amount each month for that privilege. If the initial lessor won’t take the offer, there are plenty of competitors around who will. The game, these days, is nearly over.

Lloyd’s had taken most of its risks on 370 models 158 and 168. Users of 158s have a lot of alternatives, including 168s, 3031s, 4341s, and IBM-compatible systems. Owners of 168s also have choices, like 3032s, 3033s, Amdahl machines, and so forth.

Lloyd’s also insured peripherals, and the considerations here are similar. But the values of disks and tapes have held up well compared to the prices of mainframes.

They do things different in taxes

The IBM 360 generation declined in value, too, although the 360 leasing companies did not suffer the way 370 lessors did. The history of the IBM 360 was reviewed by Lloyd’s before the 370 insurance was written, and it was implicit in any advice Lloyd’s might have received. If events had gone as well with the 370s as they had with the 360s, Lloyd’s would not have been burned so badly, nor would any of the assured. They might have emerged in good shape. But that’s not the way it happened.

For one thing, the 370s were financed in a very different way from the 360s. A big part of 360 financing was in the form of equity, sold to investors as shares in leasing companies. The equity in the 370 deals was related to machines, not companies. Equity
Tell me more about ISSCO GRAPHICS.

I just installed the most flexible graphics software available...

"It sure paid off."

A revolution was taking place. We learned computer graphics dramatically improved the decision-making process. Graphics software with "FLEXIBILITY" was the only way to make it happen. We already had some basic graphic software. It was hard to maintain and not adequate for our needs. Our users were demanding more productive and higher quality tools.

After installing DISSPLA* and TELL-A-GRAF®, ISSCO trained our users so that we were discovering profitable new applications immediately. Before ISSCO left our center, all of our output devices were interfaced. Field-proven code, maintenance, support, and ISSCO's 11 years of experience—for me it really paid off.

TELL-A-GRAF's English-like commands made graphical representations of information in our databases simple and easy to access. We now can produce a graph with only one command and as needs dictate we can easily adjust any aspect of our graphics to enhance understanding. Both our highly demanding computer specialists and our secretaries easily learn to chart or graph the masses of data already in our computers. ISSCO GRAPHICS imbedded in existing applications programs has become very popular.

For us, installation of DISSPLA® and TELL-A-GRAF® was the right decision.

ISSCO GRAPHICS run on IBM, DEC, CDC, CYBER, CRAY, BURROUGHS, PRIME, UNIVAC, and HONEYWELL.

Call or write now for more free information.
714/452-0170
4186 Sorrento Valley Blvd., San Diego, CA 92121
was a much greater portion of the 360 purchase funds than it was for the 370s, which means that the debt on the 370s was proportionally a lot higher.

Tax leveraged leasing is really a technique of the 370 generation, much as high-flying leasing company stock was a financial style of the 360 era. When 360 deals—or leasing companies—went awry, the machines themselves could be sold. When 370 deals got shaky, the nature of the tax laws made it impossible to liquidate the machines. Investment tax credit on the new 370s bought by leasing companies was the biggest incentive to investors. In order to realize the full benefit, the machines have to be held by the owner for seven years.

By the time the deals turned sour, the equity investors were in too deep to back out. The possible losses of tax benefits offset any strategy involving cutting losses by liquidation. The equity partners had to ride their computers on down, which they did.

It is unclear whether this really affected lease rates. The link between resale prices and rentals was stronger in the 360 era than in the 370 generation, and Lloyd's strategy might have contributed to some of the temporary dislocations in the market.

In order to comply with the due diligence clause in the "J" policy, lessors felt they had to keep machines on lease. During the 360 era, when prices dropped quite low, machines were taken off rent and put in warehouses. Was this diligent? Nobody can say, but it was done nevertheless. In the 370 generation, lessors kept lowering rents until the machines moved, which might have created some kind of 370 glut on the market. Again, nobody knows. If Lloyd's did contribute to the weak leasing market for 370s in 1978 and 1979, it did so inadvertently. The business of leasing did become cutthroat; but, again, leasing has always been a game that is played hard.

### ITEL TELLS ABOUT ITEL

**1978 Form 10-K**

Although the IBM 4300 announcement appears to have had an adverse impact in the first quarter of 1979 on profits from sales of Advanced System computer and from computer lease underwriting of IBM computers, no conclusive assessment of the impact of the announcement for the full year of 1979 on ITEL's computer sales and financing operations can be made at this time.

In 1975, ITEL introduced a marketing program for IBM System 370 computer equipment under which ITEL could be required in certain circumstances to assume certain financial obligations relating to the lease. ITEL is insured against resulting loss in the event it is unable to re-lease or sell the equipment at rates sufficient to cover such obligations and related expenses.

**1979 Form 10-K**

The causes of the 1979 loss are varied and complex and involve many aspects of the company's business. The loss was exacerbated by the company's inability adequately to anticipate and react to developments in the computer equipment market. Among the significant causes of the loss was an announcement by IBM, early in 1979, of a new series of computer products.

If Lloyd's did realize it was making a strategic error in playing off leasing companies on the due diligence clause, that realization must have come late. Then, too, Lloyd's could have been influenced in the direction of false confidence by the way the financial world was treating its biggest insurance risk, ITEL.

### EVENTS AND PRICE

Right through 1978, ITEL and the other leasing companies seemed to be doing well, at least in the eyes of the financial institutions. Remember, most people had no idea that the IBM 4300 series was going to be announced in January 1979, setting new price/performance levels for mainframes and drastically reducing the cost of power, air conditioning, and support.

ITEL, the king of the lessors, was going at IBM from two directions—pushing IBM's own 370s against the 303X line at the high end, selling compatible machines under its Advanced Systems label at the low end. ITEL's behavior, however, indicates that it might have begun to suspect that a test of its strengths was coming. For, while the picture was still rosy, the company went to its lead banker, Manufacturers Hanover Trust, and worked out a credit agreement that would prove to be as big a mess as the Lloyd's insurance.

In 1977, Manny Hanny had lined up a handful of banks to pump $82.5 million of unsecured credit into ITEL. ITEL, in turn, had taken down a chunk of the money and made more money with it. The next year, ITEL was back at the trough.

The managers of the San Francisco lessor had told the bankers most of what was going on, citing the leases insured by Lloyd's and its commitments to buy more IBM-compatible mainframes. As of June 1978, when ITEL got more credit, the company had on order $47.2 million in Hitachi AS-6 large systems and $26 million in National Semiconductor AS-4 and AS-5 medium-size mainframes. Coming in, and in need of financing, was another $21 million in disk drives and other related gear, plus $180 million in rail cars, $102 million in marine vessels, and $207 million worth of big jet planes.

ITEL was making money, but not enough to fuel the growth it felt it could achieve. In 1974, when Surety got its "J" policy, ITEL had earned $9.7 million on revenues of $144 million. By 1978 the company reported earnings of $47.2 million (which was later adjusted downward) on a gross of $689 million. ITEL had $1.3 billion in assets under its control. Reported earnings per share had jumped from $1.28 to $3.86.

This must have impressed the bankers. On July 15, 1978, ITEL got an unsecured credit line of $500 million, with Manny Hanny taking the biggest share, $55 million. Chemical and Citibank took $45.5 million each. The complete list included banks like Bank of America, Bank of Montreal, Crocker, Chase, Security Pacific, Bankers Trust, Mellon, Marine Midland, First Penn, Girard, Bank of California, Northern Trust, Na-
At last. A low cost, realistic alternative to the IBM 370. The Formation 4000 Information System is a complete minicomputer system that runs DOS/VS, OS/VS1 or VM370, plus your 370 applications software. Without reprogramming.

Think of the savings in time and money. Thanks to our unique Program Equivalent architecture, your library of 370 software is ready to put on your Formation 4000 as soon as it's operational.

Not a plug-compatible CPU. The Formation 4000 is a powerful, 32-bit minicomputer system that includes processor, controllers, and peripherals. In a complete, integrated system.

The Formation 4000 reduces costly downtime in two ways. Our unique, modular redundancy extends system performance and can automatically compensate for failing modules. Access via a remote console is available to provide instant hardware and software support, as well.

We supply the total package — complete installation, service and support of Formation 4000 systems.

Whether you market 370 software, develop customized computer solutions or manage data processing services, the Formation 4000 is the smart alternative in computer systems.

To learn more, write Formation, 823 East Gate Drive, Mt. Laurel, NJ 08054. Or call (609) 234-5020.

See us at Interface '81, booth 1025.
If the data processing system you’re buying today can’t handle office functions, it’s already obsolete.

Vic Poor is Executive Vice President of Research and Development at Datapoint. He pioneered dispersed data processing, designed the first computer-on-a-chip, and developed ARC™—the most widely used coaxial network for linking business machines. Now, as architect of Datapoint’s Integrated Electronic Office, he discusses the new realities of office automation.
To make the decision that's right for today, you must keep one eye on tomorrow. It won't be enough for your next computer to solve today's problems well. It must also be ready to solve tomorrow's.

Word Processing, Electronic Mail, Voice Communications. You're going to need them all.

People are multifunctional. But most office machines are not. That's why we developed the first computer that handles all the basic business functions — data processing, word processing, electronic message service, and management of voice and data communications.

All functions are truly integrated and available at every workstation. You can enter data...compute and file...retrieve and incorporate in text...transmit to other workstations across the hall or across the nation...and receive confirmations automatically. The result — increased productivity and tighter management control.

This is Datapoint's Integrated Electronic Office, a unified approach to office automation with virtually unlimited growth potential.

The cornerstone is a local network that's at work now.

Datapoint introduced local networking over three years ago. Now more business is processed on ARC™ coaxial networks than all other cable systems combined.

With conventional computers you can only add processing power in large, expensive steps. With ARC, you can add power in small increments, closely matching capacity to user needs.

With ARC you add processing power, workstations, storage, and peripherals as your needs require without constant reprogramming. And no matter how large the system grows, you'll still get responsive performance at each workstation.

Word processing with new search power.

Add word processing to existing workstations whenever you're ready. Because WP and DP are truly integrated, you can retrieve information from DP files and incorporate it into WP documents.

Datapoint word processing offers you a productivity tool no one else can. It's AIM™, Datapoint's Associative Index Method™. It brings automation to the filing cabinet at last.

With AIM you can search files and documents by their content. You don't need to know the document number or title. Search by subject or a remembered phrase. AIM will find every document or data file in which the key words occur.

Electronic message capability allows completed documents to be transmitted to other Datapoint workstations, cutting paper work and speeding communications. You can even use it to send file updates and new application programs to your geographically dispersed processors.

Cut long distance telephone costs up to 40 percent.

Your telephone expense may be rivaling your data processing costs. We can help there, too.

The Datapoint Long Distance Control System operates with your existing PBX or CENTREX and automatically routes each long distance call over the least-cost line. It can hold specified calls until a low-cost line becomes available. And it prints out information on phone costs and traffic to let you optimize and control your telephone usage.

You get an immediate reduction in telephone charges, plus the ability to interleave voice, message, and data traffic through integration with ARC.

Begin now. We're ready with service and support.

Apply the power of the Integrated Electronic Office to your organization now. Datapoint systems have been proven in more than 30,000 user locations and are backed nationwide by over 800 customer service engineers.

Itel became a monument: it had the largest negative net worth of any company in American history before it went bankrupt.

In 1979, Lloyd's brought in the First National Bank of Boston to help process the insurance claims. The bank worked with information coming from the assured, from accountants Coopers & Lybrand, and from a consultant's forecast of future computer values. The bank encouraged Lloyd's to prepare for bigger losses, so Lloyd's raised its loss estimate to about $340 million. Then the estimate rose again, to $400 million. Along the way, the claims evaluation moved from Boston to New York, and was placed in the hands of Lloyd's litigation counsel, Lord, Day & Lord.

The decline in the Boston bank's responsibility might be tied in with an insurance loss under a "J" policy. Lloyd's was aware that First of Boston was the lead banker for DFP, which had made some big deals on 138s and 148s. Lately, it seems as if a large part of the insured value will be lost, making the relationship between Lloyd's and Boston an awkward one. Nobody is talking much about the DFP deal, which could lead to claims in the $20 million range, according to various leasing industry estimates. Of all the 370s, the 138 and 148 models were hit the hardest by newer systems.

The loan star state

In the meantime, insured peripheral deals, believed to be nearly half of the more than $1 billion covered by "J" policies, have fared relatively well. One sore spot involves Surety Industries, the original "J" policy holder, because a lessee, Southwestern Bell, had an unscrupulous fellow handling some of its computer equipment leases. Lloyd's says the rotten aspects of the leasing deal should take it off the hook, and it's willing to return the premiums it has received. Southwestern Bell is holding out for more than that.

The largest insured peripheral lessor, Lease Financing Co., seems to be doing pretty well and probably won't be much of a headache for Lloyd's. Other peripheral lessors have kept out of the courts so far.

The ghost of Chris must pass

With new IBM machines coming out and new leases on the computers being written all the time, it would seem that the recent disasters would lead to cleaner arrangements and smarter deals. Users have certainly become aware of the potential threats posed by indemnity leases and walk clauses, but they are still under pressure to find bargains. Leasing companies have learned to sell deals at more realistic rates, but there seems to be no shortage of hungry leasing salespeople, willing to low-ball a deal and worry later.

As for Lloyd's, well, it isn't back in the business, although there are policies guaranteeing residual values on some computing equipment. These policies guarantee less and cost more than the old "J" arrangements, but in many cases they're good enough to enable banks to get around Regulation Y. The company leading the market is Chicago's International Capital Equipment, and its stock, which has recently gone public, is doing well.

The echoes of the Lutine bell, had it been rung to signal the sinking of a billion dollars' worth of computer deals, would have faded out of the Great Hall at Lloyd's by now. The 370s are fading away, too.

Sometime during this new decade we'll find out if anybody learned enough from the old generation's leasing debacle. Put another way, we'll surely find out if nobody learned about the risks of leasing.

Mr. Wiener publishes Computer and Communications Buyer and Mainstream newsletters and Technology News of America news service.
Paydirt for VAX and PDP-11 users.
One blue-chip card delivers 16 DZ lines per slot.

Now you can add twice as many DZ lines to your PDP-11 in half the space and at a lower cost than ever before. Our new DZ/16 is a microprocessor-based controller which fits 16 asynchronous communications channels into a single board but sells for much less than the two-board DZ11-E it replaces. There’s no waiting either. You’ll probably have your card plugged in and running less than 30 days after we get your order.

The unique multiplexer installs in any standard hex-width slot and presents only one load to the Unibus. It supports all DZ11 baud rates, provides modem control on all lines and is compatible with DEC diagnostic and operating system software. The data format is program-selectable for each channel.

This isn’t the first time we’ve been first. It won’t be the last. The advantages we’ve sent your way again and again will keep coming. Get the most out of your VAX or PDP-11. Write today for details on our remarkable line of memory, communications and general-purpose cards for use in the PDP-11 family.

Able, the computer experts
ABLE COMPUTER, 1751 Langley Avenue, Irvine, California 92714. (714) 979-7030, TWX 910-595-1729.
ABLE COMPUTER-EUROPE, 74/76 Northbrook Street, Newbury, Berkshire, England RG13 1AE. (0635) 32125. TELEX 848507 HJULPHG.
Valedictorian of the Smart Editing Class of Terminals.

Compare the new VISUAL 400 with the other smart terminals. Then compare it to your own specification. And if that doesn't do it, we have “Room for RAM” for custom modifications in large quantities.

For a pleasant surprise on pricing, call or write us today.

**FEATURE COMPARISON CHART**

<table>
<thead>
<tr>
<th>FEATURE</th>
<th>Visual 400</th>
<th>Lea &amp; Speigel AOM-42</th>
<th>Perkin Elmer 1230</th>
<th>ADDS Regent 60</th>
<th>Hazeltine Executive 80, Model 30</th>
<th>Beehive DM30</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANSI X.3.64 Specified</td>
<td>STD</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>STD</td>
<td>NO</td>
</tr>
<tr>
<td>Set-up Modes Eliminate External Switches</td>
<td>STD</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td>Typomatic Solid State Keyboard</td>
<td>STD</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td>Detached Keyboard</td>
<td>STD</td>
<td>STD</td>
<td>OPT</td>
<td>NO</td>
<td>STD</td>
<td>STD</td>
</tr>
<tr>
<td>CRT Saver</td>
<td>STD</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td>Block or Underline Cursor</td>
<td>STD</td>
<td>NO</td>
<td>STD</td>
<td>STD</td>
<td>STD</td>
<td>NO</td>
</tr>
<tr>
<td>60 and 132 Columns</td>
<td>STD</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>OPT</td>
<td>NO</td>
</tr>
<tr>
<td>Double Size Characters</td>
<td>STD</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>OPT</td>
<td>NO</td>
</tr>
<tr>
<td>Smooth Scrolling</td>
<td>STD</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td>Horizontal Split Screen</td>
<td>STD</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>OPT</td>
<td>NO</td>
</tr>
<tr>
<td>Video Attributes Require No Display Space</td>
<td>STD</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>STD</td>
<td>STD</td>
</tr>
<tr>
<td>8 Area Qualifications</td>
<td>STD</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td>8 Resident Natl Char. Sets Including Line Drawing</td>
<td>STD</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>STD</td>
<td>STD</td>
</tr>
<tr>
<td>Programmable Non-volatile Function Keys</td>
<td>STD</td>
<td>OPT</td>
<td>STD</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td>Display of ALL Control Codes</td>
<td>STD</td>
<td>STD</td>
<td>STD</td>
<td>STD</td>
<td>NO</td>
<td>STD</td>
</tr>
<tr>
<td>Insert Delete Line with Push Up or Down</td>
<td>STD</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td>Insert Delete Character with Push Right or Left</td>
<td>STD</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td>Select Editing Extent to Field, Area, Line, Page</td>
<td>STD</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td>20 mA Current Loop</td>
<td>STD</td>
<td>STD</td>
<td>OPT</td>
<td>OPT</td>
<td>STD</td>
<td>STD</td>
</tr>
<tr>
<td>Programmable Message Framing (non-volatile)</td>
<td>STD</td>
<td>NO</td>
<td>STD</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td>Programmable Answerback</td>
<td>STD</td>
<td>NO</td>
<td>STD</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td>Baud Rates to 19200 BPS</td>
<td>STD</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>STD</td>
<td>STD</td>
</tr>
<tr>
<td>Independent Xmit/Receive Rates</td>
<td>STD</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td>Printer Port Independent of Communication Interface</td>
<td>OPT</td>
<td>OPT</td>
<td>STD</td>
<td>OPT</td>
<td>STD</td>
<td>STD</td>
</tr>
<tr>
<td>Paging</td>
<td>OPT</td>
<td>STD</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
</tr>
</tbody>
</table>

VISUAL 400

Visual Technology Incorporated
Railroad Avenue, Dundee Park, Andover, MA 01810
Telephone (617) 475-8056   Telex 551-539

CIRCLE 166 ON READER CARD
Now, any way you slice it, Technical Publishing delivers the information processing market.

Now, with the acquisition of Sentry Computer Services, Inc., Technical Publishing Company's already broad coverage of the EDP industry becomes the broadest and most in-depth in the industry. With five publications aimed directly at the end-user, OEM, hardware and software markets, we cut across the industry to deliver all the buying influences in the computer market.

This approach to reaching the market indicates our solid understanding of the computer industry, a fact that shows up in hard results—quality editorial, select circulation and top readership. A combination that makes our books among the most respected, best known and best read EDP publications.

And Technical's understanding of the EDP market helps us to be responsive to the needs of the marketplace. We have published Datamation magazine since 1957. Then, in March of 1980, we introduced Output magazine to serve the needs of the managerial user. Now, we see a strong need for the software industry to have its own publication—and we are responding by creating the first newspaper devoted to the software industry, Software News. The premier issue of Software News will debut just prior to the 1981 National Computer Conference, May 4-7 in Chicago.

Other Technical magazines that serve the fast-growing information processing market are:

- Datamation, the monthly information source reaching 130,093 EDP professionals.
- Dataguide, the semi-annual buyers' guide and directory of OEM computer products, with a circulation of 20,000.
- Directory of Systems Houses and Minicomputer OEM's, an annual directory listing sources.
- Output, the monthly information systems magazine bought by 60,000 general management users.
- Control Engineering covers 75,000 engineers engaged in design and development of computer-based control systems.
- Industrial Research & Development delivers 104,000 professionals in the scientific market who specify computer hardware and software.

Solid market knowledge and continued strong commitment to the EDP industry ... Reach for your slice. With Technical Publishing.

Technical Publishing
Some straight talk about computer terminals

The last official count identified 256 companies marketing display terminals. One of every four terminals brought to market in the past ten years has been discontinued. Makes it pretty tough on someone who's responsible for making the company's terminal buying decisions. Like, whom do you believe and who will be around tomorrow to talk to?

Direct, Inc., waited 2 years before introducing our products. We knew all about this volatile market before we entered it. We knew that to succeed we had to market the finest terminal possible... but more important, we knew that we had to back it up with honesty, integrity and good service. We're not perfect yet, but we're close. And we'd like the chance to tell you about how we can fill your terminal needs. And if we can't, we'll tell you.
HE MAKES IT HAPPEN

If someone’s looking to sell, rest assured Ken Miller knows it. You won’t have to call him. He’ll find you.

The 59-year-old electronics engineer’s aggressive acquisition strategy has transformed Penril Corp., Rockville, Md., from dirt to diamond in 7½ years. When Miller took command as president of the small electronics firm in March 1973, it was sporting a $337,000 deficit on sales of $1.7 million. Since May of that year, every division has made a profit every month. Sales for the fiscal year ending last July 31 were $337 million, and profits were expected to exceed $1.5 million. Penril is now one of the top 10 independent manufacturers of modems in the U.S.

What hath this man wrought?

“It’s a little bit knowing the data communications field and a lot through acquisitions of unrelated areas,” Miller says. “It’s been fairly successful because we did it all with a combination of internally generated cash and loans.”

The task was hardly that simple. Miller arrived at Penril with an extensive computer and electronics background, including two stints at Lear Jet Corp., where he helped develop the Lear Jet and, to the undying gratitude of music freaks, the world’s first eight-track stereo tape system. He got the call to rescue Penril while at Wilcox Electric, a subsidiary of American Standard. Many an eyebrow was raised when he left Kansas City for Rockville.

“Yes and no,” he answered when asked if he had been scanning the employment sections. “My operation with Standard Brands was comfortable and profitable. But in a corporation that big, your earnings often get lost. What’s $100 million in a $1 billion company? About 10%, and that’s it.

