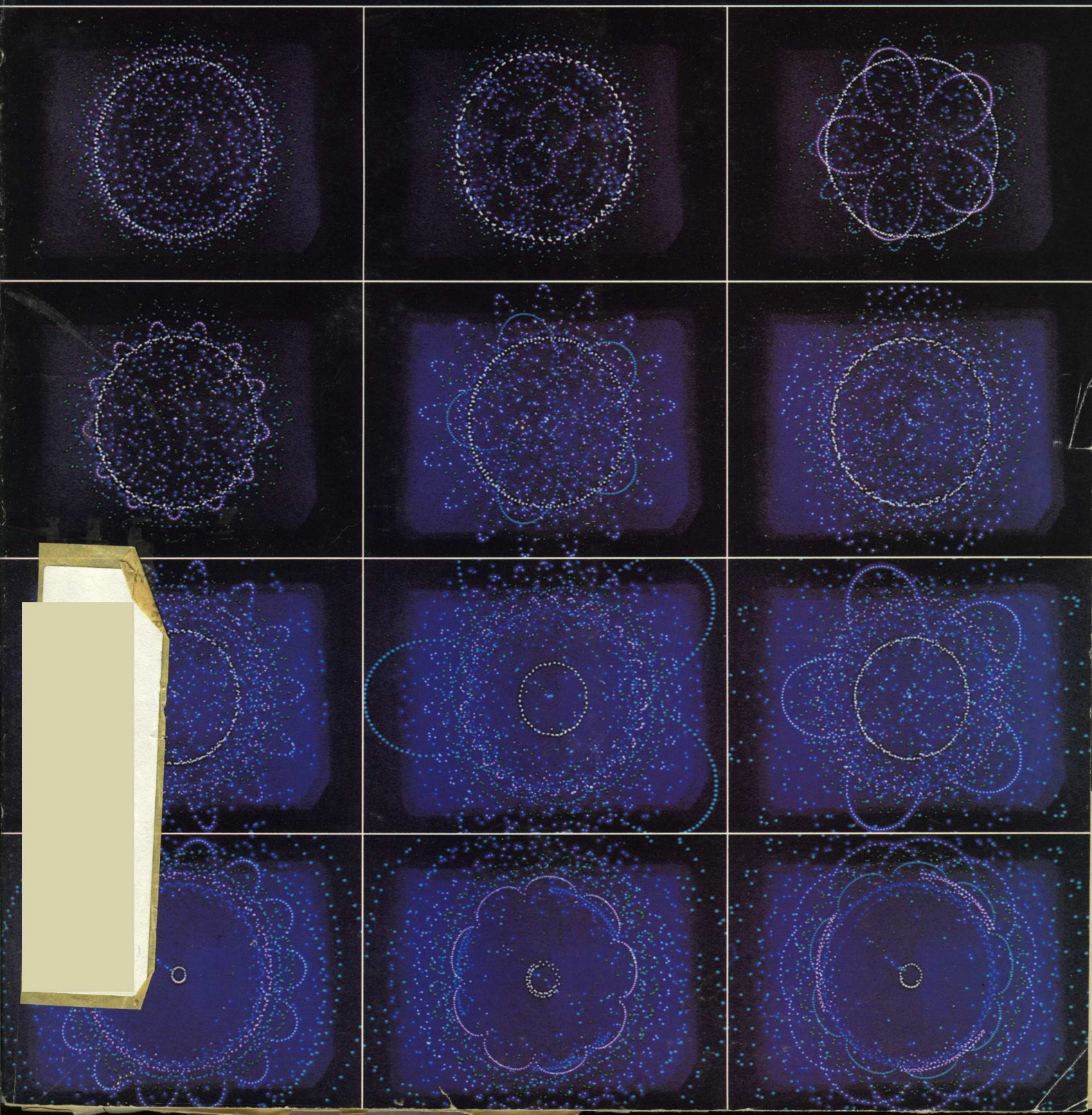
DATAMATION '73®

September

upgrading

also...computers behind the iron curtain,
data code control, monopoly–it's not a game...



Why think small? V-73 with WCS & Memory Map.

Our V-73 system is as big and flexible as your needs. Tailor your micro-instruction with Writable Control Store. Or use ours.

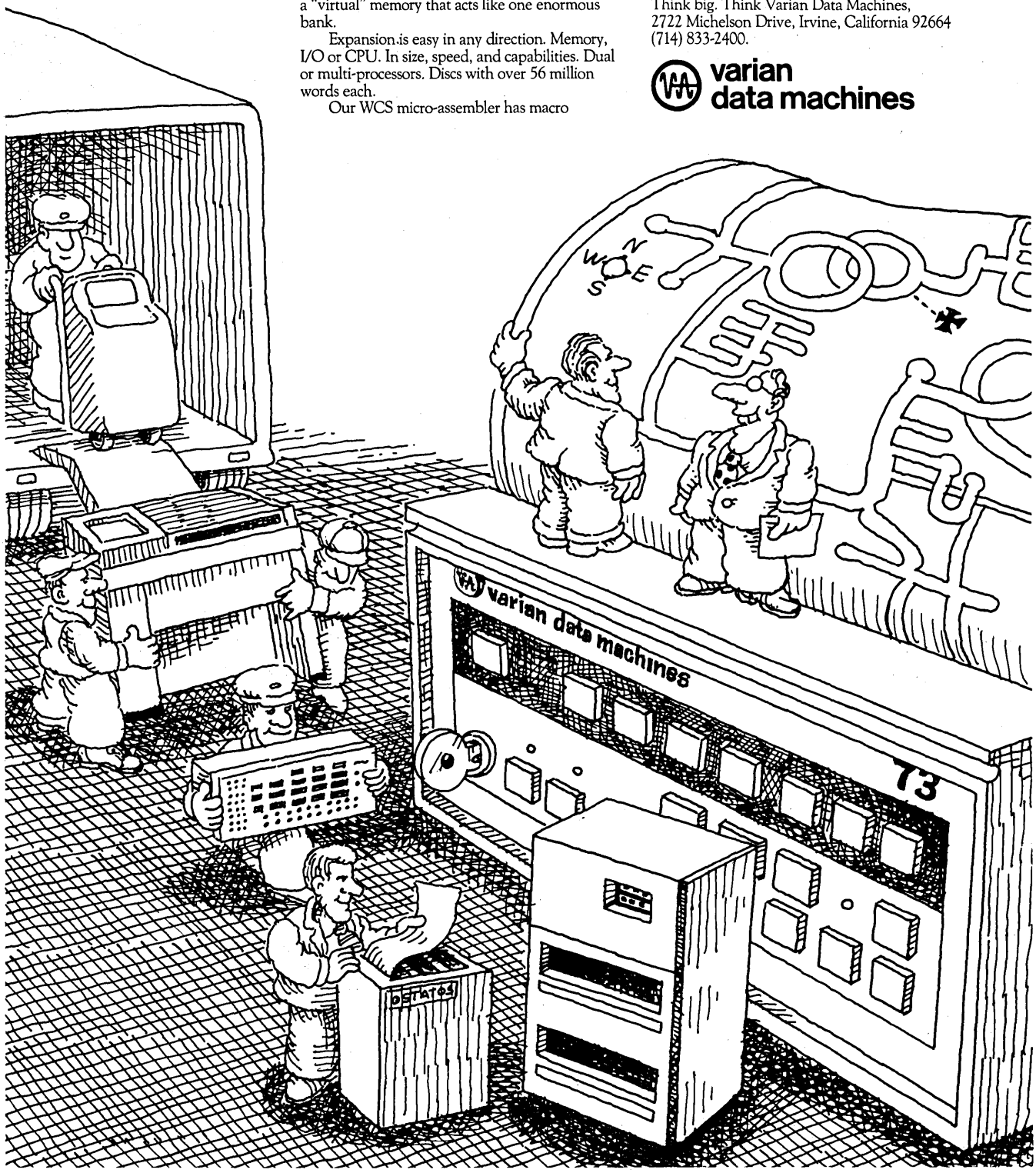
Memory map delivers a fast 256K words in main memory, with multi-tasking of up to 16 simultaneous tasks in foreground. Supported by VORTEX II real time operating system, it's a "virtual" memory that acts like one enormous bank.

Expansion is easy in any direction. Memory, I/O or CPU. In size, speed, and capabilities. Dual or multi-processors. Discs with over 56 million words each.