“From the point of view of career advancement, visibility, and seeing the results of your personal decisions that affect a lot of people, you can’t beat running your own show. American Standard failed to fulfill what I wanted, which was to be in an environment where I could react fast and move rapidly.”

Hello, paradise. Penril, begun in 1968, was originally planned as the first and foremost in an expected wave of credit terminal companies. By the time a machine was developed, it was too fancy and costly even for the tastes of such backers as Burroughs and American Express. The fledgling had moved into a nest suitable to its sales but not its revenues, and was shelling out more than it was taking in.

Enter Miller, though hardly on a white horse. First, he had to cope with the political sensitivity of succeeding the firm’s founder. Second, he had to borrow $75,000 to meet a payroll. He went to Riggs Bank, the Washington area’s largest. They showed him the door. But he met that obligation and several others during those first tense months, and after that it was up, up, and away. The red ink quickly turned black and has not yet stopped flowing.

“The main thing we had to do was restructure,” Miller says. “It’s textbook, but it works. We had to restructure the spending in line with the revenue. Everything was out of whack. We had to reassign it, then at the same time do things to jack up the revenue.”

The first of those was to devote attention to the modems, then the company’s sole source of support. Once that was accomplished, and the oem modems developed, Miller began searching for bargains. He found them in manufacturers of test instruments, digital panel meters, high-performance power supplies, and stereo systems. All but one were bought for book value or less, and each was strictly cash. No plastic, thank you.

“We try to find businesses that have some uniqueness about them, that will give us some niche in the industry, and will add to our earnings per share, which is the whole game plan for us,” Miller explains. "We take the position that cash talks the loudest, and we’re pretty hard-nosed about it. We’re able to make acquisitions partly because we have cash and partly because we’re able to get in and out while someone’s still making up his mind at the first-level decision in a large corporation. We can do a deal in a third the time they can.”

So when Miller talks about $100 million in sales for a 10-year anniversary present, people listen.

“I think we’ll do it,” he says emphatically. “During our first 18 months, it wasn’t that clear we’d make it. Our first objective was to get the business into the black rapidly. Then we decided if we made it to $10 million it’d be a hell of a milestone.

“But once you get the momentum going, get a taste that you can do it, and get acceptance in a number of areas, you can truly set your goals higher. Our next goal is to double our business after we reach $100 million. Of course, we can’t do that forever or we’ll have the whole GNP. But it’s a hell of a lot easier than going from ground zero to the first $1 million.”

It’s much simpler to get money, too. Last time Miller visited the folks at Riggs, they gave him $15 million. Unsecured. And they felt so good about it they took a quarter-page ad in a local paper to tell everyone what they’d done.

“I felt very proud of that,” Miller admits, “especially after what happened in ’73. But I can understand why they did it. I wouldn’t have loaned the money to me either, then.

“It’s a long way between then and now.”

KENNETH M. MILLER: "We take the position that cash talks the loudest, and we're pretty hard-nosed about it."
Choice.

You've seen it in everything from fine wines to fashion jeans. And now you're seeing it in small computer software. But to take advantage of the new choices, you have to know what to look for.

Consumer facts:
1. Microcomputers are now as powerful as minicomputers for many business, science and education applications — at a fraction of the cost.
2. Today you can independently select the best software to match your computer hardware.
3. An operating system provides the basis for specialized software, such as word processing and data base management packages. Therefore, once the operating system is selected, you have determined the range and cost of available application packages.

Digital Research: The Software Experts

Computer manufacturers are not the best source of powerful, flexible software. We at Digital Research are experts in small computer software. We designed CP/M®, the world’s most widely-used computer operating system. Our operating systems, utilities and PL/I Programming Language give you access to a virtually unlimited supply of specialized software. Let us show you how to maximize your computing power.

It's your choice.
PERQ - A Landmark Computer System

A Time Sharing Alternative
PERQ provides all the benefits of a time shared mainframe cost per user. Each user gets a very powerful CPU, a minimum virtual address space, a high resolution video display with large capacity rigid disk — integrated into a complete system. System response time, unaffected by other users' load. System reliability workstations does not affect other users.

PERQ FEATURES:
- Microprogrammable CPU
- 32-bit Virtual Address
- 256K-byte memory
- 12 Megabyte disk
- 768x1024 Raster Display
- Keyboard and Tablet
- 10 Mbit/Sec Network

PERQ is more powerful than any current microprocessor-based system
PERQ's CPU is a Three Rivers-designed, sophisticated, microprogrammed minicomputer which directly executes Pascal P-Code at up to 1 million P-Codes per second. A 32-bit virtual address means that very large programs can execute with ease. Even PERQ's operating system is written in Pascal, the front-runner in high-level languages for structured programming.

PERQ is leading the revolution against the mainframe.
Across America, PERQ is revolutionizing the way work gets done — because it provides all the benefits of a time-shared mainframe without any of the drawbacks.

OEMs who need low-cost, highly flexible computing systems are choosing PERQ for CAD/CAM workstations, phototypeset applications, business systems and office automation applications.

Engineers and scientists are using PERQ to provide all the facilities of a good timesharing system, plus uniform response time, incremental expandability and high reliability which a timesharing system cannot provide.

Government agencies see PERQ as an ideal way to provide computing resources in command and control situations, analysis and in R&D.

Join the revolution. And find out more about what PERQ can do for you.

Three Rivers Computer Corporation
720 Gross Street
Pittsburgh, Pennsylvania 15224
412/621-6250

CIRCLE 134 ON READER CARD
HIGH-SPEED NETWORKING

Last fall, while assembling our special issue for 1980, we learned of Sytek, and its LocalNet data communications system that uses the same co-ax cable as cable television franchises (and, indeed, can coexist with cable TV programming). The firm was, at that time, introducing its System 20, which can multiplex thousands of 9600bps data streams onto a co-ax link.

Of course, the number of channels on the co-ax is dependent on how you slice up the bandwidth, and Sytek is back with its System 40, offering higher-speed (1Mbps) channels. Intended primarily to link computers to other computers, the initial System 40 offerings interface to the Unibus used in DEC’s 32-bit VAX line and the PDP-11. Standard Network Adapter Units will be compatible with Intel’s Multibus.

The System 40 LocalNet can support high-speed packet communications on up to five logical channels. Additionally, it can coexist with System 20 and other transmissions on the same cable. A System 40 bridge can logically connect up to four channels, while the System 40/20 bridge performs speed matching and multiplexing functions linking System 20 and System 40 nodes on the same co-ax. Gateways are offered to other LocalNets as well as external nets, including those adhering to CCITT Recommendation X.25. A System 40 Network Adaptor Unit sells for $8,515 with Multibus compatibility; the VAX/PDP-11 interface is an additional $1,500. The System 40/20 Bridge is $5,800, while the System 40 Bridge has yet to be priced. System 40 uses the same head-end T-Vertor as System 20; it is priced at $3,500. SYTEK, INC., Sunnyvale, Calif.

FOR DATA CIRCLE 300 ON READER CARD

STATISTICAL MULTIPLEXOR

Intertel’s SMX8000 statistical multiplexer—offered in four- and eight-channel versions—reportedly can multiplex a group of asynchronous devices (having an aggregate data rate of as much as four times the output channel) onto a single high-speed synchronous line. The microprocessor-controlled mux uses an error-correcting full-duplex protocol on the high-speed line, protecting the user against transmission errors. A built-in test pattern generator and a loopback feature facilitates troubleshooting the complete link, including the high-speed line, local and remote SMX8000s and their associated asynchronous devices, and the modems. An eight-channel standalone SMX8000 sells for $2,675; the rack-mount version sells for $2,475. INTERTEL, Andover, Mass.

FOR DATA CIRCLE 302 ON READER CARD

MINICOMPUTERS

The Sperry Univac minicomputer family has two new members, the V77-500 and V77-700, augmenting the midrange of the V77 line. The 16-bit microprogrammable minis will be marketed to both end users and oems. Compatible with the remainder of the V77 series made by Sperry Univac’s Minicomputer Operations (nee Varian Data Machines), both provide software...
With the Teltone Data Carrier System, wherever there's a telephone, you can now have a computer terminal, using your existing PABX wiring.

This means you can now talk to a customer while your terminal talks to the computer. At the same time, over the same phone. At different frequencies—so neither conversation interferes with the other.

You're saving the cost of cabling, you're saving the cost of a phone-hogging modem. And you're gaining unheard of mobility and ease of computer access.

With all this, you don't sacrifice a bit of performance. The exclusive Teltone DCS transceives up to 9600 bps, full duplex, asynchronous data. And since the data doesn't go through your PABX, it's compatible with any system.

So if you're a data systems manager fighting the tangle of problems associated with cable or limited distance modems, consider using the existing wiring in your buildings.

The Data Carrier System. It's another reason it pays to talk to Teltone.

Teltone Corporation, P.O. Box 657, Kirkland, WA 98033. Phone (800) 426-5918. In Canada: 91 Telson Road, Markham, Ontario L3R 1E4. Phone (416) 495-0837.

It pays to talk to Teltone.

CIRCLE 156 ON READER CARD
HARDWARE

compatibility with other V77 models as well as field upgradeability. A basic CPU
configuration of the V77-500 sells for
$29,500, while a basic V77-700 goes for
$36,100. Both can be used as nodes in dis-
tributed processing networks, where they
can function within Sperry Univac's Dis-
tributed Communications Architecture
(DCA). Operating with a remote IBM host,
the minis can support 3270s.

Both processors sport hardware
multiply and divide, memory mapping
and control, and error detecting and cor-
correcting

The five-inch Winchester disk drive
market has grown

The size of a standard piece of typing paper
roughly

The unit also can be had with a 40 character
LCD in place of the full-page display. The
software-based system boots itself from dis-
kette at power-up. With a 55cps letter qual-
ity printer and dual disk drives, the unit's
pricing starts around $9,000.

Sony also plans to oem the micro-

To get hardcopy from the Typecord-
er, Sony also introduced an Actuator Unit
that fits over the keyboard of a standard
electric typewriter, punching keys in tune to
the tape ($700). The Japanese giant also
introduced its portable Silent Compact
Printer ($800), which uses a thermal print
head. This printer can use thermal paper or,
with a special film ribbon, plain paper.

Tapes of text created on the Type-
corder can be read into the Sony Series 35
word processing system. The standalone
word processor has a full-page display (said
to have the highest resolution of any avail-
able on the market today), and two Sony-
developed 3.5 inch microfloppy disk units
(each capable of storing 437.5KB—that's
not a typo; it really is close to half a meg).

HARDWARE SPOTLIGHT

WORD PROCESSING

Sony—probably best known for its con-
sumer electronics—recently made its entry
into the word processing market with stand-
dalone word processor and a radical enhance-
ment to the current state of the art in source
document creation. The Sony Typecorder
can perhaps best be compared to the old IBM
MITS (magnetic tape Selectric typewriter),
dating back to the summer of 1964. Not in
size or technology, but it's not at all un-
reasonable to suspect that the Typecorder of
today—a three-pound, self-contained, elec-
tronic editing typewriter (using a 40 charac-
ter LCD instead of paper), with magnetic
tape for storing documents—will evolve
into an entirely new generation of high-
technology smart typewriter-equivalents.
The size of a standard piece of typing paper
and only 1.5 inches deep, the Typecorder
has a full-size keyboard, 2Kb of internal
buffer memory, microprocessor-controlled
editing functions, and a dual-function mi-
cro cassette recorder that can be used for
dictation and transcription (voice) or stori-
ing up to 120 pages of text. Because of the se-
quential nature of tape, the unit lacks fancy
text processing functions such as block
moves. It can operate on either batteries or
house current. The basic unit sells for
roughly $1,400. An Rs232 interface is op-

The VuePoint is a touch-sensitive plasma
display terminal with a microprocessor-
based controller. The display's format is 12
lines of 40 characters, with 240 touch-sensi-
tive points on the screen. The controller can
store up to 51 pages of data; it communi-
cates with a computer via an Rs232 interface
at data rates ranging from 300bps to
19.2Kbps. Options include a 40 character
per line printer and a 128 character ASCII
keyboard. Pricing starts at $3,500 with
quantity discounts available for orders of 10
or more units. GENERAL DIGITAL CORP.,
East Hartford, Conn.

FOR DATA CIRCLE 301 ON READER CARD

INSTANT COLOR FILM

For computer imaging (not to mention
professional photography), Polaroid Corp.
has come up with an extended range color
instant print film called Polacolor E.R.
Available in two formats, 8 x 10 and 5 x 4,
the film uses new chemistry and a new
magenta dye that are said to provide in-
creased exposure latitude and improved
color rendition. The film produces prints in
as little as 60 seconds, and can handle image
brightness contrast ranges of roughly 5.5 f-
stops (148). Developing at room tempera-
ture for 60 seconds produces an image of
low contrast with color curves closely
matching professional studio photographer

FOR DATA CIRCLE 305 ON READER CARD

Polaroid

FOR DATA CIRCLE 301 ON READER CARD

5½ INCH WINCHESTER

Shugart Associates has entered the 5.25
inch Winchester disk drive market with a
family of three drives with formatted ca-
capacities ranging from 2.6MB to 7.8MB. The
5A600 family has the same physical mount-
ing and DC power requirements as Shugart's
existing Minifloppy line, and it offers two
interfacing choices. One choice is pin-out
compatible with the Minifloppy line, allow-
ing both rigid and floppy drives to interface
via the same control lines. The other inter-
facing choice is said to be compatible with
other 5.25 inch Winchesters already on the
market.

The three drives differ in capacity
and in the number of platters they contain:
the 5A602 has a single platter and a capacity of
2.64Mb formatted (3.33Mb unformatted),
the dual-platter 5A604 has a formatted ca-
capacity of 5.2MiB (6.66Mb unformatted), and
the 5A606 uses three platters for a formatted
capacity of 7.8MiB (10Mb unformatted). All
these drives have an average access time of
75msec (160msec maximum), transfer rates of
4.34Mbps (the same as Shugart's 5A1000
8 inch Winchester), and a track-to-track ac-
cess time of 18msec. Deliveries are slated to
begin in the third quarter, with prices start-
ing at $760 a unit in lots of 500 or more.
SHUGART ASSOCIATES, Sunnyvale, Calif.

FOR DATA CIRCLE 320 ON READER CARD

FOR DATA CIRCLE 304 ON READER CARD

TOUCH-SENSITIVE DISPLAY

The VuePoint is a touch-sensitive plasma
display terminal with a microprocessor-
based controller. The display's format is 12
lines of 40 characters, with 240 touch-sensi-
tive points on the screen. The controller can
store up to 51 pages of data; it communi-
cates with a computer via an Rs232 interface
at data rates ranging from 300bps to
19.2Kbps. Options include a 40 character
per line printer and a 128 character ASCII
keyboard. Pricing starts at $3,500 with
quantity discounts available for orders of 10
or more units. GENERAL DIGITAL CORP.,
East Hartford, Conn.

FOR DATA CIRCLE 301 ON READER CARD

INSTANT COLOR FILM

For computer imaging (not to mention
professional photography), Polaroid Corp.
has come up with an extended range color
instant print film called Polacolor E.R.
Available in two formats, 8 x 10 and 5 x 4,
the film uses new chemistry and a new
magenta dye that are said to provide in-
creased exposure latitude and improved
color rendition. The film produces prints in
as little as 60 seconds, and can handle image
brightness contrast ranges of roughly 5.5 f-
stops (148). Developing at room tempera-
ture for 60 seconds produces an image of
low contrast with color curves closely
matching professional studio photographer

FOR DATA CIRCLE 305 ON READER CARD

INSTANT COLOR FILM

For computer imaging (not to mention
professional photography), Polaroid Corp.
has come up with an extended range color
instant print film called Polacolor E.R.
Available in two formats, 8 x 10 and 5 x 4,
the film uses new chemistry and a new
magenta dye that are said to provide in-
creased exposure latitude and improved
color rendition. The film produces prints in
as little as 60 seconds, and can handle image
brightness contrast ranges of roughly 5.5 f-
stops (148). Developing at room tempera-
ture for 60 seconds produces an image of
low contrast with color curves closely
matching professional studio photographer

FOR DATA CIRCLE 305 ON READER CARD

For computer imaging (not to mention
professional photography), Polaroid Corp.
has come up with an extended range color
instant print film called Polacolor E.R.
Available in two formats, 8 x 10 and 5 x 4,
SYSTEM 132-70

Now! The industry's highest quality 132-character-per-line alphanumeric display with full IBM 3274/3278 compatibility.

The DATAGRAPHIX 132-70 system consists of the 132-74 cluster controller with up to 32 ports, the 132-78C cluster display station and the 132-78S stand-alone display terminal that does not require a controller.

- SWITCH SELECTED FORMATS
- LINE HIGHLIGHTING
- PRINT LOCAL
- LINE INSERT, DELETE, ERASE
- 104-KEY KEYBOARD
- AUDIBLE ALARM
- NUMERIC PAD
- CURSOR SELECT

STAND ALONE or CLUSTER

The Difference Is Clear
Write or call for complete information today.

Datagraphix
a General Dynamics subsidiary
P.O. Box 82449, San Diego, California 92138 / (714) 291-9960, Ext. 481

CIRCLE 171 ON READER CARD
Original prints.

Announcing the HP 2680 Laser Printing System.
With its own intelligence and our HP 3000 computer behind it (including the powerful new Series 44), our new Laser Printing System takes information directly from your data base, formats it exactly the way your users want, and prints it out on manageable, "people-sized" paper. Reports. Letters. Documents. And every one an original.

Software for creative writing.

The 2680's two interactive software packages let you design your own characters, symbols and logos, and format them any way you like on a familiar 8½" x 11" page: with windowing, scaling, shading and zooming. You can even reduce the print size to get four logical pages on a single sheet. Or rotate the forms 90° so your Z-fold output reads like a book. Then, simply tell the computer what data you want on the forms, and the 2680 does the rest—including monitoring and correcting its own print quality!

Handle less paper. Handle more information.

Think of it—with fewer pre-printed forms to stock, the 2680 dramatically reduces purchasing and inventory expenses (and the paperwork that goes with them!). And that means fewer chances for costly printing or delivery delays when you want to change the forms you're using. Add to that what you'll save on copying and reducing costs, and you'll find that the system pays for itself before you know it.

When you're ready to expand, our advanced networking software lets you send information to an HP 3000 anywhere in the world, where a local 2680 can print out your data. (As originals, of course.) And with data base management and other software features, the 2680/3000 can be a powerful part of your entire information processing system, including connections to your mainframe.

If you'd like to find out more about our new Laser Printing System, call your local HP sales office listed in the White Pages. Or write for more information, including print samples, to Hewlett-Packard, Attn: Bill Murphy, Dept. 493, 11311 Chinden Blvd., Boise, ID 83707.
HARDWARE

Films; allowing the film to develop for 75 seconds yields a slightly higher density. Polacolor ER Type 809 (8 × 10) comes in boxes of 10 exposures and carries a suggested list price of $71 per box. Four-by-five format Type 59 comes in 20 exposure boxes, listing at $42.75 per box. Polaroid Corp., Cambridge, Mass.

FOR DATA CIRCLE 307 ON READER CARD

PRINTER

General Electric has added a split-platen printer to its TermiNet 200 series of dot matrix impact printers. The printer can operate at up to 200 cps, accepting data at strap-selected data rates ranging from 110 bps to 9600 bps; a 2 KB input buffer is available as an option. Interfacing is Rs232. The printer's split platen uses a pair of independent tractors, each with its own servomotor, allowing different forms lengths of from one to 199 lines. Up to nine-part forms can be accommodated. The left platen accepts forms ranging in width from two inches to 8 1/2 inches; the right handles those from two inches to 4 1/2 inches. End user quantity one pricing for the split platen TermiNet 200 is $3389, with deliveries ranging from eight to 10 weeks ARO. The terminals will be built to order, according to a GE spokesman, not warehoused. General Electric Co., Data Communications Products Business Dept., Waynesboro, Va.

FOR DATA CIRCLE 306 ON READER CARD

DISTRIBUTED PROCESSING SYSTEM

Seeing two-thirds of the distributed processing market—by units—going to systems with fewer than 12 terminals, Northern Telecom has developed its largest system to date, the Model 585, which the firm targets directly at the segment with seven to 11 terminals per system. The 585, which can handle up to 16 workstations and printers, extends the company's potential market and brings it into direct competition with smaller HP 3000s and IBM 8100s, as well as members of Texas Instrument's 990 series and potentially some offerings from Datapoint and Four Phase, according to Northern Telecom's analysis of the market.

The 585 uses a new processor that can support from 128KB to 512KB of main memory and a maximum of 342MB of disk. Compared to the company's previous top-of-the-line Model 445, the 585 is said to have twice the throughput (and twice the memory capacity). After going through a lengthy make/buy study, Northern Telecom went ahead and developed its own eight-inch Winchester disk for the 585. The disk is made in 11MB and 22MB (formatted) capacities, and includes an integral 15MB cartridge tape for backup.

In addition to the main processor, the 585 off-loads I/O functions into separate processors in each peripheral controller. The 585 can use peripherals and software originally developed for the smaller 405, 435, and 445 systems, and it can be connected via the coaxial cable Omnilink to other 585s or to the smaller systems. Up to

SCHEDULIZE with Magnetic Controls

FREE 16 PAGE ILLUSTRATED BROCHURE

For Scheduling • Programming • Personnel • Sales • Shipping • Inventory • Maintenance • Production • Quotations • Computer • Special Situations

METHODS RESEARCH
70 ASBURY AVE., FARMINGDALE, N.J. 07727

CIRCLE 174 ON READER CARD

TECHNICOMM
800-257-7775

TERMINALS
DELIVERY NEXT BUSINESS DAY

TEXAS INSTRUMENTS • DIGITAL EQUIPMENT 
HEWLETT PACKARD • HAZELTINE 
LEAR SIEGEL • ADDS 
VISUAL TECHNOLOGY • QUME 
PLUS OTHERS

SALES • SERVICE • RENTAL • LEASE PURCHASING 
CORPORATE OFFICE 1101 KINGS HIGHWAY / CHERRY HILL, N.J. 08034 
(609) 662-4620

CIRCLE 175 ON READER CARD
A must for your consideration because the Series 630 starts where other terminals stop.

The 630 is a smart state-of-the-art ergonomically designed terminal which incorporates quality, reliability, and the flexibility to adapt to your system at a price which helps keep your overall system cost down.

The 630 has many standard features to complement your system. A few of these are detached keyboard with the reliable reed switch technology, non-glare screen, full editing capabilities, user programmable auxiliary I/O port and horizontal split screen, six user defined function keys, and upper and lower case characters.

TEC also offers an array of options to make the 630 even more attractive to you, some of which are tilt/swivel terminal base, 96 character limited graphics set, composite video output, 2, 4, or 8 pages of memory with paging or scrolling.

TEC has been in business for over 23 years. We know how to make OEMs happy, we have built CRT terminals for them for over 15 years. That's a long time and we're proud of it. We believe in providing individual support to all of our customers, especially after the sale has taken place. TEC will also modify or completely redesign its terminals to meet your exact requirement.

For a detailed brochure on the 630 or other TEC terminals, or for applications assistance, contact TEC today.

TEC, Incorporated
DECADES OF SUPPORT
Corporate Headquarters
2727 N. Fairview Ave.
Tucson, Arizona USA 85705 (602) 792-2230
TWX 910-952-1377 Telex 16-5540

- Boston (617) 879-6886
- Chicago (312) 655-1060
- Cincinnati (513) 884-6620
- Los Angeles (714) 848-3111
- Minneapolis (612) 941-1120
- Philadelphia (215) 730-5700
- San Francisco (415) 374-2660
- Washington D.C. (703) 354-1222
- West Palm Beach (305) 684-1604

TEC International, Inc.
European Sales Office
Avenue Louise 148-Box 6
1050 Brussels, Belgium
(02) 649-81 54 Telex 846-63553
nine systems can participate in a local Omnilink network, sharing files and peripherals. Omnilink reportedly is being enhanced to allow 3270 access. The 585 also supports 3270 pass-through applications. A variety of communications protocols are supported by the 585, including async, bisync, and SDLC. Emulators allow communications with machines from IBM, CDC, and Burroughs.

The 585 can be programmed in Northern Telecom's proprietary TAL 2000 language or in COBOL. Its operating system can handle up to 32 concurrent tasks. For word processing, the firm offers its Omniverse word software package.

A Model 585, with 11Mb of disk, cartridge tape, 256Kb of main memory, four workstations, a printer, and a communications adapter, sells for $49,600. The same system can be leased for $1,966 per month for one year or $1,573 per month for three years. Deliveries are to begin in May.

For DATA CIRCLE 308 ON READER CARD

COMMUNICATIONS TESTER

Atlantic Research Corp.'s Interview 4500 is that firm's latest test system for data communications protocol diagnostics. The 4500 can check out packet protocols and SNA, and includes capabilities for detailed frame analysis of SDLC and HDLC traffic. The standard tester also works with BSC and asynchronous protocols, and handles a variety of character codes, including EBCDIC and ASCII. An integral cartridge tape drive is used to store and load test programs as well as capture data traffic from the line under test.

Interview 4500 uses a "simultaneous trigger technique," allowing the user to specify up to eight conditions (e.g., timeouts, receiving a specified character string) and actions, such as sending a message, controlling timers or counters, sounding an alarm, or reformating the display to enhance or suppress data.

The tester can be used to emulate hosts, terminals, and nodes as well as monitoring network performance. Up to 600Kb of traffic can be captured and stored on a single data cartridge. An option 1 megabit capture memory is available for recording high-speed data streams (up to 72 Kbps). The Interview 4500 can be rack-mounted or purchased as a portable unit. It sells for $14,500. Existing Interview 3500s can be upgraded for $5,000.

FOR DATA CIRCLE 309 ON READER CARD

PERSONAL COMPUTING

Additional peripheral support, more memory for its top-of-the-line pocket programmable calculator, and a new entry-level configuration of its personal professional computer were all announced by Hewlett-Packard's Corvallis Div. at the recent Consumer Electronics Show in Las Vegas. More software offerings and a "custom calculator" marketing effort put the icing on the cake.

Users of the Desktop Series 80 personal computers now can enter graphics via the HP 9111A Graphics Tablet. The digitizer transfers pen tracings from the tablet's surface onto the computer's screen and into its memory. The tablet lists for $1,950.

A parallel Printer Interface, also for the Series 80, allows connection of low-cost printers. The interface sells for $295.

The new top of the line in HP's programmable pocket calculator family is the HP-41C. That "V" suffix is a Roman

In by 8:00:00
Out by 8:02:40.

Introducing our new 360 ips Mark X, the world's fastest magnetic tape cleaner. It can clean and rewind 2400 feet of tape in 160 seconds flat. That's 20% faster than the best our competitors can do. The Mark X uses two patented rotating, self-sharpening cleaning cylinders — guaranteed for the life of the equipment. Contaminants are removed by an efficient vacuum system. No costly blades or tissues to replace. You save on time and supplies, tape errors are reduced, tape life lengthened. Whether you buy, rent, or lease, the Mark X can pay for itself in less than a year under normal circumstances. For more information call us at 216/327-5050.

Data Devices
Data Devices International
20235 Bahama St, Chatsworth, California 91311

CIRCLE 177 ON READER CARD

How to cut through
UPS Bull!

You're probably skeptical of uninterruptible power supply (UPS) manufacturers' claims and boasts. Even ours.

We make just one: "Our's works!" But, you don't have to take our word for it. Ask any of our customers about LorTec UPS performance and our genuine commitment to customer service. We'll provide our customer list and you can check us out for yourself.

To simplify your search for the most reliable UPS around, write or call Tom O'Neill, Vice President, at 216/327-5050. And don't forget to ask for our new "UPS Decision Makers' Guide."

LorTec: 15 years of documented UPS dependability. Units from 12.5 kw to 125 kw; 50 Hz and 60 Hz.

LorTec
Power Systems
5214 Mills Industrial Parkway
North Ridgeville, Ohio 44039
216/327-5050.
The IBM 6670 helps you run an office. Not a marathon.

The IBM 6670 Information Distributor takes the leg work out of paper work.

Instead of running from the printer to the copier, now word processing operators can save time and make prints without ever leaving their desk.

That's because the IBM 6670 has communications capabilities which can connect with many word processors.

So, not only does our system eliminate a lot of walking, but it also eliminates the need for individual printers.

And since the IBM 6670 prints with a laser, each copy is of original typewriter-like quality.

It can print on one or both sides of your paper. As well as collate your work—electronically.

For special emphasis, it can reformat your documents. And offers up to 4 type-styles per page.

You'll find the IBM 6670 is so automatic that word processing operators won't be getting much exercise in the office anymore.

Except in their skills at word processing.

I am interested in learning more about the IBM 6670 Information Distributor. Please have your representative get in touch with me.

Name ___________________________ Title ___________________________
Address ___________________________ City ___________________________
State ___________________________ Zip ___________________________
Tel. ___________________________

IBM Office Products Division
400 Parsen Road/Dept 804 Franklin Lakes, N.J. 07417
Or call 800-631-5582 Ext. 71/In New Jersey, 800-352-6560 Ext. 71
VOTRAX LVM-80

Talks Business
with voice response systems for:

- Banking
- Computer Services
- Data Processing Management
- Credit Card Information
- Warning Systems
- Order-Entry/Inventory Information
- Process Control
- Paging Systems
- And Many Other Applications

When your people need telephone access to stored information, the Votrax LVM-80 is the answer. The LVM-80 works with your computer to provide customers, contractors, vendors, or salesmen telephone access to vital business information. Each LVM-80 gives you maximum capacity, feeding as many as 64 telephone lines simultaneously with up to 1000 individually-addressable human voice messages.

Votrax is a leader in voice response systems and provides everything from hardware and modems to software and systems design. You even have the capability of programming your messages in your own voice on a real-time basis. You'll especially like Votrax dependability—no moving parts, all solid-state translates into a highly reliable peripheral. Before you plan your next voice response system, call Votrax and let's talk business.

A Division of Federal Screw Works
500 Stephenson Highway, Troy, Michigan 48084 • (313) 588-2050
TWX 8102324140 • Answer Back — VOTRAX—TRMI

CIRCLE 180 ON READER CARD

HARDWARE

numeral, representing the fivefold memory increase over the existing HP-41C; the 41CV's memory can store up to 2,000 program lines or more than 300 pieces of data (or a combination of the two). The 41CV lists for $325. If you've already got a 41C, don't despair—HP also announced a "super memory module" that plugs into one of the four "ports" on the back of the calculator, providing a fourfold memory increment (over its internal memory), and thus the same total memory as the 41CV. This Quad Memory lists at $95, and the 41C's price has been reduced to $250. HP also announced reduced prices for its 32E and 32C calculators, and packaged prices for 41s and peripherals purchased at the same time.

HP's new entry-level personal computer, the HP-83, is identical to the HP-85 introduced little more than a year ago, except that it is configured sans integral thermal printer and cartridge tape drive. In dropping the two I/O DEVICES, HP also cut the price by $1,000: the HP-83 lists for $2,250. HP is aiming the 83 at those who want a disk-based system and their own choice of external printer—aside from lacking integrated peripherals, the HP-83 is the same BASIC-speaking personal computer with graphics capabilities as the HP-85.

HP has drawn a bead on the business market, offering the widely acclaimed VisiCalc developed by Personal Software (computer dealers have told us that package has been responsible for selling entire systems). HP's version, dubbed VisiCalc PLUS, is an enhanced implementation of the dynamic electronic spreadsheet package, with capabilities for producing four-color charts and graphs of VisiCalc tables. VisiCalc PLUS sells for $200.

An Information Management Pac, priced at $200, provides database management functions, including searching and sorting, as well as report and graphics generation. A Graphics Presentation Pac, also priced at $200, produces four-color charts for overhead projection or incorporation into reports. Bar, pie, and line charts can be created, and annotated with three different character sets. A Data Communications Pac, priced around $200, lets a Series 80 computer function as an intelligent asynchronous terminal operating over either a direct line or through a modem at transmission speeds ranging from 300bps to 9600bps.

For software developers—not end users—HP has released a System Monitor, allowing development and debugging of assembly language code. An Advanced Programming ROM containing 'additional BASIC commands and a plug-in drawer for EPROMs has also been released to software package developers.

The Custom Calculator marketing effort lets those with specific applications—such as aircraft navigation or investment analysis—buy HP-41s with their code burnt into the calculator. HP completes the customization with application-specific labeling of the keyboard, and the purchaser's logo. Beech Aircraft and International Diamond Corp. are two companies currently taking advantage of the program.

FOR DATA CIRCLE 310 ON READER CARD

6SD'S LATEST

IBM's General Systems Div. launched a raft of products and enhancements, including two new processors in the Series/1 family, a new communications controller that allows S/1 minis to participate in local ring networks, new printers, additional communications facilities for the System/38, and enhancements to the 5280 Distributed Data System.

The Series/1 now has both a new top-of-the-line processor and a new entry-level processor (with an integrated floppy disk drive). At the top, the IBM 4955 Model F supports twice as much main memory as any of its predecessors—512K. The lower-end 4952 Model C can accommodate up to...
Information shouldn't get stuck in traffic.

Now you can avoid costly traffic jams in your communications network with Codex's new 6650 Distributed Communications Processor. An intelligent processor that lets you efficiently manage the flow of traffic in your dispersed network. Improving network performance and reducing your communications costs.

Advanced routing and traffic control.

Even when traffic is heavy, the 6650 helps ensure information integrity and avoid long transmission delays by automatically rerouting congested or faulty links. It also offers user destination routing, allowing terminal operators to access various host resources. And it provides X.25 support, so system users can take advantage of the benefits provided by both public and private networks.

Increased line utilization.

The 6650 provides statistical multiplexing and adaptive data compression capabilities so you can support more terminals on existing lines. A powerful feature that provides improved information throughput on satellite links. And the 6650 allows you to combine digitized voice and data transmission for efficient use of expansion leased lines.

Reliable transportation.

The 6650 uses an ARQ scheme to ensure error-free transmission. And its network management and control functions let you monitor, diagnose faults, and reconfigure your network from a single site in minimum system availability.

The powerful new 6650 DCP. You can depend on it to keep your information from getting hung up in traffic. Call or write for more details.

We'll get you through.

Codex Corporation
2000 East Searle
McLean, Virginia 22101
Phone: 703-770-2600

Circle 9 for free information.
128K of main memory. An IBM spokesman says that, all things considered, the 4955 Model C has about a threefold processing advantage over the 4952 Model C. Prices range from $8,500 to $11,500. Four printers, the 4975 line, offer print speeds ranging from 40cps to 160cps. Models can be had for both local and remote attachment, and two of the printers are software-switchable from draft- to letter-quality printing. Prices range from $2,500 to $3,650.

FOR DATA CIRCLE 311 ON READER CARD
Equipping each S.1 with the Series/1 software—carrying a one-time charge of $5,280—handles the flow of messages between devices and processors in an S/1-controlled network. An enhancement, the monitor reportedly provides all the functions of the earlier release and adds new device support, a high-level language interface, and other features. RPS/SAE Extended Support, a separate licensed program ($2,784 one-time fee) provides a low-level interface to RPS/VS and CICS/VS applications on the host. The RPS/Multiple Terminal Manager Version 2 adds 3270 emulation upstream to a host and terminal support for the 3270s and 3101 full screen terminals. For a development system, there is a one-time charge of $15,000. No additional license is needed for execution systems.

FOR DATA CIRCLE 312 ON READER CARD
COBOL for both EDX and RPS systems is now at Version 2, offering LINAGE support, logical connectives, and blocking of relative files, for a one-time charge of $4,512. RPS and EDX have a one-time charge of $1,440 Indexed Access Method, which adds multiple secondary index support, a data paging function, and enhanced utility functions to the capabilities of the earlier release.

FOR DATA CIRCLE 313 ON READER CARD
The IBM 5520 Administrative System got a new letter quality printer, the 5219. Two models are offered, with maximum burst speeds of 40cps and 60cps (printing at 10 pitch). The bidirectional impact printers can be fed continuous forms, or sheet paper with an optional dual-drawer feeder. Ten type-wheels, packaged in drop-in cartridges, are offered. Proportional spacing as well as 10-, 12-, and 15-pitch horizontal spacing are features of the 5219. Prices range from $5,050 to $5,450.

FOR DATA CIRCLE 314 ON READER CARD
System/38 got its share of attention in the form of a new printer, additional communications support, and enhanced software offerings. The 3203 Model 5 prints up to 1,200 Ipm, and features a power stacker. Two of these printers can be attached to a S/38. The printer, with attachment, leases for $1,545 per month, rents for $1,731 per month, and sells for $41,050.

FOR DATA CIRCLE 315 ON READER CARD
The S/38 also got a promise of bisync communications support, deliverable in February of next year. BSC support will allow COBOL and RPG III programs on a S/38 to send and receive data from a variety of terminals as well as other IBM computers (ranging from the aging System/3 through the 3081 mainframe). BSC leases for $75 per month, rents for $86 a month, or can be purchased for $2,925. A second communications attachment and two more workstation controllers also were announced for the S/38. All double the number of devices previously attachable to an S/38: to eight lines from four on
Who offers peripheral switches with higher capacity and more features at lower cost?

Data/Switch...the outperformer.

Simply stated, Data/Switch outperforms every other peripheral switch. Its integrated semi-conductor matrix assures the highest throughput for data transparency. You can even reconfigure off-line control units while the channels remain active.

Start with the industry's single largest matrix: 16x24 or build up to it gradually from a 2x2, because Data/Switch is modular and easily field upgradable.

A unique channel diagnostic display monitors data passing through the switch to isolate hardware problems in the computer room. And with the widest selection of expandable matrices at the industry's lowest cost per crosspoint, Data/Switch provides unrivalled economy.

For higher capacity and more features at lower cost, Data/Switch is the outperformer.

For more details, write or call Data/Switch at (203) 853-3330.
the communications attachment, and up to 80 IBM 5250 Information Display System devices on the workstation controllers. Prices for the new equipment are the same as for their predecessors. The communications attachment sells for $780, and the workstation controller goes for $5,070.

**FOR DATA CIRCLE 316 ON READER CARD**

System/38 software also received enhancement. The Interactive Data Base Utilities (IDU) were upgraded. A new Source Entry Utility (SEU) user interface is said to have additional functions as well as being easier to use. The IDU also picked up a Screen Design Aid (SDA) for designing and maintaining screen layouts, application menus, and Control Language programs for executing the menus. A Log Recovery feature has been added to the S/38 Data Base Logging function, freeing users from the need to develop and implement their own logging and recovery procedures. Finally, the list of software offerings includes a System/34 to System/38 Conversion Aid, to help current System/34 users migrate applications to the S/38. The Conversion Aid carries a one-time charge of $1,300; the enhanced IDU goes for $65 a month, and the S/38 Log Recovery feature is $50 per month.

**FOR DATA CIRCLE 317 ON READER CARD**

In the 5280 Distributed Data System product line, IBM introduced a new printer, controllers with additional memory, and 3270 communications emulation. The 5224 impact matrix printer works with both 5280s and S/34s, providing standard 10cpi printing and compressed 15cpi operation. Two models are offered, one printing at 140 lpm and the other at 240 lpm (both measured at 10cpi). The 5224 Model 1 leases for $237 per month and sells for $6,150. The 5224 Model 2 goes for $270 a month on lease and $7,000 for purchase.

The 5285 Programmable Data Station and the 5286 Dual Programmable Data Station have had their maximum memory capacity increased by 50%, to 96KB from 64KB. The 5288 Programmable Control Unit—which had a maximum memory size of 160KB—can now be had with 224KB or slightly over 288KB. The 5285 is offered in five models ranging in price from $6,730 to $9,015. There are two models of the 5286, ranging in price from $8,620 to $9,870. Prices from $9,855 to $16,695 span the 28 models of the 5288.

The IBM 5280-3270 Emulation Licensed Program lets 5285 and 5286 terminals communicate as 3270s to a host under SNA or bisync protocols. The program carries a monthly charge of $35. INTERNATIONAL BUSINESS MACHINES CORP., General Systems Div., Atlanta, Ga.

**FOR DATA CIRCLE 319 ON READER CARD**

**CRT TERMINAL**

The TAB 132/15 seemingly derives its name from its ability to display 132-character lines on its 15 inch screen. The upper and lower case ASCII editing terminal, developed by Tab Products' Office Products Group, can operate in either 80 column or 132 column mode; screen-labeled softkeys and English language prompts help the operator set operating modes. Softkeys also can be programmed by the user.

The terminal, which can display true descenders on lower case letters, can transmit a character at a time, line at a time, partial or full page, or all four pages of display memory provided in the standard unit. Protected fields can be transmitted, if desired. Character attributes are available, including bold, blinking, and reverse video. An rs232 interface is standard, supporting communications at speeds of up to 19.2Kbps. A printer port and a second rs232 interface are offered as options. The 132/15 also offers bidirection smooth or jump scrolling, horizontal panning, horizontal split-screen operation, and a status line. A basic 132/15 sells for $2,450, quantity one. TAB PRODUCTS CO., Electronic Office Products Group, Palo Alto, Calif.

**FOR DATA CIRCLE 303 ON READER CARD**
Everyone Working on Network Software Should Stop.

We've Started Giving It Away.

Introducing a one-of-kind communications system called C/30. Based on a microprogrammable mini and priced under $25,000, what makes the C/30 special is that it comes with all the communications software you need to build a network of any size. Efficient, cost-effective, packet-switch software.

Only BBN Computer packet-switching gives you true adaptive routing, both node and network transparency regardless of hardware, plus speed and message control. All field proven for over a decade on the world's largest packet network.

If you've discovered network hardware is easy to come by and network software impossible to find, stop. Our new C/30 gives you the best of both. And at this price, it's like getting the software absolutely free.

BBN Computer

BBN Computer Corporation, C/30 Marketing, 33 Moulton Street, Cambridge, MA. 02238. (617) 497-2800.

☐ Send me complete C/30 product information.
☐ Have your representative call.
☐ Tell me more about packet-switching.

Name __________________________________________
Title/Dept. ______________________________________
Company ________________________________________
Address _________________________________________
City __________________________ State ______ Zip __
Phone No. ________________________________

CIRCLE 185 ON READER CARD
SOFTWARE AND SERVICES

UPDATES
The System 2000/80 Multi-User database management system has completed a successful beta test under VM/370 CMS, reports Intel's Commercial Systems Div. (formerly MRI), developers of the database system. The test was completed at ECRI, a medical equipment research firm in Pennsylvania. Intel sees VM/CMS (Conversational Monitor System) gaining increased acceptance, particularly in the 4300 sector.

The SEED database management system user's group, called the Grange, held its first meeting in Philadelphia shortly before year's end. The organizational meeting drew more than 50 users. A group of four members was named as an interim committee of the Grange, with responsibilities of drafting working guidelines and objectives for presentation at the next users' meeting, slated for May on the West Coast.

Data General began shipping its AQOS/VS software to users of its 32 bit Eclips M/8000 three months ahead of schedule. Encouraged by positive feedback from its five beta sites, DG began shipping the MV/8000 operating system, FORTRAN 77, PL/1, BASIC, Macro Assembler, and the SWAT source language debugger.

Thomson-CSF, the large, diversified French electronics manufacturer, has signed a distribution agreement with 3M, giving the Minnesota company distribution rights for a desktop facsimile machine developed by Thomson-CSF. The machine complies with CCITT recommendations for Group 2 and the recently finalized Group 3 specifications for high-speed digital facsimile communications.

OPERATING SYSTEM
Texas Instruments now offers a new operating system, DNOS, and an enhanced COBOL compiler for its DS990 series of computers. DNOS—the Distributed Network Operating System—reportedly combines the strengths of the existing DX10 operating system with a "flexible job architecture." TI says that DNOS will form the basis for networking support using bit-oriented protocols—an apparent allusion to SDLC and X.25. DNOS requires a DS990 Model 8, 20, or 30 with at least 256KB of memory. Users of these systems can get job accounting from DNOS plus improved use of system resources through such features as prioritized output spooling, multivolume files, interprocess communication, job and task synchronization, and increased terminal support for time-sharing. Upward compatibility from DX10, DNOS error messages are stored in files, allowing the user to customize messages as appropriate for the installation. Supplied on mag tape, DNOS is priced at $4,000, including the first year’s support.

DNOS supports COBOL and Pascal; programs developed under DX10 require only relinking to run under DNOS. Data files are compatible between the two operating systems. COBOL Plus is a faster version of COBOL 3.3.0's run-time interpreter. It runs only under DNOS, and exploits the writable control store of the 990/12 processor to achieve a 10% to 20% average speed improvement. The language is identical to the existing COBOL, and existing object modules can link with COBOL Plus programs.