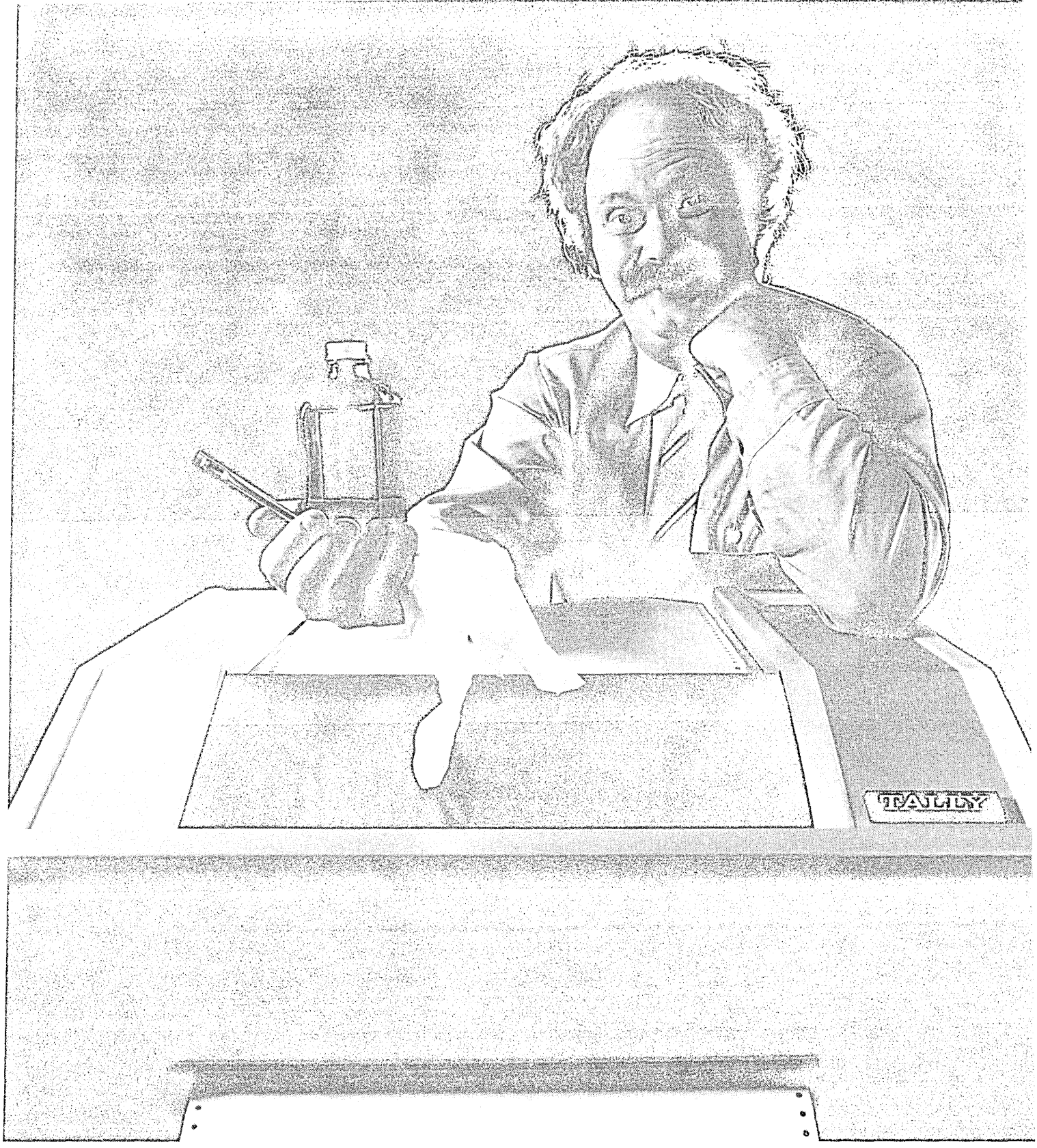
Our WCS micro-assembler has macro capabilities; and micro-simulation lets you de-bug your micro-instructions off-line or in the background.

Powerful even in its smallest configuration, it out-performs far more expensive machines in the toughest applications. The only thing small about the fully loaded V-73 system is the cost. Think big. Think Varian Data Machines, 2722 Michelson Drive, Irvine, California 92664 (714) 833-2400.

varian data machines



CIRCLE 1 ON READER CARD



How to maintain the Tally printer

Just clean it. Occasionally—like every month or so. Easy. No lubrication. No adjustments. No grief.

Our elegantly simple print mechanism is so reliable that we guarantee it for one full year. Our original 1000-hour predicted MTBF now looks a little conservative.