The C68 cross-compiler runs under the UNIX operating system on POP-11s, producing object code for the 16 bit Motorola 68000 microprocessor. Comprising a preprocessor, compiler, relocatable assembler, linking loader, support library and utilities, the C68 package can produce object code that can execute standalone or under control of an operating system on the target 68000 system. The compiler generates assembly language code, which is then processed by the assembler, producing relocatable object code. The linking loader then combines object code files with any referenced library functions, creating an executable object file, including symbol table. Getting the executable file from the host POP-11 to the 68000 is simplified through the use of a utility program that sends the object file over a serial communications line in a format acceptable by the MACSBUG loader. A single cpu binary license goes for $950. Standard distribution media for the C68 package is 9 track mag tape. ALCYON CORP., San Diego, Calif.

FOR DATA CIRCLE 328 ON READER CARD

OUTPUT FORMATTER
The n-Up Output Generator, which runs under OS or MVS, is such an elegant program that we're surprised we haven't seen something similar until now. Instead of requiring applications programmers to go through the drudge work of formatting output for n-up printing (i.e., several forms horizontally spaced across the page), the n-Up Output Generator acts as a post-processor, reformating output files from any application program. In addition to saving programmer
## ASI-ST does most of the work; YOU reap the profit!

### Easy to Use
More organizations are using ASI-ST more heavily than any other data management and report writer system. Why? Because ASI-ST is so easy to work with. You simply enter language statements and parameters; there are few rules to learn and remember. You can even omit many parameters entirely; ASI-ST picks the most commonly selected condition for those entries.

By eliminating up to 90 percent of the programming effort usually required to perform data management functions, ASI-ST is saving time and money for hundreds of users. Typical examples:

- **COMBUSTION ENGINEERING, INC. (CE)** currently executes from 18,000 to 22,000 ASI-ST runs every month. Some runs produce more than 100 reports in a single pass of one or more TOTAL data bases and conventional files.
- **Using ASI-ST, AMERICAN EXPRESS COMPANY recently required only four minutes of CPU time to process over 12 million records. AMEX also uses ASI-ST with IMS.**
- **CORNING GLASS WORKS now executes an average of more than 18,000 ASI-ST runs monthly against IMS and TOTAL data bases and standard files.**
- **UNION CARBIDE's usage of ASI-ST averages over 9,000 runs per month at each of its worldwide data centers where ASI-ST is used with IMS.**

### Uses Less Machine Time
Although not originally intended to replace higher-level computer languages, ASI-ST can solve 70 to 90 percent of your commercial data processing problems. And ASI-ST can process your IMS or TOTAL data bases more economically—because it uses less machine time. In a single run, for example, ASI-ST creates and updates related or independent files; retrieves, manipulates, calculates, and displays data; and generates detail and summary reports. How's that for versatility—and efficiency?

### Hardware and Operating Environments
- IBM 43XX, IBM 30XX
- IBM 360/370, AMDAHL, ITEL
- OS/MVS, OS/VS1, OS/VS2
- DOS, DOS/VS, DOS/VSE

For complete time- and money-saving details on ASI-ST, call or write today.

---

**ASI**

Applications Software, Inc.
21515 Hawthorne Boulevard
Torrance, CA 90503
(213) 540-0111

---

Member SIA Software Industry Association
CIRCLE 166 ON READER CARD
SOFTWARE AND SERVICES

time, printing several forms side by side should reduce printing time. Printing parameters are set to default values for each installation, but can be altered when the n-Up Output Generator starts. Collating sequences can be protected by the program's ability to print the output in row or column sequence. It leases for $120 per month, including maintenance. Multiple processors at the same address are covered by a single license agreement, and a copyright release is granted so the documentation can be reproduced for internal use. APPLIED SOFTWARE, INC., Palm Beach Gardens, Fla.

FOR DATA CIRCLE 326 ON READER CARD

S/34 DOCUMENTATION

Mann Data Corp. does custom programming, much of it troubleshooting System/34 applications. In the course of this work, it developed a S/34 documentation package, which has been used internally for several years. Now, the firm has decided to offer the System/34 documentation package to others for $1,200.

The package is inserted into the job stream along with the programs to be documented. It generates 12 reports, including a table of contents, descriptions of procedures, files, and programs, screen/program cross-reference, procedure/program cross-reference, "exploded" procedures showing the files used, and a report layout showing titles and format. And, of course, the package can be rerun whenever program modifications are made, keeping the documentation up-to-date. MANN DATA, INC., Newton Upper Falls, Mass.

FOR DATA CIRCLE 329 ON READER CARD

SCREEN FORMATTING

Sperry Univac has added the Display Processing System (DPS) to its software offerings for the 1100 series mainframes. DPS 1100 helps users interactively develop input and output screen formats, and provides a screen-handling interface to applications programs. Actual screen design is performed at the terminal, with the user entering formats and field attributes. A tutorial mode, for novice users, provides prompts and explanations on how to create or revise

a screen. Application programs can use pre-stored screens created by DPS 1100 by calling the screen handler and providing the screen's identifier. The screen handler takes care of displaying the screen format, accepting and validating the input, and passing the resulting data back to the calling program. The DPS screen handler functions in a transaction system such as the Series 1100 Transaction Interface Package (TIP), or in interactive mode, using the Conversational Timesharing System (CTS). DPS 1100 supports additional features, such as password protection for screens and fields and the creation and controlled access to multiple screens. DPS 1100 carries a monthly fee of $250. SPERRY UNIVAC, Blue Bell, Pa.

FOR DATA CIRCLE 330 ON READER CARD

SOFTWARE SPOTLIGHT

APPLICATION DEVELOPMENT

Ever have one of those weeks (or months) when you wished the days had 48 hours, just so you could keep up with your workload? Yet the poor user departments can't understand why, if the computer is so fast, it takes so long for the dp department to bring up a new application. Even hiring more programmers, when you find them and find the money in the budget, doesn't seem to help all that much. In introducing its new application development system, Series 80 Mantis, Cincom president Thomas M. Nies drew an analogy between programming and manual labor—hiring more ditchdiggers may get the job done a bit faster, but buying a steam shovel will have far more impact.

Mantis is Cincom's "steam shovel" for program development. Here, Nies' analogy breaks down—a steam shovel requires a skilled operator, while Mantis is an attempt to simplify on-line program development, increase the productivity of professional programmers and hopefully simplify the task so intelligent end users can build systems as needed. Mantis comprises capabilities for screen and file definition and interaction, processing, and generating batch or on-line hardcopy reports.

The menu-driven application development tool runs under OS or DOS, using either CICS or Cincom's Environ/1 teleprocessing monitor. Using a "paintbrush" approach, the user can lay out and edit a screen format; Mantis will prompt the user for the attributes of each user-specified field. Once the user is satisfied with the screen, Mantis can make it available immediately for use (there's no waiting for a systems programmer to update CICS tables).

Mantis also simplifies file definitions and the creation of subsequent maintenance programs. Records are defined with named fields and user-specific attributes, including field-by-field encryption for sensitive data. Each application sees the database through logical views. Mantis comes with the capability to interface automatically with Cincom's Series 80 TOTAL DBMS and standard file structures, such as VSAM. The interface between file or database management system and Mantis is implemented as an independent module, making it easier to adapt the system to work with other file and database systems.

Once the screens and files are defined, Mantis lets the user write the processing part of the application. Mantis has its own programming language that allows interaction with screens and files with a single statement. It seems straightforward enough and includes structured programming constructs. For those who don't want to learn another language, or want to include previously compiled modules written in COBOL or another language, the Mantis procedure definition language supports calls to external programs.

Mantis also offers security features, including multilevel passwords, restrictions on who can access what data through the use of logical views, and access restrictions for menus (thus limiting the functions available to any given user). To make applications easier to use, Mantis has a help facility that lets the user get short form instructions, or, upon request, more detailed directions. Help messages can be provided by the developer as the application is written, or edited into existing applications.

Mantis has undergone beta-testing at a number of sites, and Cincom is quoting some dramatic comparisons, such as an application that took 80 hours of development time using COBOL (and 24 hours with IBM'S DMS) versus five hours with Mantis. Prices, as of Jan. 10, were quoted at $20,000 for an initial single-use license, plus $2,000 for installation. Under a one-year lease, the monthly charge would be $500. This price is for either OS or DOS and support for up to eight terminals. Support for each additional group of eight terminals (up to 32 terminals) goes for a $750 installation fee and either $150 per month for a one-year lease or $6,000 for a single-use license. The next step adds support for a group of 32 terminals, then 64 additional terminals; finally, all terminals beyond the 128th are included in the final support offering. CINCOM SYSTEMS, INC., Cincinnati, Ohio.

FOR DATA CIRCLE 325 ON READER CARD
COMPARE SMARcS.

Features:
- Feature-for-feature our smart CRT terminals cost less than their dumb ones. Much less. Compare smart terminals, compare price. You'll pick TeleVideo.
- Four different models to choose from. Each with features you'd expect to pay extra for. But with TeleVideo, they're standard.
- We put a lot of engineering savvy into our CRTs. Their modular design means high reliability. It also lets us build-in volume. And sell to you at low prices.
- Find out how you can make your next CRT buy a smart one. Contact TeleVideo today for information.
- Nationwide Field Service is available from General Electric Co., Instrumentation and Communication Equipment Service, Dept. A.

See us at INTERFACE Booth 1020

CIRCLE 187 ON READER CARD
HOME COOKING.
Pillsbury’s recipe calls for plants to do their own processing, with Level 6 computers and a dash of central control.

For Pillsbury, Level 6 computers were the yeast that made plant efficiency rise.

A Level 6 computer in each of 12 plants allows managers to do their cost accounting/general ledger work in-house.

Before they were installed, raw, end-of-month data had to be transmitted to headquarters for processing.

Each plant ran as many as a dozen jobs to get its final figures in. This took time and errors took longer to detect and correct.

As a result, plant managers had to wait for news of their precise financial condition.

Now, however, information flows smoothly and quickly.

Thanks to on-line editing, information going to headquarters is now error-free.

And this information can be sent in a single 10-minute job.

The main advantage of Pillsbury’s move to distributed processing has been in giving plant management instant control of the data they need to run their operations.

There have been other benefits too.

Uniform hardware and software have gone a long way toward integrating the four organizations brought together in Pillsbury’s Consumer Foods Division.

And, as you might expect, processing and communications costs have dropped.

Naturally, Pillsbury has more than cost accounting in mind for its Level 6 computers.

Right now, they are being used to maintain employee files locally.

In the near future, Pillsbury intends to institute automated office procedures, word processing, and electronic mail.

Here at Honeywell, we know these plans will come off without a hitch.

After all, distributed processing at Pillsbury is a piece of cake.

For more information on the family of Level 6 computers write Honeywell, 200 Smith Street (MS 487), Waltham, Massachusetts 02154.
MINDSTORMS
by Seymour Papert

Mindstorms, subtitled Children, Computers, and Powerful Ideas, is based on a decade of Dr. Papert's work at the LOGO group in the Artificial Intelligence Laboratory at MIT. There, learning environments have been developed in which children communicate with computers in a relatively simple and natural way. This is primarily accomplished utilizing the Turtle, a floor robot which the children come to see as "an object to think with." The basic methodology is that of Jean Piaget, who felt that children learn fundamentals by building their own intellectual structures.

Mindstorms attempts to show how the fundamental concepts of mathematics can be comprehended by young children through the "discovery" method, which Papert outlines in considerable detail. He tells us how the system works, and gives us a "Piagetian learning" interpretation of the child's progress via intellectual "jumps and leaps." These intellectual experiences are then related to total cognitive development. The description of what takes place in Dr. Papert's laboratory is quite different from what occurs in the typical American classroom.

The "status quo" approach is also analyzed in a careful and systematic study, and Papert shows how our present approach turns off many of our children, burdening them with "math-phobia." Papert argues that "all of us, professionals as well as laymen, must consciously break the habits we bring to thinking about the computer... It is hard to think about computers of the future without projecting onto them the properties and limitations of those we think we know today." Papert feels that this is especially true in the area of computer applications to the total learning process. He states that "It is not true to say that the image of a child's relationship with a computer... goes far beyond what is common in today's schools. My image does not go beyond: it goes in the opposite direction."

And that, perhaps, is a weakness of Seymour Papert's book. It is not based on experience with teachers and educational administrators. Previous reform efforts based only on theoretical studies and carefully controlled laboratory settings have not done well. It was over 50 years ago that the Dalton Plan and other innovative quality systems for educational reform were introduced. They, too, initially went in "opposite direction" to the norm. Papert's weakness may be that he has limited himself to his own models, and has become "absolutist" in his own approaches.

The author shows his awareness of how thinking differently can separate a person from society in the opening passage, called "The Gears of My Childhood." He relates his early and intense involvement with automobiles and their gear systems: "One day I was surprised to discover that some adults—even most adults—did not understand or even care about the magic of the gears. I no longer think much about gears, but I have never turned away from the questions that started with that discovery: how could what was so simple for me be incomprehensible to other people?... A modern-day Montessori might propose, if convinced by my story, to create a gear set for children. Thus every child might have the experience I had. But to hope for this would be to miss the essence of the story. I fell in love with the gears. This is something that cannot be reduced to purely "cognitive" terms. Something very personal happened, and one cannot assume that it would be repeated for other children in exactly the same form... My thesis could be summarized as: 'What the gears cannot do the computer might.'"

Seymour Papert feels that the computer is the "Proteus of machines." Because it can take on "a thousand forms and serve a thousand functions, it can appeal to a thousand tastes." Mindstorms is the result of Papert's attempts to turn computers into instruments flexible enough so that children can create for themselves what
The 7 most common mistakes made in designing computer room environment.

Mistake No.3
Using energy-wasting compressors for winter cooling.

It's a costly error to run compressors in the winter when using a standard or partial savings system (Diagrams 1 and 2). In the temperate zone, temperatures fall below 50°F for at least half the year. The elimination of compressor operation during this period can save thousands of dollars each year.

However, in a computer room, using outside air for cooling destroys critical humidity control. Closed-circuit glycol systems with an auxiliary coil avoid this problem. But, some of them are poorly designed (Diagram 2 shows restricted air flow and an undersized coil). These systems limit savings by requiring extended compressor operation.

The EDPAC Solution
The EDPAC “ECX” System (Diagram 3) avoids these costly mistakes and offers maximum savings. “ECX” can reduce energy use by as much as 60%. It is available either as a standard option on new EDPAC equipment or as a retrofit to existing systems. In ten years it can save $100,000 in a typical 3,000 sq. ft. computer room.*

To make this kind of savings possible we've made the “ECX” coil oversized (14 fins per inch, 6 rows deep, full face area) and made sure the airflow is unrestricted.

In fact, the “ECX” is so efficient that it provides 100% of the sensible capacity with glycol temperatures of 52°F or below.

And to make sure there is no sacrifice of reliability, automatic controls return the system to compressor operation whenever the room temperature doesn't hold.

For a brochure detailing the solutions to all seven “mistakes,” contact your local EDPAC representative or write to the address below.
gears were to him.

To some extent, the author has fallen in love with his own creation, the Turtle, carefully showing the concepts that can be learned with it. But given the hundreds of thousands of Apples, PETS, TRS-80s, and TI 99/4s now entering schoolrooms, transition applications are conspicuous by their scarcity. (LOGO is a relatively sophisticated computer language, and such interface work is under way at the TERC group, and at Brookline, Mass., public schools.)

The headlong rush into the era of educational computers has now begun, and things will never be the same. Yesterday's theory and today's laboratory results may well be obsolete by tomorrow, as our learning-via-technology pace accelerates. Brookline, Mass., public schools.)

Because of this, *Mindstorms* is an important contribution. The book is an excellent starting point to meet this challenge of change: how we utilize educational computers, how we evaluate, interpret, and communicate these advances and all of their ramifications, and how we react to their effects will determine the shape of tomorrow's society.

*Mindstorms* is a thought-provoking presentation of the ideas of Prof. Seymour Papert and the LOGO group at MIT. While the reader may not agree with all of the content and approaches presented, it is an excellent entry into a series of issues that may well become a major concern of the last decades of this century. Basic Books, Inc., New York (1980, 230pp., $12.95).

—Dr. Harvey J. Brudner

**VIDEOTEXT: THE COMING REVOLUTION IN HOME/OFFICE INFORMATION RETRIEVAL**

**edited by Efrem Sigel**

The first book on using the television set as an information-retrieval tool is a slim volume bearing a hefty price. Hailed in jacket copy as a state-of-the-art report, *Videotext* is a collection of five essays on proposed and actual television set information systems and their technology, bracketed by brief introductory and concluding sections.

Take away the two appendices, 25 full pages of illustrations (mostly photos from Great Britain), and extraneous matter, and the 154-page volume shrinks to 104 pages of actual text. Whether *Videotext* is state of the art or already historical—having been overtaken by the rapid changes occurring in this field—is relatively unimportant. Whether it supplies enough information to justify its $24.95 price tag is something else.

Efrem Sigel (editor-in-chief of Knowledge Industries Publications, publisher of this volume) prefers the word videotext as a general term for television information systems. Teletext is the one-way (noninteractive) transmission of "printed" information via the regular or cable tv broadcast signals; a control keypad allows the viewer to cut out the scheduled program and dial the teletext "pages."

The interactive system on the other hand,—viewdata—turns the television set into a computer by linking it to databases through phone or cable tv lines; a special decoder (built in or attached to the set) and a handheld control panel allow two-way communication.

The heart of the book—and more than half the text—is the 62 pages on Ceefax and Prestel, the British videotext systems. Colin McIntyre, editor of Ceefax (for "see facts"), the British Broadcasting Corporation's teletext operation, describes in detail the history, content, scheduling, and staffing of this news and information service. Ceefax draws its content from the BBC's worldwide news-gathering resources and gets its funding from the receiving license required of every television or radio set owner or renter. The Independent Broadcasting Authority—the commercial television in Britain—has its own teletext, called Oracle. One would have wished for more details on how this private system works and gets its revenues; it would better serve as a model for American teletext.

Prestel, the interactive viewdata system, is still in the startup stage, with numerous problems to be solved, not the least of which is how to attract enough subscribers to bring down the costs. Developed by the British Post Office in conjunction with tv set manufacturers and "information providers," Prestel uses telephone lines for communication with computers. The Post Office, which owns and operates the telephone system, has invested a lot of money and several years in Prestel, and success will depend on how quickly subscribers sign up. The chapter on Prestel, written by Max Wilkinson, electronics correspondent of the Financial Times of London, is of particular interest for its "Third Wave" visions of the future.

*Videotext* devotes a chapter to American viewdata experiments and teletext tests, written by Sigel. Here he discusses the test transmissions of teletext conducted by tv stations in the District of Columbia, Salt Lake City, and Philadelphia, and the interactive viewdata experiments planned or already launched by
OUR FREE DEMONSTRATION
WON'T SOLVE EVERYBODY'S
PROBLEMS...
JUST YOURS.

Let Pertec® do one of your input application or data entry jobs free, on our XL40 System. Then you'll see how easy our distributed data entry can be.

The XL40 is a powerful distributed system that gives you flexibility to put processing power where you need it most—at remote sites—without the added cost of going through your mainframe.

Pertec's outstanding XL System features:
Data Capture. Our XL System eliminates the need for keypunching or costly mainframe validation runs. You correct errors as they're entered at each terminal, and get clean, computer-ready data in one step.

File Management. You'll save time retrieving files with the XL40's multi-key capability. You can access and update remote data base files and get your reports immediately. All possible with our new Winchester-type disk storage of up to 120 megabytes.

Concurrency. You'll get greater productivity because the XL40 lets you do up to eight tasks at once, with the fastest keyboard response around. It supports up to 16 terminals in a variety of configurations, and you have a choice of 480- or 2000-character CRT displays.

Ease of Operation. Pertec designed the XL40 to be quiet and compact. So no matter where you put the system, your people can operate it easily.

You wouldn't expect less from a company that's been perfecting technology for over 14 years. In fact, we back the XL40 with outstanding reliability, nationwide software support, and a superb customer service network.

We're sure the XL40 will make a big difference in your company, and we're willing to prove it.

For your free demonstration, or more information call (213) 822-9222, Ext. 2593, or just mail the coupon and we'll do the rest.

Take my problem and give me a free demonstration of your XL40 system.
Name ____________________________________________
Company _________________________________________
Address __________________________________________
City __________________________________ State ________ Zip ________
Telephone __________________________ Title __________

Pertec Computer Corporation
P.O. Box 92000
Dept. 50-56
Los Angeles, CA 90009

Perfecting Technology

© 1981 Pertec Computer Corporation

CIRCLE 190 ON READER CARD
SOURCE DATA

Telecomputing Corporation of America, GT&E, Knight-Ridder Newspapers, and Warner Cable. This is the section that suffers most from a lack of currency. By now, other experiments have been planned, those in the planning stage are under way, and those described as launched are bearing fruit.

Also discussed at length are the videotext operations and plans of such countries as France, Germany, Japan, and Canada. This section and the one on the technology of teletext and viewdata were written by Joseph Roizen, listed as president of Telegen. The technology chapter gives a good description for the nontechnical reader-informative, but not befuddling.

A six-page concluding section by Sigel raises for the first time the question of whether the videotext services are really all that useful. This is a somewhat sour note after all the enthusiasm of the preceding chapters, but one that should have been developed further.

An index consisting mainly of the names mentioned in the text and two appendices round out the volume. One appendix lists U.S. videotext involvement, and the other lists British Prestel providers.

Is this book worth $24.95? The answer depends on your needs and resources. How much do you need to know of what is behind the development of the British videotext systems? The technology chapter is valuable for those who would like a fairly detailed description for the layman. If you can make do with less, for very much less you can get a pretty good picture of the videotext field in the February 1980 issue of American Libraries, the monthly magazine of the American Library Association. Knowledge Industries Publications, Inc. (1980, 154pp, $24.95).

—Harriet Rosenfeld

REPORTS AND REFERENCES

CIB 20

The Computer and Business Equipment Manufacturers Association (CBEMA) and the American National Standards Committee have announced a new COBOL Information Bulletin (CIB 20). The bulletin contains the latest information about X3.23-1974 (American National Standard Programming Language COBOL, or COBOL 74). This CIB was produced by the ANSI Technical Committee X3t3, which is responsible for maintaining the COBOL standard. It is the third CIB published since the approval of X.3.23-1974; CIB 18 was issued in March '79 and CIB 19 came out in May '80. Numbers 18 and 19 can be purchased for $6 each, and the latest bulletin, No. 20, sells for $7. Send check and self-addressed mailing label to CIB, X3 Secretariat, CBEMA, 1828 L St. N.W., Suite 1200, Washington, DC 20036. Phone orders not accepted.

NIPPON FUTURE

An update of the 1975 report produced by the Japan Electronic Industry Development Association (JEIDA), "The Future of the Japanese Electronic Industry" is being distributed by Strategic Business Services, Inc. It presents data going back to 1960 and forecasting out to 1990, examining in detail the outlook for computers, peripherals, videodisks, lasers, optical fibers, as well as all types of general consumer goods. Information is included on Japanese exports and imports with the U.S., West Germany, France, Italy, and other countries. The 626-page report sells for $425 from Strategic Business Services, Inc., 4320 Stevens Creek Blvd., Suite 215, San Jose, CA 95129, (408) 243-8121.

MULTINATIONAL MARKETS

"The European Computer, Word Processing and Copier Markets: Opportunities and Challenges For the Major Multinational Companies" is an intensive analysis of developments in those industries in Western Europe. This report highlights the strategies of 15 multinational companies, including IBM, Cii Honeywell Bull, Sperry Univac, Amdaht, Nixdorf Computer, Wang Laboratories, Prime Computer, Intel, and Texas Instruments. Current growth trends, an
EDP SYSTEMS ANALYSTS,
PROGRAMMERS

Earn up to 40 percent more, save more, vacation more as you take on new job challenges with Aramco in Saudi Arabia

Aramco needs outstanding people on the energy frontier in Saudi Arabia. We’re offering outstanding incentives to get them. Up to 40 percent pay premium. 40 day’s paid vacation every year. And a chance to work on a teleprocessing network for the world’s largest oil-producing company—a network that’s in the process of growing from 800 to 1500 terminals.

Our advanced computer network is the absolute intelligence center for all of Aramco’s many activities. Everything depends on it: exploration, production, refining, materials supply, engineering, finance, personnel, process control, and more.

Here are the highlights of the system: Two IBM 3033’s, one 370/158, one 370/168. Smaller systems include an MVS/SE, JES2, TSO, IMS/VS and VTAM.

Aramco’s regional teleprocessing network, running under IMS and TSO, will be growing from 800 terminals to 1,500 terminals.

That’s why we need good EDP people like you.

The immediate openings
• Analyst/Programmers. We need you if you have experience in engineering, finance, power systems, inventory control, purchasing, payroll, industrial relations. Requirements: a BS or a BA in physical science, computer science, engineering, math, finance or business administration. You should also have at least 3 years’ experience, preferably in one or more of these languages: PL/I, IMS-DB/DC, ADF, MARK IV, COBOL, FORTRAN.
• Systems Programmers. Our Computer Science Division needs you to work on IBM 3033’s running MVS/SE, JES2 and VTAM. Requirements: a BS or a BA in physical science, computer science, engineering, math, finance or business administration. You should also have at least 2 years’ experience in one or more of these areas: MVS, JES2, VTAM.

Unsurpassed compensation and benefits
The Aramco salary is competitive and a cost-of-living differential increases it even further. In addition, Aramco people in Saudi Arabia receive a tax-protected premium which can amount to up to 40 percent of the base salary.

Money aside, Aramco offers an outstanding combination of benefits, including the long vacation, comfortable housing, abundant recreation, and an excellent American-style school system for the children.

Extra overseas bonus and new voluntary “bachelor” status for married employees
Newly hired employees for Saudi Arabia also receive a one-time, lump-sum, fully tax-protected Overseas Employment Bonus of up to $5,000.

And now all of the attractive compensation and benefits are available for married employees who may want to work overseas on a temporary “bachelor” status for the first year. This program includes three free repatriation trips by air during this one-year period, and the option to request family status at three conversion dates during the same year.

Interested? Call our 24-hour line any day: (713) 750-6965. If you wish, call toll-free: (800) 231-7577, ext. 6965 between 7 A.M. and 5 P.M., Monday-Friday, Central Time.

If you prefer, send your résumé in full confidence, or write for more information to: Aramco Services Company, Department DM0301NB04C, 1100 Milam Building, Houston, Texas 77002.
evaluation of the European economic environment, and a comparison between IBM’s H Series and the Amdahl 580 are examined. Priced at $475, the study runs 66 pages. Available from MSRA, Inc., 115 Broadway, New York, NY 10006, (212) 349-7450.

LISTING FROM RYE
Contracting for dp program development is often a problem for executives and MIS management, and this “Checklist for Computer Software Contracting” addresses the development of customized software for new applications and conversion of existing programs. The first eight pages discuss the problems encountered in this area, and the other 12 make up the checklist. Covered in the checklist are the following five phases: precontract, proposal evaluation, contracting, performance period, and post-contract. The checklist is available for $5 from Reymont Associates, 29 Reymont Ave., Rye, NY 10580, (914) 967-8185.

VENDOR LITERATURE
REMOTE POSSIBILITIES
This vendor offers a 20-plus-page booklet that supplies the reader with the how-tos of remote services for the first time. The step-by-step instructions are simple guidelines for companies considering remote services investment. Problems encountered in this area, and the step-by-step instructions are included. DIGITAL EQUIPMENT CORP., Northboro, Mass.

FOR DATA CIRCLE 350 ON READER CARD

I/O SUBSYSTEMS
“Industrial I/O Subsystems” is a 32-page booklet that provides a general look at I/O subsystems used in process control and on the factory floor with the vendor’s DPM family of management systems for industry. Specifications and configuration summaries are included. DIGITAL EQUIPMENT CORP., Northboro, Mass.

FOR DATA CIRCLE 351 ON READER CARD

AMBASSADOR FROM MICHIGAN
A four-page flyer details the capabilities of the vendor’s Ambassador CRT terminal. The flyer consists of pictures of the terminal, the terminal’s command and control set, a spec sheet, and environmental requirements. ANN ARBOR TERMINALS, INC., Ann Arbor, Mich.

FOR DATA CIRCLE 352 ON READER CARD

UPGRADE YOUR MICRO
This condensed, six-page catalog describes the vendor’s line of AC remote controls, data acquisition modules, printer adaptors, and interfaces for use with micros, including PETs, TRS-80s, and Apples. CONNECTICUT MICROCOMPUTER, INC., Brookfield, Conn.

FOR DATA CIRCLE 353 ON READER CARD

BARTENDER’S GUIDE
Designed for users and producers of bar code labels, this illustrated 64-page booklet explains the basics of bar code structures and wand scanners. Chapters discuss how scanners work, bar code structure, characteristics of popular bar codes, bar code printing, and bar code label design criteria. MSI DATA CORP., Costa Mesa, Calif.

FOR DATA CIRCLE 354 ON READER CARD

HIGH SPEED DATA TRAP
The vendor’s TRAP (Transient Recorder/Analyzer & Plotter) is described in this four-page brochure on the Model 57-TR high speed trap. PEDERSEN INSTRUMENTS, Walnut Creek, Calif.

FOR DATA CIRCLE 355 ON READER CARD

VIDEO, STORAGE DISPLAY COPIERS
Two four-page brochures available from this vendor highlight its 4611 storage display copier and its 4612 video copier. TEKTRONIX, Beaverton, Ore.

FOR DATA CIRCLE 356 ON READER CARD

NEED EIA CABLE? Data Set has it!
They don’t call us “The Company with a Lot of Connections” for nothing! Whatever your interface cable needs, call on Data Set.

All types of cables and connectors, pinned to your specifications — ribbons, coax, twin-ax, Telco, junction boxes... to name just a few.

THESE ITEMS IN STOCK

| EIA RS 232-C Cables — All 25 Pins Wired |
| MALE-TO-MALE or MALE-TO-FEMALE |

Specify when ordering:

<table>
<thead>
<tr>
<th>LENGTH</th>
<th>PRICE</th>
<th>LENGTH</th>
<th>PRICE</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 feet</td>
<td>$17.50</td>
<td>20 feet</td>
<td>$26.00</td>
</tr>
<tr>
<td>5 feet</td>
<td>$18.50</td>
<td>40 feet</td>
<td>$36.00</td>
</tr>
<tr>
<td>45 feet</td>
<td>$38.50</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10 feet</td>
<td>$21.00</td>
<td>50 feet</td>
<td>$41.00</td>
</tr>
<tr>
<td>15 feet</td>
<td>$23.50</td>
<td>30 feet</td>
<td>$33.50</td>
</tr>
</tbody>
</table>

New catalog available

The EST Company offers a complete line of pedestal bases and components for stationary or movable stands for terminals or printers. We offer seven styles of 4-leg pedestal bases in sizes from 19" to 34" spreads, and three styles of 5-leg pedestal bases in sizes ranging from 22" to 28" spreads.

Our line of uprights and top plates can match your needs for those stands. Let us quote your custom casting needs or work with you on your stand unit design.

EST COMPANY, BOX 251, GRAFTON, WI 53024 (414) 377-3270
A DIVISION OF LEGGETT & PLATT, INC.

CIRCLE 194 ON READER CARD

CIRCLE 195 ON READER CARD
“Our Pitney Bowes Computer Output Mailing System lets one person do the work of three and gets our premium notices out in one-quarter the time. It’s a truly cost-efficient means to improved cashflow.”

“For years we’ve relied on the most advanced computer systems to generate premium and lapse notices for our customers in 10 midwestern states. But once the computers were done, the notices always went through a real obstacle course before they hit the mail.

“The forms would be taken from the third floor computer room down to the first floor mail room for bursting and trimming. Then, someone would take them over to the print shop for folding. Finally, they were brought back to the mail room for inserting and metering.

“But, now all that’s changed with the help of our new Pitney Bowes Computer Output Mailing System. One person simply takes the computer output to the mail room, loads it into one end of the Pitney Bowes system and pushes a button.

“Seconds later—fully bursted, trimmed and folded—letters are being automatically inserted, sealed and metered. As the letters emerge from the other end they’re ready to mail—they’re even presorted by zip code so that we can take easy advantage of the Postal Service’s 2¢ first class presort discount.

“It’s also a very flexible system. We frequently have to insert special notices into certain mailings, for example when a state changes its insurance laws. Before we did it all by hand—adding a day or two to the mailing. Now we simply load the system with the special notices—several can be handled at once—and it automatically inserts the notices into the appropriate envelopes. Not a second is lost.

“Now our payments are coming back one to two days sooner. Cashflow is improved. Manpower costs are down. And it’s all thanks to the Pitney Bowes Computer Output Mailing System.”


Name __________________________
Title __________________________
Company ________________________
Address _________________________
City, State, Zip ___________________

CIRCLE 196 ON READER CARD
Source Code Program Generator
For RSTS/E™ And RT-11™ Systems

Reduces Program Development times by 70 - 90%!*

- Produces clean, consistent source-level code in BASIC-PLUS™ COBOL-14™ COBOL-PLUS™ DBOL™ and/or DBM™
- More than 100 installations in less than one year!
- Come and see RIMS/MPG at our expense...
  (ISR offers an airfare reimbursement plan to licensees who review RIMS/MPG at our Pgh. Airport-located offices.)
- Call or write...

The Effective Solution for
DETAILED JOB COSTING

J.A.M.I.S.
(Job Cost & Management Information System)
Integrates:
- Job Cost
- Payroll
- Accounts Receivable
- Accounts Payable/Purchase Orders
- General Ledger
- Inventory/Order Entry
- Fixed Assets

S-Cubed Business Systems
320 Walnut Street, Philadelphia, PA 19106
Phone 215/922-7500

*Based on a June, 1980 survey of more than 40 RIMS/MPG users.

Call us for structured solutions to help you address your people productivity challenges...

SDM/70™ for Designing, Maintaining, Enhancing & Documenting Systems
ESTIMATOR™ for Estimating Project Time & Cost
PC/70™ for Project Planning & Control

Components of OSP - An Operating System for People

Atlantic Software Inc.
320 Walnut Street, Philadelphia, PA 19106 (215) 922-7500
Contact: Robert P. Wolk, Executive Vice President
The deal of the ’80’s!

CP/M® Business Software
- Accounts Receivable
- Accounts Payable
- General Ledger
- Payroll

For a modest one-time fee, TCS offers you to fully integrated, fully operational business software — over 500 pages of documentation.

If you have an 8080, 8085 or Z80 CPU system, a minimum of 48K of memory and Microsoft Basic, CP/M®, we have the Business Software (available in both interpretive and compiled versions) — and more... for you.

Call us today for more information and our new price list!

TCS Corporation
5582 Peachtree Road
Atlanta, Georgia 30341
404/445-6162

The Prevent DBMS
Productivity Tool
- For DEC 11 and VAX (Native Mode Tool)
- In Use For 10 Years... 140 Sites Installed.
- Technology Leader in Data Base Systems.

Call For A FREE
BRIEFING MANUAL
(617) 437-7600
AMERICAN USED SOFTWARE COMPANY
P.O. Box 5, Kenmore Station, Boston, MA 02215
(This is a product of Advanced Data Management)

PREVENT “Wild Cards”
IN YOUR DATA

with... SUPER-MST

SHARED DASD USERS:

- PROJECTS YOUR DATA INTEGRITY by preventing simultaneous destructive updates by jobs in different systems.
- Eliminates RESERVE Lock-outs (both per-task and “deadly embrace”)
- DOES NOT SACRIFICE RELIABILITY as do other approaches to the problem.
- Now has extended VSAM Dataset Integrity to specifically handle the internal VSAM Dataset SHR options.
- Informs Operators and/or TSO users (as appropriate) about the precise task (job, TSO user, etc.) causing dataset conflicts.

For More Information or to Order a No-Obligation FREE TRIAL...

CIRCLE 309 ON READER CARD

SOFTWARE CHANGE CONTROL

Universal Cross-Reference Program
Automatically Generates Installation Wide Cross-References Between Main-Lines And External Sub-Routines.

When a sub-routine changes it is essential to find out what other programs are calling it. Because they all have to be re-linked or re-compiled!

Files used and macros called references are also generated.

New available for cobol and PL/I shops with OS or VM setups.

CENTRAL CANADA
SOFTWARE RESEARCH
P. O. BOX 425
STREETVILLE STATION
ONTARIO CANADA L5M 2B9
(416) 826-8473

CIRCLE 310 ON READER CARD

MARCH 1981 255
The Global Console Director™ is an extremely flexible tool. It allows (selected) message streams from different systems to be logically "blended" to create a unified system image to which whatever devices are physically connected can be allocated into the appropriate revenue center. The Global Console Director™ can improve overall throughput by simplifying operations. By allowing several physical consoles to be logically merged, excess devices can be eliminated for immediate savings, or deployed elsewhere to strategic advantage.

ACSL

The Advanced Continuous Simulation Language is a powerful yet easy to use program designed for modeling the behavior of dynamic systems. Applications range from control system analysis to chemical plant models to urban dynamics. 

- Interactive or Batch Graphics
- Unlimited Problem Size
- FORTRAN Compatibility
- Stiff Integration

ACSL reduces program development time by factors of two to ten: ACSL is available for CDC 6000/7000, IBM 360/370, UNIVAC 1100, SEL 32, PDP 10/20 and VAX™ II computers. Access through UCS, CYBERNET and other national networks.

MITCHELL AND GAUTHIER ASSOCIATES, INC.
P.O. Box 685, Concord, Ma. 01742
(617) 369-5115

RSX-11M

NEW! DIGITAL COMMAND LANGUAGE

- CREATE COMMANDS
- SAVE POOL SPACE

SAVES YOU TIME AND MONEY

- English commands
- Makes RSX-11M simple to use
- On line help, hints, and examples
- Easy to install NO SYSGEN required
- Fully supported
- Complete documentation
- $795, available immediately

ANDREW RUBEL & ASSOCIATES, INC.
One Soldiers Field Park 605
Boston, Ma 02163 (617) 876-7993

BIMPOO S

DOS/VS/VI Terminal Facsimile Printing
Retrieves batch print from POWER/VS queue, converts and prints on 3270-type terminal printer via CICSH or SHADOW. May be used to eliminate RJ E printers.

BIMSERV

DOS/VS/VI Library Display

Displays directories and entries in all DOS/VS/VI libraries, plus Label Area and VTOC's. CICS $1480 or $74/mo.

BIMSLUG

DDS/VSE Paste Display

Used by operators or programmers to review DDS/VSE messages via CICS or SHADOW without taking up system console $720 or $360/mo.

BIMMONTR

DOS/VSE System Status and Disk Display

The original and still the best DOS/VSE system activity, performance measurement, POWER/VS queue, and POWER/VS job output display system. CICS Numerous options to assist operators, programmers, and systems programmers.

BIM

BI MOYLE ASSOCIATES
4335 LYNDALE AVENUE SOUTH
MINNEAPOLIS, MN 55409
(612) 822-2661

Consultants based in Minneapolis and Wash. D.C.

ALLEN SERVICES CORP.
Software Dept. 212 W. National Rd
Vandala, Ohio 43777

EDP Managers... You need QCM

You've tried solving your performance problems with hardware monitors, sampling software monitors, unsatisfactory billing systems, SMPF and RMF inadequacies, simulations... Now, try something that works! QCM.

QCM is the only complete system that precisely monitors all hardware and software processes, accurately bills all operations and improves performance...all on a full-time basis.

Let us show you how QCM can improve control, efficiency, confidence and dollars to your customers.

I'm ready to try something that works! Please provide me more information about QCM.

Name

Title

Organization

Address

City

State

Zip

Telephone

CIRCLE 310 ON READER CARD

CIRCLE 311 ON READER CARD

CIRCLE 312 ON READER CARD

CIRCLE 313 ON READER CARD

CIRCLE 314 ON READER CARD

CIRCLE 315 ON READER CARD

CIRCLE 316 ON READER CARD

CIRCLE 317 ON READER CARD
ATTENTION SHARED DASD AND SHARED TAPE USERS

... YOU NEED SDSI/STAM

SDSI protects data integrity by guarding against concurrent update from multiple CPUs.

SDSI/STAM eliminates RESERVE LOCK-OUTS.

SDSI provides operator and TSO users information about dataset conflict conditions.

SDSI requires no system or user program modifications and installs in minutes.

STAM automates the sharing of tape and DASD devices thus allowing allocation decisions to be made faster and reducing the possibility of human errors.

STAM makes more efficient use of tape pools thus allowing you to reduce tape drive requirements.

STAM provides global operator commands and control.

STAM eliminates tape re-runs due to multiple tape drive allocation errors.

STAM requires no system or user program modifications and installs in minutes.

CIRCLE 318 ON READER CARD

EXPAND YOUR DATASYSTEM® 310

Do you wish you could use a 2nd terminal on your present system? What if it was possible to go to 16 terminals, and any of those through remote phones at your other locations? The first step is to expand to "Hard Disks" (RK05 or RL01) then copy your present DIBOL® programs over to run with little or any modification. It’s being done all over the country . . .

Call and find out more . . .

Phone: 214/428-5300 or 278-4031 Brier

FEDERATED CONSULTANTS INC.
1210 S. ERVAY,
DALLAS, TX. 75215

©)Dibol and Dataystem trademark Digital Equipment Corp. AD-13

CIRCLE 319 ON READER CARD

FREE

Data booklet on specialized software information systems covering:

* GENERAL SOFTWARE
* DATABASE SOFTWARE
* MICRO & MINI SOFTWARE

A.P. Publications Ltd
322 ST. JOHN STREET - LONDON, E.C.1

CIRCLE 320 ON READER CARD

All Hands on DEC

Good news. It’s smooth sailing for financial modeling, analysis and consolidation applications because the FCS-EPS system is now available on DECsystem-10, DECsystem-20 and PDP-11/70 CPUs.

FCS-EPS is the comprehensive package for developing decision support systems with a minimum of time and effort. More than just a modeling tool. FCS-EPS is a sophisticated, open-ended system utilizing a financially-oriented language easily applied by non-technical people. "What if" analysis, statistical analysis, risk analysis, hierarchical consolidation . . . it’s all within the grasp of the financial information user with FCS-EPS.

Find out more about what to look for in truly user-oriented financial planning systems. Write today for our free brochure: "Selecting and Evaluating Financial Modeling Systems".

Eps Consultants, Inc.
8600 W. Bryn Mawr - Chicago, IL 60631
Phone: 312-693-2470

CIRCLE 321 ON READER CARD

RSTS/E & RSX-11M SOFTWARE PACKAGES

KDS5 multi-terminal key-to-disk data entry system
TAM multi-terminal screen-handling facility for transaction-processing applications
FSORT a very fast record sort for RSTS/E
SELECT convenient, very fast extraction of records that meet user-specified criteria (RSTS/E only)
BSC/DV a DV11 handler for most bisynchronous protocols (RSTS/E only)
COLINK links two RSTS/E systems using DMC11s
DIALUP uses an asynchronous terminal line to link a local RSTS/E system to a remote computer system

Evans Griffiths & Hart, Inc.
55 Wattham Street
Lexington, Massachusetts 02173
(617) 861-0670

CIRCLE 322 ON READER CARD

CIRCLE 323 ON READER CARD
HEN YOU NEED
DEC...

TERMINALS
- VT-100 • VT-103
- LA34 • LA120 • LA180
PDP11/03 • PDP11/23
SYSTEMS
LSI/11 MODULES
Demand • Delivery • Oem • Discounts
Demand • UNITRONIX

UNITRONIX
CORPORATION
(201) 874-8500
198 Route 206 • Somerville, NJ 08876
TELEX: 833184

CIRCLE 324 ON READER CARD

DEC
SYSTEMS & COMPONENTS
C.D. SMITH & ASSOCIATES, INC.
12605 E. Freeway, Suite 318
Houston, TX 77015
713-451-3112

CIRCLE 325 ON READER CARD

PERSONAL COMPUTING

DISCOUNT TRS-80® DEALER A301
COMPUTER SPECIALISTS
FREE
COMPUTER
CATALOG
UPON REQUEST

$ DISCOUNT $ on TRS-80's
26-3001 4K Color = $340.00
26-1062 16K III = $88.00
26-4002 64K DRIVE = $640.00
1-800-841-0860 TOLL FREE
MICRO MANAGEMENT SYSTEMS, INC.
Downtown Plaza Shopping Center
115 C. Second Av., S.W.
Cairo, Geor. 31728
(912) 377-7120 Ga. Phone No.

CIRCLE 327 ON READER CARD

INFORMATION SYSTEMS
Fleming, a nationwide wholesale food distributor and food-related products, has tripled its sales in the last ten years to more than $2.5 billion annually. We have implemented new technology aimed at achieving increased productivity, greater efficiency and improved service to our retail members and their customers.