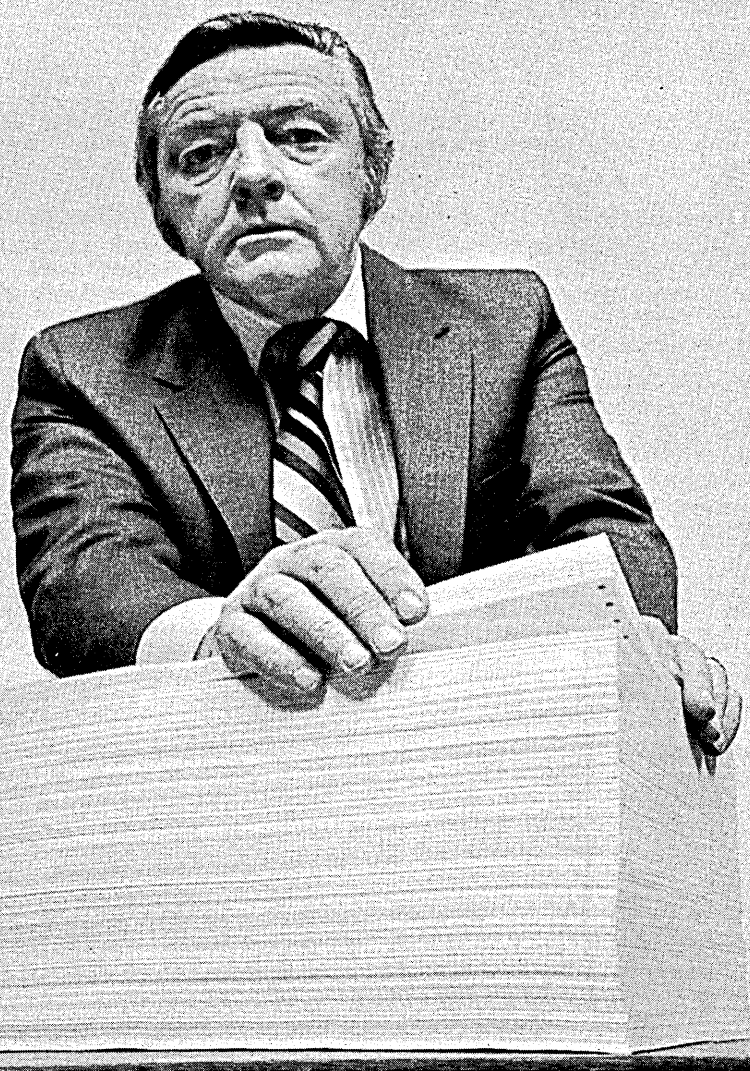
No wonder the Tally printer is becoming the first choice of computer manufacturers and users who demand reliability. If you're looking for an impact printer that can churn out 200 lines per minute day in and day out without fuss or failure, see your Tally man, now.

TALLY®

Tally Corporation, 8301 S. 180th Street, Kent, Washington 98031 (206) 251-6770
Data Terminals • Printers • Card Reader Terminals • Paper Tape Terminals

CIRCLE 4 ON READER CARD

WHEN IT COMES TO COM, YOU CAN SPEND A LOT OR YOU CAN SPEND A LITTLE.



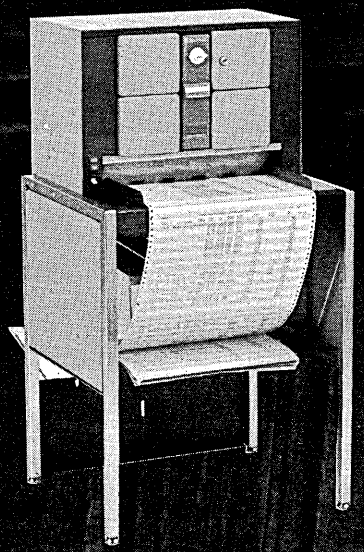
If money is no object, then get the best computer output microfilm system you can buy.

But if money is an important consideration, then get the most for your money. A Bell & Howell Inter/COM Microfilm Recorder.

The Bell & Howell Inter/COM unit films continuous forms onto microfilm at 5,000 lines per minute. To give your operation all the benefits of computer output microfilm. So data can be stored in less space. With faster retrieval. And more efficient distribution.

Our Inter/COM recorder also has a built-in hand-feed shelf and stacker. This permits double-duty operation, since the unit will now record all your legal-sized documents, too.

The Bell & Howell Inter/COM Microfilm Recorder. It's the lowest cost fanfold recorder available. Just call your Bell & Howell representative. And ask him how economical it can be.



BUSINESS EQUIPMENT GROUP

6800 McCormick Road Chicago, Illinois 60645

BELL & HOWELL

CIRCLE 13 ON READER CARD

DATAMATION 73®

SEPTEMBER, 1973
volume 19 number 9
This issue 137,646 copies

departments

DATAMATION.

EDITORIAL STAFF

Editor	Robert B. Forest
Articles Editor	John L. Kirkley
International Editor	Angeline Pantages
Communications Editor	Phil Hirsch
Technology Editor	Richard A. McLaughlin
Industry Editor	W. David Gardner
Products Editor	Michael William Cashman
Copy Editor	Merrill Press Cherlin
Calendar Editor	Carol A. Constantian
Letters Editor	Angela V. Smith
News Editor	Tom McCusker
Bureau Managers	
San Francisco	Edward K. Yasaki
Los Angeles	Edith D. Myers
Washington, D.C.	Phil Hirsch K. Endres
New York	Angeline Pantages
New England	W. David Gardner
Correspondents	
Minneapolis	James K. Johnson
Southwest	Robert F. Alexander
Europe	Pearce Wright
Australia	Frederick A. Bland
Editorial Advisor	Robert L. Patrick
Technical Advisor	Lowell Amdahl
Contributing Editors	Paul Armer, Howard Bromberg, Philip H. Dorn, Louis B. Marienthal, Ray W. Sanders, Milton R. Wessel, F. G. Withington

EDITORIAL OFFICES

Headquarters: 1801 S. La Cienega Blvd., Los Angeles, CA 90035. Phone (213) 559-5111. **Eastern:** 35 Mason St., Greenwich, CT 06830, (203) 661-5400. Lakeside Office Park, 599 North Avenue, Wakefield, Mass. 01880, (617) 246-2121, 9805 Singleton Dr., Bethesda, MD 20034, (301) 530-7271. **Southwestern:** 2711 Cedar Springs, Dallas, TX 75201, (214) 744-0161. **Western:** 61 Renato Ct., Redwood City, CA 94061, (415) 364-3171. **Foreign:** 65, Hill Road, Chelmsford, Essex, England, 64/90 Blues Point Rd., McMahons Point, NSW 2060, Australia.

GRAPHIC DESIGN & PRODUCTION

Art & Production Director	Cleve Marie Boutell
Production Manager	Marilee Pitman

CIRCULATION

35 Mason Street, Greenwich, CT 06830

Circulation Director	Suzanne A. Ryan
Marketing Research Director	Douglas De Carlo
Publisher	James M. Morris

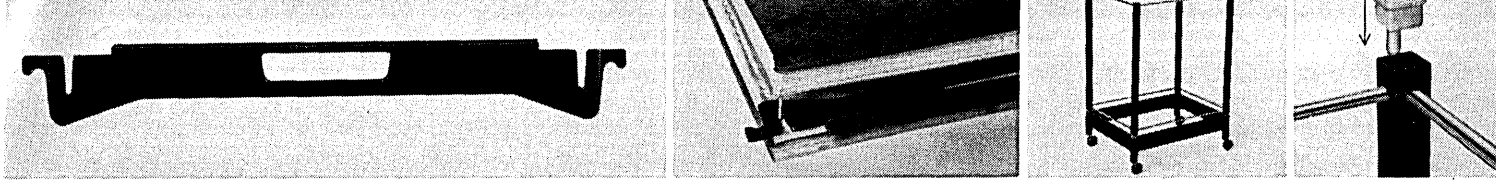
Circulation audited by Business Publications Audit BPA

Member ABP American Business Press, Inc.

DATAMATION is published monthly on or about the first day of every month by Technical Publishing Company, 1301 South Grove Ave., Barrington, Illinois 60010; Arthur L. Rice, Jr., Chairman of the Board; James B. Tafel, President; Gardner F. Landon, Executive Vice President. Executive, Circulation and Advertising offices, 35 Mason Street, Greenwich, CT 06830, (203) 661-5400. Editorial offices, 1801 S. La Cienega Blvd., Los Angeles, CA 90035. Published at Chicago, Ill.

DATAMATION is circulated without charge by name and title to certain qualified individuals who are employed by companies involved with automatic information handling equipment. Available to others by subscription at the rate of $18 annually in the U.S. and Canada. Reduced rate for qualified students. Foreign subscriptions are available for £12.50 or for the equivalent of $30 U.S. in most West European currencies. Sole agent for all subscriptions outside the U.S.A. and Canada is J. B. Tratsart, Ltd. 154 A Greenford Road, Harrow, Middlesex HA13QT, England. No subscription agency is authorized by us to solicit or take orders for subscriptions. Controlled circulation paid at Columbus, OH and Form 3579 to be sent to Technical Publishing Company, P.O. Box 2000, Greenwich, CT 06830.

Microfilm copies of DATAMATION may be obtained from University Microfilms, A Xerox Company, 300 No. Zeeb Road, Ann Arbor, Michigan 48106. Printed by Beslow Associates, Inc.



With our handles you can get a grip on things.
Some manufacturers make a hanger without a handle. Try picking up a heavy binder with one. It's tough. Especially for your secretary. You won't have this problem with our handles. We give you something to hold onto.