We are looking for information Systems personnel with proficiency in COBOL, DOS/VS and IBM 360/370 equipment. If you have a strong data processing background with a bachelor's degree or equivalent, and would like to take advantage of these nationwide opportunities, please send your resume to:

Personnel Administrator
Fleming Companies, Inc.
P.O. Box 26647
Oklahoma City, OK 73126
An equal opportunity employer, M/F.

CIRCLE 326 ON READER CARD

PROGRAMMER
(SENIOR)

Scientific Applications
We are one of the largest environmental consulting companies in the U.S. with an outstanding opportunity for an individual with a BS, experience in assembly language preferably on minicomputers and experience in Data Communications/Consultant software.

As a senior member of our 6 person DP department, you will assume certain managerial responsibilities, will conduct systems and applications programming, will install and develop software for our home office Data General Eclipse M600 minicomputer and our 10 existing and rapidly increasing number of in-field minicomputer/microprocessor systems.

We offer a generous compensation package. Send resume with salary history and requirements to: M.E. CANTWELL.

ENVIROPLAN, INC.
59 Main Street
West Orange, N.J. 07082
An equal opportunity employer M/f.

CIRCLE 328 ON READER CARD

BUY, SELL, LEASE

DATA PROCESSING MANAGER
COMPUTER PROGRAMMERS
SYSTEM ANALYST
HAMAD GENERAL HOSPITAL
DOHA, QATAR
ARABIAN GULF

DATA PROCESSING MANAGER, 2 COMPUTER PROGRAMMERS and SYSTEMS ANALYST sought to initiate computer system for the new 660-bed Hamad General Hospital in DOHA, QATAR on the ARABIAN GULF.

SALARIES are attractive and BENEFITS excellent, including free furnished housing, air tickets to and from Doha for a family of five, 45-60 day paid vacation at the end of each 12-months of service, liberal allowances for relocation, local travel and children's education.

Interviews to be held in the U.S. in late March 1981.

Candidates are invited to send their complete resume with telephone numbers to: Dr. G. Gilbert Tallau, Director of Personnel Affairs, Hamad General Hospital, c/o University Associates, 598A Brookline Avenue, Boston, Massachusetts 02215.

CIRCLE 329 ON READER CARD

USE THE DATAMATION MARKETPLACE ADVERTISING SECTION

CALL KATHY
(212) 489-3473
OR SHIRLEY
(212) 489-3460

CIRCLE 330 ON READER CARD
Great visual applications need a great graphics system

VGM® – The Virtual Graphics Machine
A truly great graphics system providing a rich set of operations, developed for flexibility and device independence. This will allow your own applications to drive any graphics device without software alteration. VGM is designed to support any output configuration based on any display technology, be it raster, vector, storage or hardcopy and any input device such as lightpen or joystick. With VGM you concentrate on what’s important: the application, not the hardware.

Flexibility the Key
VGM provides a wide variety of selectable features to support a broad spectrum of graphics applications including engineering, architectural and business. Since this set of graphics functions implements and extends the 1979 ACM/SIGGRAPH Core System standards, program portability is guaranteed and significant reduction in programmer training is ensured. In addition, VGM is written in ANSI-FORTRAN and is compact enough to fit on most processors, including micros, making VGM machine independent — another key factor in VGM's flexibility!

The Basic Package
VGM lets you optimally use graphics by providing: a complete set of 2D primitives including lines, arcs, text polylines; choice of size, colour, orientation and intensity; an extensive debugging and error handling facility which speeds up application software development; introductory and user manuals; fully documented skeleton device driver; a user requested device driver from the current VGM library; Acceptance Package for system self-test; 90-day support. These are some of the key features now available.

For your Future Expansion
VGM's modular design allows you to expand your system capability by using VGM options. Increase productivity through the ability to interactively build quality charts with our Business Graphics option. Types handled include: cartesian graphs, pie charts, polar plots, in any color, texture and font. Other enhancements include: additional device drivers; a 3D graphics package which resides on top of VGM, with optional hidden line removal. Extended support, on-site installation guidance and consultation are also available.

For more information on this versatile system which can provide a positive increase in performance please contact:
VGM Marketing
Dept. BD01
Bell-Northern Research
P.O. Box 3511, Station C
Ottawa, Canada K1Y 4H7
(613) 226-5400

Bell-Northern Research is the largest privately owned research and development organization in Canada. It is widely recognized as a world leader in electronics and digital communications, VGM and many other quality software tools help maintain its prominence.

Illustration is an artist's impression. VGM is a registered trademark of Bell-Northern Research.
Aramco needs outstanding process computer specialists on the energy frontier in Saudi Arabia. We’re offering outstanding incentives to get them, including up to 40 percent pay premium.

The application of process computers to Aramco projects has accelerated the need for experienced computer system specialists in systems engineering, systems software, real-time application of programming, computer hardware, instrumentation, and NGL process engineering.

Need best people for challenging jobs
Aramco has challenging job opportunities on oil, gas and NGL control systems, offshore and onshore SCADA, metering, chromatographic systems, terminal systems, and many more.

Aramco, the principal oil company helping the Saudi Arabian government develop its energy resources, is involved in projects that are overwhelming in scope, complexity and inventiveness.

The Company is dedicated to applying process computer systems to all areas. That’s why we need some very talented process computer specialists. Openings are available immediately for direct foreign assignment, temporary USA project teams, or permanent domestic assignments, depending on your particular qualifications.

Process Computer Software Engineers
We require Process Computer Software Engineers with a B.S. degree in engineering, math or computer sciences, and 3 or more years’ experience in various real-time processes, SCADA, projects, or process systems.

Process Computer Control Specialists
We also need Process Engineers with a B.S. in chemical engineering, and 3 or more years’ plant experience and process computer control application experience.

Process Computer Hardware Systems Engineers
Process Computer Hardware Systems Engineers are needed with a degree in electrical engineering, computer science or engineering, computer science or engineering technology, plus 3 or more years’ experience in designing and maintaining process computer and instrumentation systems.

Unsurpassed compensation and benefits
The Aramco salary is competitive and a cost-of-living differential increases it even further. In addition, Aramco people in Saudi Arabia receive a tax-protected premium which can amount to up to 40 percent of the base salary.

Money aside, Aramco offers an outstanding combination of benefits, including 40 days’ vacation every year, comfortable housing, abundant recreation, and an excellent American-style school system for the children.

Extra overseas bonus and new voluntary “bachelor” status for married men
Newly hired employees for Saudi Arabia also receive a one-time, lump-sum, fully tax-protected Overseas Employment Bonus of up to $5,000.

And now all of the attractive compensation and benefits are available for married employees who may want to work overseas on a temporary “bachelor” status for the first year. This program includes three free repatriation trips by air during this one-year period, and the option to request family status at three conversion dates during that same year.

Interested? Call our 24-hour line any day: (713) 750-6965. If you wish, call toll-free: (800) 231-7577, ext. 6965 between 7 A.M. and 5 P.M., Monday-Friday, Central Time.

If you prefer, send your résumé in full confidence, or write for more information to: Aramco Services Company, Department DM0301-DR04A, 1100 Milam Building, Houston, Texas 77002.
An exchange of readers' ideas and experiences. Your contributions are invited.

READERS’ FORUM

MANUAL MADNESS

Madness, indeed. Judging the many entries to DATAMATION’s Manual Madness contest proved to be no small challenge. (And we confess that holiday madness took precedence over Manual Madness; our apologies for the delay in releasing the contest results.)

We received several dozen entries, including a number from Europe. Micros, minis, and mainframes all have been documented by writers with senses of humor ranging from extremely subtle to borderline obscene. And, of course, there are the outright mistakes, such as the microcomputer BASIC Language Reference Manual (manufacturer’s name omitted to protect the guilty) that tells neophytes:

```
PRINT "ONE HALF EQUALS", ½
```

This entry was submitted by John van Someren, of the Bank of Credit and Commerce International, London.

Errors are all too common; there’s the personal computer peddler that uses a six-character input example for a four-character field, for instance, and the mimemaker that combines typos in its explanations along with program examples containing bugs, etc., ad nauseam.

The late Xerox Data Systems rated two entries, both from its Extended FORTRAN IV Reference Manual. Bill Weisman of the Jet Propulsion Laboratory sent the following example of the format for declaring blank and labeled COMMON blocks:

```
COMMON MARKET, SENSE/GROUP/X,Y,JUMP/GHIA, COLD
"Common market, common sense, and common cold I can tolerate," writes Weisman, "but 'common ghia' is a real groaner!"
```