Our handle is simple to handle. You can insert it without removing posts or sheets. Without threading. Just loosen posts and slide our handle in. Once in place, it won't slip off or slide.

Assembly: simple yet secure.
With fewer parts, assembly won't give you problems. Anyone can do it. And when it's done, your Module will be so sturdy you can stand on it.

Save and rave.
Colorful vinyl side panels are optional. Without them, you can save. With them, you can choose between iced blue, beach white, hot orange, and wood-grain. Savings or sides, your choice will draw raves.

Data File Module.™ It's better all around.

Look over the new Data File Module carefully. See how easily it assembles, how well it's put together.

Though Data File Module is not the first of its kind, you'll find that it's the finest. It puts over 3,500 printouts at your fingertips. Keeps both unburst and burst sheets in their place.

Call your office products supplier. Or contact us.

Unburst or burst.
For unburst binders, 14⅞″ handles are used; burst binders require 11″ handles.

Take it or leave it.
If you're on the move, Data File Module with casters will go with you. If you're stationary, Data File Module with feet will stay with you.

Boorum & Pease
McMillan·Trussell

General Offices: 84 Hudson Ave., Brooklyn, N.Y. 11201
Distribution Centers: Atlanta, Ga., Kankakee, Ill., Los Angeles, Cal., Syracuse, N.Y.

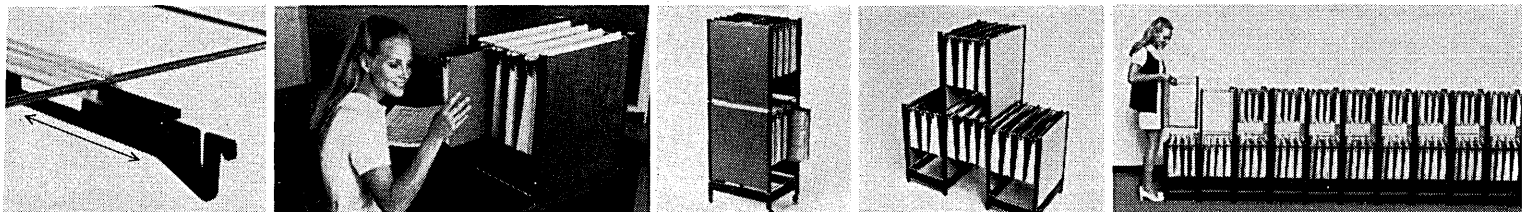
CIRCLE 14 ON READER CARD

Top or side retrieval.
Binders can be retrieved from the top or, with the use of conversion channels, from the side. Our channels are universal. They'll accept all handles on the market. Give you more flexibility.

Steady as she goes.
Data File Module's sturdy structure means that, on casters, you can move two as easily as one.

4 for 3. Stack three Modules, pyramid style, and you've got the capacity of four Modules.

Anyway you work it, Data File Modules stack up better.
Desktop end to end or side by side, piggyback, pyramid, around the corner, or wall to wall, Data File Modules will expand with you, meet your exact space requirements efficiently.



The new GTE Information Systems' IS/7800 Series Intelligent Video Terminals cost an average of 10-15% less than IBM 3270's on rental and 20-33% less on purchase.

But we don't just cost you less than they do. We also offer you more than they do. The IS/7800 offers four character capacity choices, not just two: 1920, 960, 480, or 240 characters. We offer upper and lower case and double-width characters. We offer an extended character set with bar graphs, charts, histograms and line drawings. We offer an inverted image (black characters on white background). We offer underlining. We offer a character blink. We offer a choice of impact or thermal printers operating at from 30cps to 165 cps. Like the IBM 3270, the IS/7800 offers complete character addressability of any character on the screen and an optional light pen.

And everything we offer is truly plug-to-plug compatible with the IBM 3270 and interfaces with IBM Systems 360/370. No hardware or software changes. Even the cables are compatible.

But even that's not all. The IS/7800 terminals are microprogrammed to handle today's problems. And you can have them reprogrammed to meet tomorrow's.

We cost a lot less than they do

So in addition to giving you more for today, we're giving you all of tomorrow as well.

Costs less, does more. What's more, the IS/7800 is backed up by our 700-man service organization working out of 96 locations all across the country. And behind them is GTE Information Systems itself. We're probably the best single source for data communications equipment you'll ever find. Terminals, modems, multiplexers, controllers, even programming.

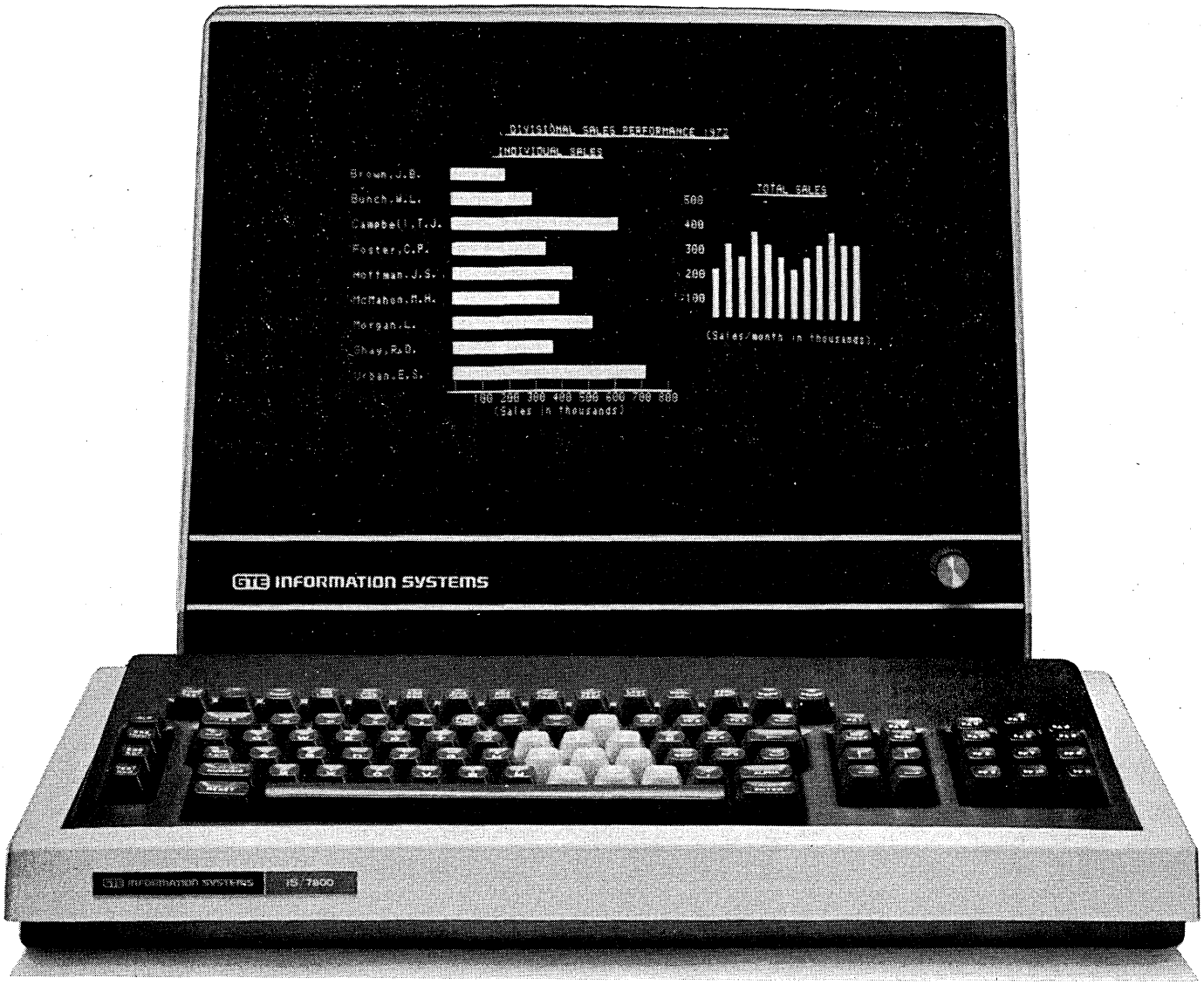
We've got what you need to get closer to your computer.

And just remember: Sometimes the best way to get more is to pay less.

GTE Information Systems, One Stamford Forum, Stamford, Connecticut 06904. Regional offices: Mt. Laurel, New Jersey, 609-235-7300; Chicago, Illinois 312-332-7800; Fullerton, California, 714-523-9440; Montreal, Quebec, 514-866-9324; Toronto, Ontario, 416-362-1541.