D. S. Galbraith of Canada’s Department of National Defense, the second submitter of XDS documentation, sheds some light on the XDS FORTRAN manual. “Some sort of recognition should be given to the pioneers of ‘human-written’ manuals; there are so few of them still around. I enclose samples of the work of my candidate: someone who wrote the FORTRAN manual for Xerox computers. I believe the manual was composed while Scientific Data Systems was still alive, since later versions of the same manual, subject to more influence from Xerox, became as dull as anyone else’s,” Galbraith says. He indicates a number of entries, ranging from the documentation writers’ standard of using puns in examples—

```CRE(8,ED)=8(ALL,MEN); CALL FOR(‘PHILIP MORRIS’); ABNORMAL PSYCH—to the deadpan ‘IBM (International Business Machines Corporation)’ entry in the index. He states that his personal favorite is the possibility to change the value of π: “The primary purpose of the DATA statement is to give names to constants; instead of referring to π as 3.141592653589793 at every appearance, the variable π can be given that value with a DATA statement and used instead of the longer form of the constant. This also simplifies modifying the program, should the value of π change.” Actually, that’s not as far-fetched as it sounds: we remember reading that one of the Southern states, many years ago, tried to legislate the value 3 for π on the grounds that it would be easier for schoolchildren. Perhaps that’s where we get the time-honored excuse ‘That’s close enough for government work.’

Galbraith also found an extremely subtle bit of craftsmanship on the author’s part. “Perhaps the example having the most significance,” he writes, “is one of the few known references to recursion in FORTRAN, on page 150.” That’s in the index, and the first entry on the page is “Potter, Stephen, 2, 93, 150.” This example “suggests that the anonymous author was one Stephen Potter,” says Galbraith in conclusion. “Where is he now, when we need him?” Indeed.

WESTINGHOUSE GETS 3


According to the Disk Utility System Manual, “Shortly after these programs began to be used by customers other than Westinghouse locations a strange random phenomenon appeared—namely, unpredictable results after a RESTORE. In over two years of continuous internal use no Westinghouse location had experienced anything similar. It became known as 'THE' problem. As the number of external users went up, so did the incidence of 'THE' problem... Then one day a core dump came in the mail of a COPYDT failure and everything became clear—these external customers hitting 'THE' problem all had garbage strewn over their disk tracks. [Subsequent simulations on Westinghouse equipment demonstrated that the programs virtually always dumped and restored the garbage exactly.] Next, whenever a user program would attempt to access..."
these garbage tracks and fail, the blame was always, but always, placed on the DUMP/RESTORE/COPY programs—not a single victim would believe the programs were strictly following the ancient data processing maxim of Garbage-In, Garbage-Out."

A disbelieving user-public necessitated program modifications to detect and flag garbage tracks encountered by the utilities. Westinghouse "began then a concerted effort to build extreme paranoia into the programs. No longer would they be simple, trusting, carefree, uncomplaining souls accepting without question anything written on a disk track . . . It was fully expected these massive program changes would solve 'THE' problem for all time—alas, wrong again. (The programs identified bad tracks galore, but few users actually believed they had garbage tracks in their files.)

In a series of actions, which eventually became as stylized as a Japanese dance, the following scenario is repeated regularly.

**FUNCTION 00-06 SCENARIO**

1. A user runs into a 'Function 00-06' error message. The systems programmer is called in.

2. [The systems programmer refers to the manual, finds it means data out of place, DITTO prints the entire cylinder indicated in the error message, and finally receives eight pounds of printout, showing everything is where it belongs.]

3. [Systems programmer next calls in IBM CE, SE, and FE. All three swear on their green cards that you can't misplace data on their hardware using their software.] It just seems regrettable 'foreign' software sometimes doesn't understand these devices like IBM does, but what can you expect. [The cylinder contains only IBM checkpoint records; the IBM DITTO program shows] everything in place, so what's to worry. If you can't trust your IBM DITTO program and your IBM checkpoint records, what can you trust—the problem.

---

**DATAMATION CROSSWORD**

**A FITTING RELATIONSHIP**

by Brian FitzGibbon Burke

**ACROSS**

1. Author Ayn
5. "— thou take this . . ."
9. Kind of sax
13. Braid
15. Involved in
16. Withered
17. Chewing surface of a tooth
18. What to look for
20. What to look for
22. "The law is an ______"
23. Part of R.S.V.P.
24. Inland sea in U.S.S.R.
27. Neuter possessing
30. Metrical foot
34. Circular file
35. James or Dizzy
37. Karl Doenitz craft
39. What to look for
43. Follow
44. Beyond: prefix
45. Dash's partner
46. Kind of party
47. Johnny ______
48. Part of N.B.
49. Position, on the links
52. Exclude
54. What to look for
61. What to look for
62. Genuine Risk et al.
64. Prerequisite for a diplomat
65. Diminutive suffix
66. Roberta Peters' specialties
67. Arthur of the courts
68. Units of electrical conductance
69. Inflamed

**DOWN**

1. Tachometer concern
2. Guinness
3. One billionth: comb. form
4. Cheerless
5. Bodily tube or vessel
6. Serpent: comb. form
7. Attempts
8. Gateway of a Shinto temple
9. Oval spore sacs in yeasts and molds
10. Baltic denizen
11. Die or domino with three pips
12. Above: poetic
14. Final bugle call
19. Garlic genus
21. Type of remark
24. Word with head or heart
25. Showers
26. Dread
28. Word
29. Morley of tv
32. World, to Weygand
33. Roger or Francis
36. Observe
38. Head, in Le Havre
40. Former Chinese Premier
41. Captain Hook had one
42. Teacher
48. Br'er Rabbit used them
50. Type of legal action
51. Singer Piaf
53. _____ mater
54. Genetic compounds
55. Trace
56. Seeger or Rose
57. One quintillionth: comb. form
58. What Borg and McEnroe draw
59. Kingston _____
60. 525,600 minutes
61. Thus, to Cicero
62. Type of legal action

**Solution on page 280**
There's lots of good reasons to buy your ADD-ON/ADD-IN memory from the leader. For starters, there's the wide range of core and semi mini-memories we offer. The industry's widest. In fact, Dataram is the only company in the world supplying minicomputer-compatible core and semiconductor main memory and disk emulation systems. The only company.

And Dataram ADD-ON/ADD-IN products do more. Like save money...as well as valuable space in your minicomputer. And they increase throughput and improve overall performance.

Just some of the reasons why Dataram is the leading supplier of ADD-ON/ADD-IN memory for the minicomputer industry...and shipping at an annual rate of $25 million.

Want more reasons? If you're using a minicomputer, and want to get more for your memory dollar, talk to us. We're very reason-able. Dataram.

Dataram Corporation
Princeton Road
Cranbury, New Jersey 08512
Tel: 609-799-0071  TWX: 510-685-2542

I'd like more answers about mini-memories for my ________________ minicomputer.

☐ Please send information.
☐ Please have a salesman contact me:

Name
Title
Company
Address
City State Zip


CIRCLE 199 ON READER CARD
just has to be those Westinghouse programs.

"4. [The customer calls Westinghouse for help. Westing­
house says it isn’t aware of any undocumented bugs, and asks the
customer to rerun, and ask for a dump when the error occurs.]

"5. Repeat the failing job and get a core dump. Send every­
thing to Pittsburgh—14 pounds of paper (it’s a virtual storage ma­
chine).

"6. Original delivery envelope (including the return address
label) is shredded by the automatic-stamp-canceling-and-zip-code-
routing-machine of the U.S. Postal Service. [Temporary postal
clerk repackages the now-separated contents and original shredded
envelope into a number of franked government envelopes, dis­
patching them onward to Westinghouse in Pittsburgh.]

"7. [Wes­tinghouse in Pittsburgh receives the aforemen­tioned
envelopes, sends them to the program support group, which
attempts to reassemble the output and deduce the identity of the cus­
tomer through] bits in the core print. . . .

"A letter is composed to an unknown data processing man­
ger stating the error message is valid, that DITTO reads real
addresses from the disk but prints simulated addresses on the prin­
ter, that the record in error is probably on [another track] of the indi­
cated cylinder, and that this problem with the disk checkpoint
records is a ‘known’ IBM problem on their release of DOS.

"Now comes the hard part. Using first principles, it is di­
vined from trace bits in the core dump that the unknown company
has either just cornered the market in filet of old gnu, or is doing
advanced geriatric research on aardvarks. The letter and the prob­
able company profile is sent to

"8. Pittsburgh narrows the profile down to only 20 com­
panies, types the letter, and sends it to all of them. This has been
found to be an excellent way of suddenly stimulating customer interest.

"9. Nineteen managers (the wrong ones) get the letter and
immediately write back wanting to know how Westinghouse
guessed they had just hit a ‘Function 00-06’ error message on IBM
checkpoint records, and to keep confidential the information that they
are doing advanced geriatric research on aardvarks.

"10. Manager (the right one) gets the letter, and although he
is puzzled by the reference to aardvarks when everyone knows that
they specialize in filet of old gnu, calls IBM, asks what is going on.
Wes­tinghouse says the problem is real and they knew it all along; it is a
‘known’ IBM problem.

"IBM rises to the challenge, company honor at stake, and

brings out the big guns. Tell the manager their records clearly show
that of their 12,546 DOS users, only 11,142, including him and 19
others just yesterday, have actually hit precisely this same problem,
and so the problem is still ‘unknown’ to at least 1,404 DOS users. It
is common knowledge in the data processing community a problem
will only become ‘known’ when every one of those 12,546 DOS
users hits the same error, after which it is ‘known’ to everyone, and
this problem obviously had 1,404 users to go. Ironclad logic like
that is irrefutable, so no further mention is made of ‘known’ pro­
blems.

"[IBM proves its point by making a DITTO print of the track.
As additional proof, they dump and restore the cylinder of check­
point records, with IBM utilities.] This all comes to pass, and sure
enough there are no errors.

"11. Pacified with this dazzling display of expertise and
really good reliable software, the manager returns the Westing­
house programs with a note saying they appear to still have some
‘bugs,’ but if they are ever corrected to let him know.

"[DITTO is reassuring to both IBM and its customers, but it
doesn’t print the contents of record zero. It reads real track ad­
dresses, but prints simulated addresses. It also assumes data cannot
be placed on a track after the first EOF record.]”

Ah, finger-pointing, the bane of the multivendor shop. It re­
minds us of the dp manager who called the support manager from
each of his vendors into a group confrontation over an intermittent
failure in his teleprocessing system. After hearing each explain that
his part of the system passed all diagnostics, our friend could only
say, “Well, gentlemen, based on the evidence you just put before
me, I can only conclude that there is no problem.” (Software turned
out to be the villain—under certain rare circumstances the code was
so busy it stopped watching the lines for a millisecond or so—just
long enough to lose a message.)

Westinghouse’s seventh commandment: “Thou shalt believe
all Function 00-06 error messages, and gainsay both DITTO and
your IBM CE, for they speak with forked tongue.”

When not protecting itself from the barbs of forked tongues,
Westinghouse also endeavored to save its customers embarrass­
ment, as evidenced by the first step for operating the 047 tape-to­
card punch:

“1. Turn the keypunch machine on. (Red switch near opera­
tor’s right knee. Be careful not to offend the operator.)”

This item was submitted by Paul Carlson of Westinghouse.

APPLE
MANUALS
FUNNIEST

Apple Computer got two entries, though from what we’ve seen of Apple’s manuals, the micro­
maker probably deserved more—its manuals seem to be full of wit and wisdom. From the DOS
3.2 manual, subtitled “Do’s and Don’ts of DOS,” there’s the following explanation: “What happened was this: your Apple II went
on a fruitless unending search for information on a blank diskette
(on a clear disk you can see forever . . .).” Charles Aylworth of
Taco Time International supplied this example, with a high praise
for Apple.

“I think,” he writes, “that, in whole, the funniest set of
manuals ever published is the work of Apple Computer. In their
Pascal reference manual, there is a program example ‘PROG’ with
attributes ‘Wartsize,’ ‘Jump Length,’ etc. All in all, a very wel­
come humorous approach to otherwise dry material.”

Jack P. Christenson of New Ulm, Minn., found another
goodie. He writes, “I would like you to consider the Apple II DOS
Manual. At least one of their manual writers has a fairly whimsical
approach to choosing examples of commands . . . I think the com­
puter science industry in particular and any technical discipline in
general needs a little lighthearted foolishness once in a while.”
A lack of humor might drive some to drink. Our favorite of the half­
dozven or so examples highlighted by Christenson has to be:

“TO LOAD a program named AGATHA, use the command

@DATAMATION

LEADERS’ FORUM

"Mr. Mackenrow is here with his report on three signs
of spring he spotted today."
To take the DEC™ VT100™ terminal and turn it into a sophisticated, yet economical graphics terminal.

Will wonders never cease? Not if Digital Engineering has anything to do with it. We’re the pioneers in retrofit graphics. And this time we’ve turned DEC’s VT100 alphanumeric terminal into a full-fledged graphics terminal that features multiple character sizes, dot-dash lines, point plotting, vector drawing and selective erase for quick, easy updating of the graphics display.

We call this transformation The Retro-Graphics™ Enhancement. And while it begins with complete emulation of Tektronix® 4010 Series terminals—and compatibility with most existing graphics software, including Tektronix Plot 10™ and ISSCO’s® DISSPLA® and TELLAGRAF®—there is much more to be said for this breakthrough. First, graphics are displayed on a 12” (diagonal) green-toned screen at 640 x 480 resolution. Refresh raster scan technology insures a bright, easy-to-read display. And all of the features that the DEC VT100 terminal begins with remain intact, including 96 upper/lower case ASCII characters, up to 132 characters per line, numeric and function keypads, detachable keyboard and a wide variety of screen customizing features.

The Retro-Graphics Enhancement for the DEC VT100 terminal. Whether you are looking for continuity with existing DEC products, or for a high-quality graphics terminal at hundreds less than the competition, ours is the right idea. For more information, write or call.

Digital Engineering
630 Bercut Drive, Sacramento, CA 95814
(916) 447-7600  TWX 910-367-2009

Retro-Graphic™ is a trademark of Digital Engineering Inc. DEC™ and VT100™ are trademarks of Digital Equipment Corporation. Tektronix® and Plot 10™ are trademarks of Tektronix, Inc. ISSCO® DISSPLA® and TELLAGRAF® are registered trademarks of Integrated Software Systems Corporation.
Choose DASD.

Don't take chances with your conversion. Choose DASD Conversion Software. It's proven itself time and again on actual conversions.

Our software library is comprehensive, well-designed, thoroughly developed. It offers a full range of proven conversion tools, plus specifically designed utilities.

DASD personnel are tops in the field, fully qualified and experienced in all major hardware, languages and applications. We're fully staffed, able to go anywhere, any time you need us. And we'll handle either partial or turnkey conversions. On time and within budget.

Let us help with your conversion. Circle the appropriate number on the Reader Service Card and return it today.

Conversion Programs Available Reader Service Number

RPG/RPG II to COBOL Circle No. 203
NEAT/3 to COBOL Circle No. 204
DIBOL to COBOL Circle No. 205
COBOL to COBOL Circle No. 206
FORTRAN to FORTRAN Circle No. 207
DOS ALC to OS ALC Circle No. 208
MAP to COBOL Circle No. 209
COBOL ISAM to COBOL VSAM Circle No. 210
CCP to CICS Circle No. 211

Other products also available:
Job control language translators; MAPGEN on-line CICS Productivity Aids; Business Graphics

Dealer inquiries are invited

Choose the proven conversion software.

READERS' FORUM

loaded. To test if AGATHA is loaded, see if she can walk a straight line. "If you want AGATHA to run after she's loaded (poor thing) . . ."

Maybe AGATHA's drinking problem prompted three nearby examples: "SAVE OUR HAPPY HOME, D1, 57"; "LOAD UP"; and "RUN AMOK, 57."

DECsystem-10 (née the PDP-10) brought in three entries.

"... I think [the enclosed three-page flowchart of a DEC-10's instruction execution cycle] is worthy of being added to your collection, perhaps to be filed under 'PATHOS,'" writes Peter H. Roosen-Runge of York University. "As one who attempted to present the gyrations of the DEC-10 instruction cycle to a class of rathernumbed undergraduates, by the time we had lost our way on the 'double memory operand fetch,' waited to 'start a bus discharge,' fell through the 'store second accumulator' branch, and finally found the 'Otherwise DONE (thank God)' box . . . we had every sympathy for the author's well-justified expression of gratitude to the Diety, for providing an exit box to the most tangled flowcharts of life." (We won't even try to reproduce the flowchart—it really does take up three pages.)

We've always thought that DDT was a great name for a debugging package, and now, thanks to Merleen Gholdston of the Water and Power Resources Service in Provo, Utah, we know the history of the name. On the first page of the DDT-10 manual there's an "historical footnote" which reads "DDT was developed at MIT for the PDP-1 computer in 1961. At that time DDT stood for 'DEC Debugging Tape.' Since then, the idea of an on-line debugging program has propagated throughout the computer industry . . . Since media other than tape are now frequently used, the more descriptive name 'Dynamic Debugging Technique' has been adopted, retaining the DDT acronym. Confusion between DDT-10 and another well-known pesticide, dichloro-diphenyl-trichloroethane [c(14)H(9)Cl(5)], should be minimal since they attack different, and apparently mutually exclusive, classes of bugs."

A clean computer is a happy computer, and it pays to vacuum up all those bugs that bit it when the DDT hit. Manufacturing Data Systems, Inc.'s Karlfred Schillack sent us an appendix from the DECSYSTEM-10 Hardware Reference Manual. Under the heading of "Cleaning the Equipment," there's the following cautionary note: "When cleaning, be careful not to change the position of any switches as this could easily cause a software crash. Also be very careful not to jar any disk or drum equipment as serious head problems may result."

"It is alright to use spray cleaner on exposed vertical surfaces, but do not use it around switches, near intake grattings, or near any other openings, because the 'guck' can cause severe problems if it gets inside the equipment."

"The 'alright' in this caution applies to the sheet metal. Whether the carcinogens that come out of aerosol cans are alright for your lungs is up to you to decide. It has never been shown that the presence or absence of fingerprints or other stains has any effect whatever on the operation of the system. And anyway, it is probably much healthier to get a little exercise using something like Spic and Span."

And a healthy customer is a happy customer.

A LOVELY ONE FROM PDP-11

Then along came the PDP-11—of which so many have been installed, we're quite amazed that its documentation elicited only one entry. But it's a lovely entry, nonetheless, that David L. Hanz of SRI International found—in, of all places, the description of a diagnostic routine. A page-and-a-half historical note describes the adventure of four engineers—Field Service Engineer, Memory Engineer, System Engineer, and the narrator, a Software Engineer—who found an "indirect path to the CSRs" in early 1977. "[We four] departed the cpu on our search for the CSRs. Memory Engineer promised that CSRs would conditionally reside in the shadow of a giant memory, depending on whether or not they felt switched."

"We began our search for the first CSR believing that if we found one, that the rest of the tribe would surely be nearby. Our task
Sungard™
computer
disaster backup
and recovery
is in Chicago.

- Designed exclusively to meet the needs of America's largest corporations.
- Large-scale IBM 3033–interim to 3081—backup system available within four hours.
- Pre-conditioned space immediately available for replacement systems.
- Office and terminal space to continue vital computer-related operations.
- Technical support in operations, software, telecommunications and planning.
- A proven approach to network and telecommunications backup.
- More than 100 customer operating systems successfully tested, including MVS, VM, DOS/VS, VSI.

Over 100 of America's largest companies and financial institutions subscribe to Sungard protection in our two existing centers.

More would like to, especially in the Midwest, because Sungard backup and recovery services are, frankly, the acknowledged standard. No one else offers anything comparable.

In response to demand, then, we're opening a third center in a suburban Chicago location, convenient to O'Hare. Like the other centers, it will be a comprehensive, modern facility designed to serve the needs of large, complex customers in the 80s. And like the others in our expanding system of centers, it will reflect our unequaled experience in developing, testing and implementing backup and recovery procedures.

If you or your company would like to know more about the Sungard Center and the protection it offers, contact us in Chicago at 312-938-9244 or 800-523-4970 (in PA call collect).

The number of subscriptions we can accept is necessarily limited, and we expect the list to fill rapidly, as it has twice before.

The reason is easy to understand. Thoughtful companies know that choosing an inadequate disaster plan can be the biggest disaster of all.
“This free brochure tells you how to
PUT AN END TO POWER-
RELATED COMPUTER PROBLEMS”

Says Emil Rechsteiner,
President of Frequency Technology, Inc.
ISOREG computer power modules ISOLATE your computer from voltage spikes and REGULATE voltages within tight limits even when utility voltages drop to brown-out levels or shoot far above normal.

Write, call, or use the reader service card to obtain new brochure free.

Frequency Technology, Inc.
TDC Division
410 Great Road,
Littleton, MA 01460
Toll-free number:
1-800-225-5078
In Massachusetts
call: 617-486-3539
TWX 710-347-6974

CIRCLE 223 ON READER CARD

MINI/MICROCOMPUTERS
1981 MARKETING INFORMATION AVAILABLE NOW.

The fourth annual DATAMATION magazine Mini/Microcomputer User Survey has just been completed. Encompassing small business systems, intelligent terminals, microcomputers and data entry systems as well as traditional minicomputers, this analysis is an invaluable marketing tool and essential reading for sales executives and end-users.

Return coupon to:
Dorothy Chamberlin
DATAMATION magazine
P.O. Box 129
Riverside, CT 06878

□ Please send me ______ copies of the 1980/81 Mini/Microcomputer User Survey. $45.00 in North America, $47.50 elsewhere (deduct $4.00 if payment is enclosed). Prices for additional copies available.

□ Payment enclosed.

□ Bill me.

□ Please send me a copy of the Table of Contents.

□ Name__________________________

□ Title__________________________

□ Phone________________________

□ Company_______________________

□ Address_______________________

□ City/State/Zip__________________

DATAMATION magazine

READERS’ FORUM

was clear: find csr 17772100 behind the giant memory 0 through 16777776 (2 meg words).

“Field Service Engineer suggested that since we could arrive in the east by heading west, then surely we could find 17772100 by heading for 152100. This didn’t make too much sense to my other brothers and myself; however, since Field Service was willing to pay for the expedition, we all left cpu city in search of 152100.

“The first village we came upon was managed by an old, experienced relocator named Kay Tee. We told Mr. Tee of our expedition and our high expectations of finding 17772100 by looking for 152100. He expressed doubt that the feat could be accomplished, but he said since our three most significant bits were six that perhaps his most trusted friend Six (one of the Par brothers) could help us. So we proceeded to see Six Par.

“We found Six Par at a busy highway center directing traffic with his brothers. He greeted us warmly and assured us that we had come to the right place. Six said that his older brother Seven was not to be trusted since he preferred devices to people. Also, Six told us how his younger brothers were much too inexperienced to guide us, and that they usually only do 1-to-1 relocations. So, at Six Par’s highway we were given 177400, which he said to multiply by 64 and add to our 12100 (12100 less 3 MBS). Thus, we were leaving Kay Tee’s village with a total address of 17752100.

“At the outskirts of the village there were two tollgates—one to Cash and one to Uni. We decided to take the Cash route at System Engineer’s suggestion that ‘Cash makes no enemies.’ However, the gate guard would not let us pass because he thought we were a device. We tried to explain, but he insisted that unless our most significant bits were 16, we could not pass. Reluctantly, we decided to try the Uni gate. Here the guard was more negotiable and he let us pass, charging only four bits. Just outside the gate we boarded a Unibus with address 752100.

“The bus trip was supposed to be quite long with many stops; however, it turned out the first stop was the last stop for anybody without a device address. Here we departed the Unibus to find a long row of 36 checkout girls at special registers called Maps. Each Map register had a number with a matching bust size. We all agreed to visit Map number 17760000 to our address of 17760000 and we departed with 17772100, which Memory Engineer promised would lead to the CSR.

“Next we came to the cash highway, but since the cash register was turned off, we were declared amiss and allowed to pass all the way down the highway toll free. We arrived at the Memory bus. We gave the driver our address of 17772100 and proceeded on our way. The driver warned us that no one ever goes there, and he waited for us at our stop since it is not a regular part of his route.

“Here waiting at the bus stop with open arms, we found the CSR and the entire tribe. We briefly exchanged data and climbed back on the Memory bus since we had to return to cpu city before the last Unibus timed out.

“The journey home was without incident. It is interesting to note that once home none of the engineers, including myself, could remember what the checkout girl’s face looked like.”

IBM GETS LION’S SHARE

With its overwhelming number of installations, IBM garnered the lion’s share of entries. Robert Hart of Badger wrote, “Unfortunately, I can’t provide the exact citation, but [Manual Madness brings] to mind my favorite—and to my mind rather characteristic—IBM error message, namely, ‘WRONG ERROR.’” This came up while handling tapes, I believe. Can anyone out there give me a ‘CORRECT ERROR’?” Good question.

In the same vein, a paragraph explaining error correction
2 NEW WAYS TO PROTECT YOUR INVESTMENT

from PLESSEY, Your Full Service Memory Bank

Increase system speed. End single-bit errors. Plessey's two new dynamic MOS memories increase your system throughput. And maintain data integrity.

COMPLETE YOUR VAX* MEMORY. Up to 4 Mbytes for maximum return on investment. Plessey's S780 provides 256 Kbytes of MOS memory on a single hexwide board. Hardware and software compatibility with VAX-11; 8-bit ECC for data integrity. IMMEDIATE DELIVERY.

HIGH YIELD PDP-11/44* MEMORY. Uses 64K RAM technology to achieve 512 Kbytes on a single hexwide board, the S11E/2. One bus load to the Unibus* — either PDP-11/34 or 11/44. Integral ECC/ELR logic with LED indicators. AVAILABLE NOW.

MEMORIES YOU CAN BANK ON

Plessey Peripheral Systems is your full service memory bank for all your memory needs — LSI-11*, PDP-8, PDP-11, VAX, and DG NOVA†. Plessey built its reputation on performance. Billions of bits strong and growing stronger. Backed by years of experience. Put your money in the bank. The Plessey Memory Bank. For memories you can trust.

Plessey Peripheral Systems

Atten: Marketing Dept.
1691 Browning Avenue Irvine, CA 92714 (714) 557-9811

TOLL FREE: 800-854-3581 800-422-4217 (in California)

Waltham, Mass (617) 890-2654
Dallas, Texas (214) 387-0229
Minneapolis, Minn. (612) 881-0190
Westminster, Calif. (714) 895-1811

*Trademark of Digital Equipment Corporation.
†Trademark of Data General Corporation

CIRCLE 212 ON READER CARD
THINK PARALLEL
SOFTWARE PROFESSIONALS

Thinking parallel is not a new thought process, but a way of handling large amounts of data faster than with sequential processing.

The leader in parallel processing, Goodyear Aerospace, needs experienced software professionals to lead development of...

- Operating systems
- Assemblers
- HOL Compilers
- Application Packages

Presently, for NASA and other government agencies, Goodyear Aerospace is developing parallel computers for...

- Image Processing
- Image exploitation
- Tracking
- Command and Control
- Electronic Warfare

Sequential experience is just fine. We will teach you all you need to know about parallel computing.

Send résumé and salary requirements to:
E.L. Searle
GOODYEAR AEROSPACE CORPORATION
AKRON, OHIO 44315
AN EQUAL OPPORTUNITY EMPLOYER

Software/Hardware Professionals: Getting Ahead...
...Or Getting Along?

If you've found that you're just getting along, you need to consult with us. Over the past twelve years, R.M. Norton and Company has been helping professionals get ahead by offering the research and planning necessary for successful career change.

Drawing on more than a decade's worth of resources, our consultants provide expert resume preparation and knowledgeable career path advice. And since we represent some of the country's premier companies, we enjoy access to the choicest openings in a broad range of positions.


If you're just getting along, contact us. You'll find twelve years of experience and service to insure that you get ahead. And as you'd expect, client companies assume all fees.

271 Lincoln Street, Lexington, MA 02173
(617) 661-7800

CIRCLE 213 ON READER CARD

R. M. NORTON & COMPANY, INC.
Professional Placement Consultants
CIRCLE 214 ON READER CARD

READERS' FORUM

Codes (ECC) on the main memory of a 370/155 II explains: "Errors of more than two bits, detected as uncorrectable errors, are treated as true double-bit errors; those detected as single-bit errors are treated as true single-bit errors. . . . Undetected errors are handled as if no error occurred." Sounds reasonable to us (and thanks to John Rich of Charlotte, N.C., for sharing this one with us).

An IBM public relations man once told us that even manuals go through quality assurance before release. But we have the proof in our hands that a tech writer can use sufficient subtlety to slip a zinger past them, at least once in a while.

From the OS/IV/1 Checkout Compiler: TSO User's Guide (an October 1976 revision, to be sure) comes such an example:

"E?c 250 'f' 'he'
"I STATEMENT IN LOGICAL UNIT

"E?!
"250 PUT EDIT('LIST OF PATIENTS FOR HEART TRANSPLANT')('A);"
"Think of what the original was to produce HEART," writes Procter and Gamble's Philip G. Osborne. We must admit that with IBM's love of opaque command languages, it took us several minutes to deduce that "e 250 'f' 'he' 'm' must be an editor directive to change the occurrence of "f" to "he" in line 250. Why the change didn't affect the "f" in "of" or "for" is beyond us. (If this example still is in print, you can bet it won't be long.)

The person IBM calls on the carpet for that example will probably wind up putting spaces in the right places of the IBM FORTRAN IV language specification manual's Debug Facility appendix, where IBM's Bruce Davidson draws our attention to an example program containing the following declaration:

INTEGER SOLON, GFAR, EWELL

Davidson says the example has been there for at least 12 years, and as yet no editor has told it "so long, farewell." IBM's VM/System Product Edit manual caught the attention of two readers, Jack Feldman of Boeing Computer Services and Marvin L. Weisberg of INSCC Systems. Both sent us the text example, "Although porcupine fishes blow themselves up and erect their spines, they are sometimes eaten by sharks. No one knows what effect this has on the sharks." Weisberg sent additional examples, some attributed to Ogden Nash (and most sounding as if they sprang from his pen). Two of the unsigned verses that we liked were:

CELERY
Celery, Raw,
Develops the jaw,
But celery, stewed,
Is more quietly chewed.

and

THE PARSNIP
The parsnip, children, I repeat,
Is simply an anemic beet.
Some people call the parsnip edible;
Myself, I find this claim incredible.

After wading through all these entries, we find we can't, in all honesty, say that one entry is funnier than another. So we've decided to make all contest entrants winners. Every contributor will receive a wallet-sized calculator with a memory constant.

Finally, to unwind after this massive typing job, we're going to take a hint from Hewlett-Packard's RTE FORTRAN IV Reference Manual, submitted by David Barber of Simpact Associates, Inc. In an example of declaring an external function or subroutine, that manual tells us:

EXTERNAL SIN, IS, FUN

We've got eight editors in this office, so lets make it eight to the bar. Who knows, we may even run into the faceless checkout girls or AGATHA and a couple of her friends.

—Bill Musgrave
Only one company offers the widest label selection.

Only one.

Forget everything else you've heard. Only Avery gives you so many data processing label varieties. Stock labels in so many size, shape and color variations. Plus custom capabilities that top them all. No doubt about it.

Avery Label
An Avery International Company

There can only be one leader.

Circle 215 on Reader Card
CAREER OPPORTUNITIES WITH FORD AEROSPACE & COMMUNICATIONS CORPORATION

The right company, projects, and location...

"Deep In The Heart of Texas"

Ford Aerospace & Communications Corporation's Space Information System Operation (SISO) has the right career for you. We're the principal company with NASA's Johnson Space Center. Our projects include the Space Shuttle and NASA's Space Telescope. Located just south of Houston, we're close to beautiful lakes and the Gulf. Plus in Texas there is no state income tax.

Opportunities exist for the following professionals:

- Digital Design Engineers
- Communications Engineers
- System Engineers
- Aerospace Engineers
- Scientific Programmer
- Software Engineers
- Assembly Language Programmers
- Applications Programmers

We offer an excellent salary and benefits package. Send your resume to John Brown or Joe Coyle, Ford Aerospace & Communications Corp., Dept. AJD/2, P.O. Box 58487, Houston, Texas 77058. (713) 488-1270.

An equal opportunity employer, m/f

Ford Aerospace & Communications Corporation
Space Information Systems Operations
<table>
<thead>
<tr>
<th>Company</th>
<th>Contact Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mohawk Data Sciences</td>
<td>113</td>
</tr>
<tr>
<td>MIT</td>
<td>70</td>
</tr>
<tr>
<td>National Advanced Systems</td>
<td>2</td>
</tr>
<tr>
<td>NBI</td>
<td>111</td>
</tr>
<tr>
<td>NCR Corp.</td>
<td>143</td>
</tr>
<tr>
<td>NEC</td>
<td>9</td>
</tr>
<tr>
<td>*Norsk Data</td>
<td>216-40</td>
</tr>
<tr>
<td>Northern Telecom</td>
<td>20.21</td>
</tr>
<tr>
<td>R.M. Norton and Co.</td>
<td>270</td>
</tr>
<tr>
<td>Oasis Oil</td>
<td>236</td>
</tr>
<tr>
<td>Oxford Software Corp.</td>
<td>73</td>
</tr>
<tr>
<td>Panasonic</td>
<td>9</td>
</tr>
<tr>
<td>Perkin Elmer</td>
<td>86, 87</td>
</tr>
<tr>
<td>Pertec</td>
<td>249</td>
</tr>
<tr>
<td>*Phillips Telecommunications</td>
<td>216-12.13</td>
</tr>
<tr>
<td>Pitney Bowes</td>
<td>253</td>
</tr>
<tr>
<td>Plastic Reel Corp.</td>
<td>61</td>
</tr>
<tr>
<td>Plessey Peripheral Systems</td>
<td>269</td>
</tr>
<tr>
<td>Price Computer</td>
<td>22</td>
</tr>
<tr>
<td>Printronic</td>
<td>169</td>
</tr>
<tr>
<td>Racial Electronics</td>
<td>94</td>
</tr>
<tr>
<td>Racial Vadic</td>
<td>121</td>
</tr>
<tr>
<td>Radio Shack</td>
<td>139</td>
</tr>
<tr>
<td>Rath and Strong</td>
<td>104</td>
</tr>
<tr>
<td>Raytheon</td>
<td>277</td>
</tr>
<tr>
<td>RCA</td>
<td>84, 191</td>
</tr>
<tr>
<td>Ricoh Co.</td>
<td>81</td>
</tr>
<tr>
<td>Rixon</td>
<td>10, 11</td>
</tr>
<tr>
<td>SAS Institute</td>
<td>173</td>
</tr>
<tr>
<td>*SE Labs</td>
<td>216-11.33</td>
</tr>
<tr>
<td>Selecterm</td>
<td>64</td>
</tr>
<tr>
<td>*Siemens</td>
<td>216-28.29</td>
</tr>
<tr>
<td>Software Consulting Services</td>
<td>88</td>
</tr>
<tr>
<td>Software Results Corp.</td>
<td>90</td>
</tr>
<tr>
<td>Sorbus, Inc.</td>
<td>66</td>
</tr>
<tr>
<td>*Sord</td>
<td>216-21</td>
</tr>
<tr>
<td>Source Systems</td>
<td>21</td>
</tr>
<tr>
<td>Sperry Univac</td>
<td>26.27-132, 133</td>
</tr>
<tr>
<td>StarTech</td>
<td>8.7</td>
</tr>
<tr>
<td>Summagraphics</td>
<td>200</td>
</tr>
<tr>
<td>Sun Info</td>
<td>267</td>
</tr>
<tr>
<td>Syncom</td>
<td>76</td>
</tr>
<tr>
<td>Tab Products</td>
<td>105</td>
</tr>
<tr>
<td>TEC</td>
<td>65, 57.89</td>
</tr>
<tr>
<td>Tec</td>
<td>231</td>
</tr>
<tr>
<td>Technicon</td>
<td>230</td>
</tr>
<tr>
<td>Technology Transfer Institute</td>
<td>51</td>
</tr>
<tr>
<td>Tektronix</td>
<td>128</td>
</tr>
<tr>
<td>*Tektronix</td>
<td>216-25, 27, 35, 37</td>
</tr>
<tr>
<td>Teltype</td>
<td>Cover IV</td>
</tr>
<tr>
<td>Televideo</td>
<td>243</td>
</tr>
<tr>
<td>Telex</td>
<td>187</td>
</tr>
<tr>
<td>Teltone Corp.</td>
<td>194</td>
</tr>
<tr>
<td>Texas Instruments</td>
<td>146, 147</td>
</tr>
<tr>
<td>Time Magazine</td>
<td>118</td>
</tr>
<tr>
<td>Tran Telecommunications</td>
<td>159, 275</td>
</tr>
<tr>
<td>Trans Net</td>
<td>250</td>
</tr>
<tr>
<td>University Computing Corp.</td>
<td>140, 141</td>
</tr>
<tr>
<td>University System Information</td>
<td>273</td>
</tr>
<tr>
<td>University of Petroleum and Minerals</td>
<td>276</td>
</tr>
<tr>
<td>Vector General</td>
<td>44</td>
</tr>
<tr>
<td>ViTech</td>
<td>44</td>
</tr>
<tr>
<td>Visual Technology, Inc.</td>
<td>52, 218</td>
</tr>
<tr>
<td>Volker Craig</td>
<td>75</td>
</tr>
<tr>
<td>Votrax</td>
<td>234</td>
</tr>
<tr>
<td>Wang Labs</td>
<td>198, 278</td>
</tr>
<tr>
<td>*Wenger</td>
<td>216-45</td>
</tr>
<tr>
<td>Wespack Corp</td>
<td>162</td>
</tr>
<tr>
<td>Wright &amp; Hart Computer Systems</td>
<td>250</td>
</tr>
<tr>
<td>Wright Line</td>
<td>157</td>
</tr>
</tbody>
</table>

**SALES REPRESENTATIVES**

REMOTE COMPUTING SERVICES

We're United Information Systems, the Computer Group of United Telecommunications.

Our companies, On-Line Systems and United Computing Systems, sell timesharing on the world's largest computers, including the CRAY-ISIS.

We have experienced steady growth through aggressive marketing techniques, significant acquisitions and innovative hardware, software, and human resource development. We are just as optimistic about our future growth, and it shows!

Employment opportunities for experienced Sales Representatives currently exist at several of our offices throughout the country. Qualifications for these positions include a minimum of one year experience selling remote batch and job entry services in a large scale environment. Specialization in business, engineering or scientific applications is preferable. Light travel may be required.

Here is what we offer you:

- An attractive base salary plus commission compensation.
- Fully paid dental, disability, medical and life insurance plans:
- Stock purchase and retirement benefit plans.
- Innovative products, a team and structure designed to foster sales.
- Real potential to achieve specific career goals.

Contact us in confidence by mailing your resume to this address today.

Recruiting Department
United Information Systems, Inc.
Post Office Box 8551
Kansas City, MO 64114

Or call our Regional Employment Manager nearest you:

- Mike Cartes in Kansas City, MO at 913-341-9161
- Ralph Grin in Boston, MA at 617-694-6700
- Donna Goodhart in Atlanta, GA at 404-256-3610
- Ron Garrow in San Diego, CA at 714-540-7707
- Ron Pearce in Pittsburgh, PA at 412-931-7600

**EDP SPECIALISTS**

career search opportunities

**PROG/ANALYSTS - RETAIL BANKING, $50,000.** Prestige, blue chip NYC financial institutional sales to major new state-of-the-art retail banking applications. Co offers exciting salaries, creative working environ & fast track tech & mgmt opps.

**EDP AUDIT** to $38,000. Strong demand for EDP Audit pros in the MD, DC, VA area w/majors, intermediate & sr level positions leading to mgmt. Refer DM.

**IMS ANALYSTS/PROGRAMMERS, $25,000-$36,000.** Sev locations frm Suburban VA to Atlanta & Fla for IMS pros at all levels. Large on line IBM ship. Mfg or business bgd. COBOL desired. Refer DM. SR. SYSTEMS PROGRAMMER to $40,000. SUPER ATTRACTIVE Mid-Air location w/surprisingly low cost of living. 1 hr from beach. Between 3/25 hrs from mountains. Lead to MVS progressive, growing $1 billion energy co with strong com to MBS. Superior benefits. Refer HG.

**SYSTEM ENGRs to $30,000.** Customer support env, prepare benchmarks, assist in system configuration & recommendatns. Reg's DB exp, bgd in large medium size hardware. Atlanta based. Refer RS.

**TECH. SUPPORT PERSONNEL to $30,000.** SE "Fortune 100" mfr has immed oppy for Systems Prog w/IBM MVS/CICS bgd. Refer LS.

**DATA BASE ANALYST to $25,000.** Leading SE firm offers excellent oppy for DU Analyst w/communications & IMS tech skills. Refer LS.

**SYSTEMS DESIGNER to $27,000.** NC "Fortune 100" firm seeks DP pr w/HP 3000 exp. IMAGE & STRONG FORTRAN ASSEMBLER. Refer LS.

**SYSTEMS ANALYST to $27,000.** SE mfr has immed need for S/A w/strong DEC bgd for Process Control & mgmt sys applications. Refer LS.

**CONTACT OUR NEAREST OFFICE ABOUT THESE AND OTHER FEE-PAY OPPORTUNITIES.**

OUR UNIQUE, COMPANY-OWNED OFFICE SYSTEM ASSURES PERSONAL, CONFIDENTIAL SERVICE.

**MARCH 1981 273**
Meet the members of the Memorex Communications family: Cluster controllers and terminal controllers, Communications processors, Display stations, Printers. Although every member of our family is dedicated to its own task—each has common family characteristics you can count on.

You can plan on proven performance that has been recognized worldwide. You can plan on total compatibility with your CPU or terminals, because our family members are plug-compatible or functional replacements for 3270 terminals and controllers.

Since each member of the Memorex family is "human engineered," you can plan on improved productivity that goes hand-in-hand with ease of use.

You can schedule well ahead—knowing every member of our family is available. And you can expect cost-effective product solutions without sacrificing field-proven quality and reliability.

Now, when you're considering the purchase of communications equipment, you no longer have to be locked into the "usual" source. Because now—you have the entire Memorex family of controllers, display stations and printers to choose from.

And remember: when Memorex raises a product family, we combine our years of experience with expertise targeted on the technology of tomorrow. To find out all of the specifics on each member of the Memorex family, call Laurie McNeil at (408) 996-9000. Or write: Memorex Communications, 18922 Forge Drive, Cupertino, CA 95014.

MEMOREX Communications Excellence
© 1980 Memorex Corporation.
Memorex is a registered trademark of Memorex Corporation.
A SEPARATE IBM SOFTWARE COMPANY

As a company that has directly competed against IBM since 1965, Applied Data Research has advocated structural relief which would separate IBM's major businesses into six distinct companies:

1. One software company
2. Two hardware companies
3. One peripheral company
4. One services company
5. One office products company

Applying the principle of maximum separation, the following separation guidelines are recommended: For each company there should be separate physical facilities, personnel, names, research groups, and accountability for profit and loss and physical equipment. There should be no advances of capital or loans between organizations; and no exchange of services and products as is generally available to third parties.

Simply stated, each company would be separate. Each would have its own destiny—for better or worse.

For competing firms, the proposed restructuring would reduce IBM's marketing power since each company would have its own marketing force. The restructuring would eliminate tie-in and cross-marketing sales; and would ultimately provide for interface specifications and standards for competing software and peripheral companies. It should also provide for fairer and more competitive pricing and eliminate bundled pricing.

The restructuring would not significantly disrupt users' current operations and plans. It would increase competition, lower prices, improve the quality of IBM software, and increase life expectancy for both hardware and software.

This structural relief has been advocated by the author since the early 1970s. Many discussions have been held with Justice Department personnel, at computer association meetings, and with executives from other software companies. Most of the discussions have centered on whether a separate software company for IBM would be desirable for the computer industry as well as for companies competing against IBM. ADAPSO has supported this position—but there is a strong minority that is uncertain about its desirability.

The most common objection voiced by the Justice Department and other groups is based on the belief that hardware and software are developed together. They question how IBM could design effective computer systems if its software capability were in a "separate" software company.

We need only look at IBM’s internal structure, as well as that of the hundreds of independent software companies, to debunk this misconception. IBM has many "internal" or "separate" software companies within its overall structure. Separate IBM software centers around the world develop software products for IBM. IBM formally disseminates hardware specifications to these separate software companies. Examples include IBM PL/I compilers and CICS, developed by IBM’s United Kingdom center; selected 4300 series operating systems software from Germany; and sorting systems from IBM’s Swedish center.

Since the late 1960s, independent software companies have been developing systems and applications software for IBM computers. These independents do not have the benefit of the proprietary hardware information that the internal IBM software companies have. How have they fared? From a state of the art technology viewpoint, they have proven over and over again that their software is better than IBM's. I believe that even IBM would concede that point.

The Datapro User surveys throughout the 1970s consistently reveal that software developed by independent companies is superior in both quality and price. 

Robert Kleven and Co., Inc.

Industrial Relations Management Consultants

Three Fletcher Avenue, Lexington, Massachusetts 02173

Telephone (617) 861-1020

Member: Massachusetts Professional Placement Consultants
American Management Association
National Association of Executive Search Firms
Representing Equal Opportunity Employers M/F

ENGINEERING OPPORTUNITIES

TRAN TELECOMMUNICATIONS is currently offering the following highly specialized, key positions reporting to the Director of Future Product Planning.

SOFTWARE SYSTEMS ANALYSTS

Will perform systems design for future networking products, conceiving new systems as well as proposing systems architectures and designs. Assignments require 10 years software experience in telecommunications, real-time systems and microprocessors. Candidates will need substantial experience in implementing data communications software as well as a broad knowledge of network and data communications technology.

SYSTEMS DESIGN ENGINEER

As part of our advanced product planning and development group, this position takes on responsibility for conception of new systems designs and systems architectures. Experience in PBX or other voice switching systems, digital coding or compression schemes is desirable, with a background in systems architecture and design.

These key assignments offer excellent rewards and future potential. For consideration, please send resume with salary history to: A. Dhawan, Director of Future Product Planning

2500 Walnut Avenue
Department L
Marina del Rey, CA 90291

AN AMDahl COMPANY

TRAN TELECOMMUNICATIONS CORP.

Equal Opportunity M/F/H Employer

CIRCLE 220 ON READER CARD

CIRCLE 221 ON READER CARD
MINI/MICROCOMPUTERS
1981 MARKETING INFORMATION AVAILABLE NOW.

The fourth annual DATAMATION magazine Mini/Microcomputer User Survey has just been completed. Encompassing small business systems, intelligent terminals, microcomputers and data entry systems as well as traditional minicomputers, this analysis is an invaluable marketing tool and essential reading for industry watchers, market planners, sales executives and end-users.

For detailed information on the 212-page 1980/81 Mini/Microcomputer User Survey, mail the coupon below or call Dorothy Chamberlin, (203) 661-0055.

- Please send me copies of the 1980/81 Mini/Microcomputer User Survey; $485.00 in North America, $475.00 elsewhere (deduct $40.00 if payment is enclosed). Prices for additional copies available.
- Payment enclosed.
- Bill me.
- Please send me a copy of the Table of Contents.

DATAMATION® magazine
SUBMARINE SIGNAL

There's More Engineering Underwater.

Be a part of our growth. Take advantage of our truly unique engineering opportunities. Because we do more underwater than most companies can do on dry land.

If you want the chance to do more with your engineering, join Raytheon Submarine Signal Division. You can work on projects in a full spectrum of undersea technologies: ASW and submarine systems, sonar, oceanography, and marine systems and equipment.

And on every project, you'll work on the latest equipment with some of the finest talent in the world.

Today, we're advancing beyond the leading edge of technology. We're already fine-tuning our projects for the mid-80s, involving technologies including computer-aided design, electronic packaging, and advanced structural software.

Submarine Signal Division will be interviewing in Washington, D.C. on February 24 & 25, and in Philadelphia on March 24 & 25. If either of these interviews is convenient, please request an appointment in your cover letter.

SYSTEMS

Surface ASW
Translate our customer requirements into a comprehensive system architecture, and define critical items for development.

Systems Analysis
Experience in applying estimation theory to Kalman Filtering and other estimation problems in applied environment.

Command/Control
For both submarine and surface applications, develop command and control systems for tactical employment, display communications, navigations, sensor and weapons systems.

Fire Control
Analyze, design and specify advanced functional level systems. You should have Fire Control Systems knowledge (MK 113/10, MK 117, MK 118) and experience with the implementation on AN/UYK-7 based combat systems.

Sonar
Comprehensive sonar systems involve contact, with substantial custom contact. Total sonar systems design experience is required, with in-depth knowledge of signal processing hardware and/or software systems design procedures.

Systems Analysis
Apply scientific computers to modeling simulations and analyses. Experience solving practical physical problems through applying analysis/simulation techniques.

SOFTWARE Sr. Engineers
Translate systems requirements into software architecture, and direct a team of software engineers through the implementation of this system to delivery. This involves Fire Control Systems applications including reliability, error reporting, display graphics, target geometry. High order and assembly languages required.

Methods Engineers
Extend our integrated software development environment (PDP-11 and VAX-11-780 with interactive time sharing system) in the areas of program requirements and design languages, software tools and target interfaces. We seek individuals with all levels of experience, plus formal training in languages/compiler development, Ada, simulation and modeling.

Raytheon Submarine Signal offers you an incomparable working and living environment in Portsmouth, RI. Whatever life style you seek, urban or rural, modern or traditional, country or seaside, our convenience to Providence, Boston and New York provides the answer. Plus, you'll enjoy Raytheon's excellent salary, benefits and relocation package. If you possess a minimum BS and 5 years experience, send your resume and salary history to: A.A. Conway, Raytheon Company, P.O. Box 369, Portsmouth, RI 02871.

RAYTHEON SUBMARINE SIGNAL DIVISION
An Equal Opportunity Employer

CIRCLE 224 ON READER CARD
But since the software will have to be fully priced, it will help to expand significantly the potential of the software market. Thus, on the one hand, a separate IBM software company will require the company to develop more cost-effective software. On the other hand, a separate company will require full pricing and thereby increase the total market for software. Furthermore IBM will have to meet the independent software companies head on. This is the true test of competition.

The IBM software company will not have many of the advantages currently enjoyed. IBM software salesmen will no longer be able to work hand-in-hand with the IBM hardware company. Today, the IBM account manager sells the CPU, software, and the peripherals. This creates a “safe” umbrella for the user—especially the small user. One need only look at the sales literature and selling effort for the IBM 4300s, System 38, and 8100 series to see how strongly IBM markets its systems software to the new hardware buyer. And look what happened in the last few years: these unfortunate IBM System 38 and 8100 series buyers were totally dependent on IBM’s ability to build the System 38 and 8100 series software.

Not only is the software being delivered late, but it is not meeting performance specifications and is requiring more computer resources than originally promised.

Consider the difference a separate IBM software company would have made in this case. First, prior to announcing the System 38 or 8100 series, IBM would have been required to disclose the hardware specifications to all qualified software companies—including the IBM company. Then, any number of software companies might have decided to build the “suggested software” or alternative software. That’s exactly what happened in the past, except the hardware specifications for these systems were given only to the “internal” IBM company, resulting in late and one-of-a-kind software. While software companies were eventually able to build software for the System 38 or 8100 series, they got a late start and will have the opportunity to get only a small share of the market.

Initially, the typical IBM user would probably be opposed to such a separation. IBM users like to eat their cake—and have it too. But if they remember the 1960s, when IBM had a virtual monopoly on software, they may have second thoughts. There was no real software products industry, virtually no innovation, and little progress in improving software technology. The 1970s showed the results of unbundling and a competitive environment.

If IBM could not be the “system integrator” for all its hardware and software, there would be little or no loss for the user. Almost overnight there would be an abundance of “system integration” consultants and companies providing a similar service, and these organizations would be objective. New software companies would enter the field, stimulating innovation and lowering prices.

An IBM reorganization would also reduce the company’s hardware dominance. If IBM sold its software separately, its hardware and software would be evaluated independently. Plug-compatible CPU and peripheral companies would be in a much stronger position. The IBM hardware salesman would no longer be able to offer more expensive hardware while he touts IBM’s software and the advantages of buying from one vendor. Thus, a separate IBM software company could ultimately lower hardware prices. It would also reduce the users’ total hardware requirements. Today, IBM salesmen “upgrade” their wares by a variety of subtle means. First and foremost is the recommendation of such inefficient software as TSO, IMS, CICS, and ICCF. When a user does not install these packages and uses a more efficient piece of system software, the IBM salesman loses precious hardware upgrade opportunities.

What else would a reorganization do to IBM? Probably a fair amount of good. Whether because of internal politics, empire building, or internal structures, IBM has reacted slowly in software. A separate software company could improve IBM’s ability to reorganize and change direction. Indeed, some IBM watchers believe the company may voluntarily reorganize. But IBM’s own plan may be to
COMMUNICATIONS DATA
GENERAL SUPERVISOR

Earn up to 40 percent more, save more, vacation more as you take on new job challenges with Aramco in Saudi Arabia.

Aramco needs an outstanding communications data general supervisor on the energy frontier in Saudi Arabia. We’re offering outstanding incentives to get the experienced professional we want: up to 40 percent pay premium, 40 days’ paid vacation every year, and an opportunity to work on challenging communications data projects for the world’s largest oil-producing company.

You will be heading up a division of Aramco that is responsible for the planning and engineering of the company’s existing telecommunications system. Included will be responsibilities connected with the refurbishment and extension of the existing system.

In addition to the planning and engineering work, your division will be collecting, formulating and requesting procurement of replacement or extension items for the system. This will include preparation of all records, drawings and engineering-related performance indices, as well as standardization of designs, equipment and materials.

You will supervise a staff of about 25 engineers and draftsmen; and your area of activities will include microwave radio, mobile UHF/VHF radio, HF radio, central office telephone exchanges, PABX’s, outside telephone cable plants, TV/FM broadcast and other miscellaneous communications systems.

Unsurpassed compensation and benefits
The Aramco salary is competitive and a cost-of-living differential increases it even further. In addition, Aramco people in Saudi Arabia receive a tax-protected premium which can amount to up to 40 percent of the base salary.

Money aside, Aramco offers an outstanding combination of benefits, including the long vacation, comfortable housing, abundant recreation, and an excellent American-style school system for the children.

Extra overseas bonus and new voluntary “bachelor” status for married employees

Newly hired employees for Saudi Arabia also receive a one-time, lump-sum, fully tax-protected Overseas Employment Bonus of up to $5,000.

And now all of the attractive compensation and benefits are available for married employees who may want to work overseas on a temporary “bachelor” status for the first year. This program includes three free repatriation trips by air during this one-year period, and the option to request family status at three conversion dates during that same year.

Interested? Call our 24-hour line any day: (713) 750-6965. If you wish, call toll-free: (800) 231-7577, ext. 6965 between 7 A.M. and 5 P.M., Monday-Friday, Central Time.

If you prefer, send your résumé in full confidence, or write for more information to: Aramco Services Company, Department DM-0301NB04D, 1100 Milam Building, Houston, Texas 77002.
separate software development without separating the marketing of software and hardware. Good strategy for IBM, but very bad for the independent software companies.

To date, IBM has not had the luxury of simply developing cost-effective and innovative software. Software development strategy is intimately tied to hardware strategy and hardware goals. With a reorganization, there would be no restraints on new software development.

A separate IBM software company would have the opportunity to enter many new markets—including the development of software products for non-IBM computers. A significant amount of IBM application software is written in high-level languages, and much of its application software products could be marketed to IBM competitors.

Of course, change would not be completely painless for IBM. Separate marketing of hardware and software would deflate IBM's total sales and significantly reduce account control. With a separate IBM software company, funds would be limited and cross-subsidization would be eliminated. The company would no longer enjoy the advantage of advance hardware information. Nor would it have the IBM name, or the ability to offer the theoretical security of a package.

Strong grass-roots support for a separate IBM software company exists among the independent software products companies and within ADAPSO. The principle of "maximum separation" has long been advocated by ADAPSO. It has been an overriding theme and the thrust of its actions against banks and their encroaching activity in data services. It has been the basis for ADAPSO's action against Citicorp. And finally, it is the critical issue in the FCC recommendation on how to ensure fair competition with AT&T when it enters the dp arena.

While on the face of it insisting on a separate IBM software company might sound radical, it is actually very conservative. IBM could continue to develop, support, and market its software products. The company would simply be required to operate these activities as a separate organization. In other words, IBM would be required to follow the same rules that currently apply to Citicorp, AT&T, and other dominant organizations. If the concept of "maximum separation" is good for other industries, there is no reason to believe that it would not be good for the computer industry as well.

—Martin A. Goetz
Princeton, New Jersey

Answer to puzzle on page 262

RAND DOST ALTO
PLAIT UPTO SERE
MENSA CHARACTER
COMPATIBILITY
ASS SIL
ARAL ITS IAMB
CAN DEAN UBOAT
HIGH PERFORMANCE
ENSUE META DOT
STAG REB BENE
LIE BAR
DEPENDABILITY
INTEGRITY MARES
TACTETTE ARIAS
ASHE MHOS SORE
Do you think modems are all the same?

No, you're right more of us! But if you have chosen to purchase a modem for a home or office, one thing you'll want to be sure of is that it supports all the latest features and options.

Micron's Intelligent Modem, for example, includes a unique transmission feature: it automatically eliminates echo and the effects of long-distance lines. This means that you can communicate with others in any part of the world without worrying about the quality of your call. Our Modem is also designed to be user-friendly, so you can easily set up and use it with your existing equipment.

Micron's intelligent modems are the perfect choice for anyone who wants to stay connected. Whether you're a home user or a business, Micron's modems are designed to give you the best possible performance and reliability. So if you're thinking about buying a modem, make sure you choose one that meets all your needs. Micron's modems are the smart choice!
A vote of confidence, actually. Given when our customers participated in a leading independent survey where users rate teleprinter terminals.

Ease of operation, keyboard feel and usability, print quality, reliability and maintenance service were all considered. And when the figures were tallied, the Teletype® Model 43 got the highest rating for Overall Performance.

Not surprising when you know how the 43's remarkable reliability pays off in higher uptime. Or that its patented matrix print head has a lifecycle that averages over 200 million characters.

In fact, the only surprising thing is how a teleprinter this good can be so economical to buy and own.

So when you contact your terminal distributor, insist on the teleprinter rated number one by the people who ought to know—the Teletype model 43.

Then, maybe next year we'll interrupt our advertising for a word from you.