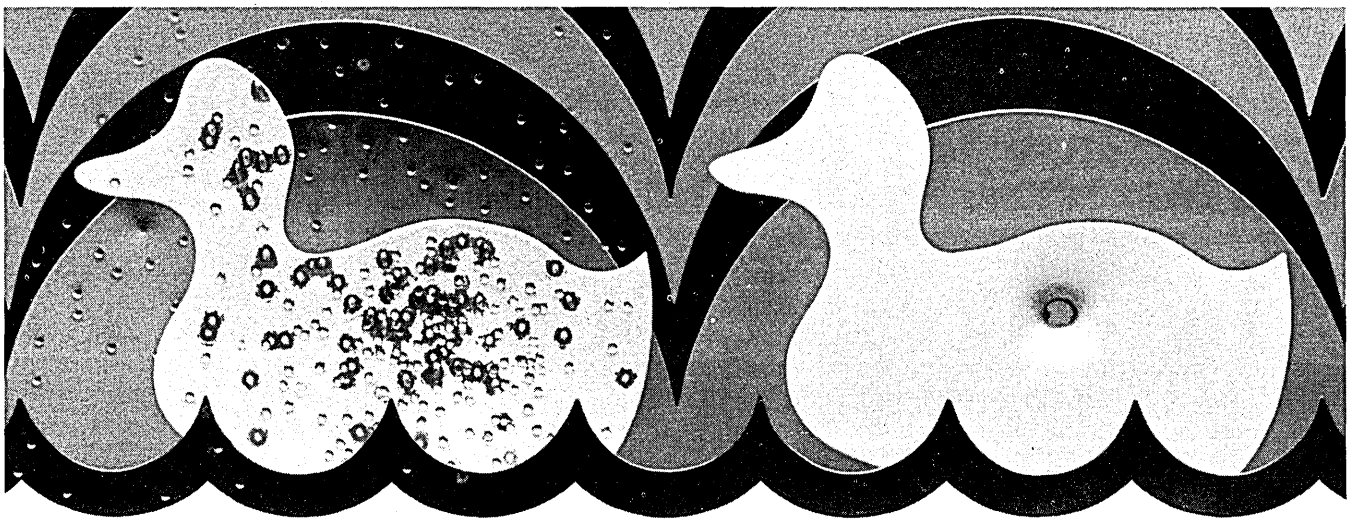
GTE INFORMATION SYSTEMS

and we do a lot more than they do.



CIRCLE 32 ON READER CARD

Converting your DOS programs to OS used to be a shot in the dark.



Before UCC TWO. After UCC TWO.

Once you've set your sights on converting to OS, we have the software to make it a sitting duck.

UCC TWO (DUO 360/370) puts you in command of the situation. It lets you run your regular DOS programs under OS control without conversion.

It puts you in charge of your conversion schedule.

So, you can say goodbye to the confusion of a mixed-job shop, the cost of programmers' overtime, the chaos of trying to meet regular schedules during the change-over. You save time, money, morale.

No wonder over 170 UCC TWO packages are in use right now.

UCC leadership software

And it's only one of the OS leadership advantages we have to offer you.

☐ UCC TWO (DUO 360/370). D9

☐ UCC ONE (TMS). Tape management software that protects your data under OS operation. Provides real-time records of tapes, jobs.

☐ UCC TEN (Data Dictionary/Manager). A comprehensive, tested product. Centralizes, controls data definitions, provides powerful cross-reference features, automatically generates data base control statements, facilitates new systems design.

☐ UCC FOURTEEN. Now, run unmodified 1400 programs under OS control on any 360/370 OS system.

☐ UCC FIFTEEN. Save hours on restarting or rerunning OS jobs.

For instant help, call the Special Products Marketing Group at 214/637-5010, extension 3422.

☐ Please send me more information.

☐ Please have someone call me.

Name_____

Title_____

Company_____

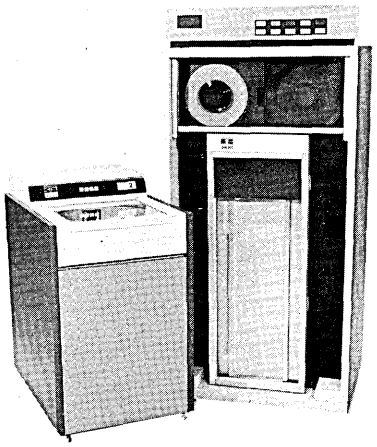
Address_____

City/State/Zip_____

Telephone_____

UCC
UNIVERSITY COMPUTING COMPANY
7200 Stemmons Freeway
P.O. Box 47911
Dallas, Texas 75247

Take a free test drive



At STC we design, develop, manufacture, install and service high performance computer peripheral equipment (tape and disk subsystems and memories.)

Our products are equal to or better than any you can lease or purchase and are less expensive.

We invite you to take advantage of a free evaluation at your installation of our high performance computer peripheral equipment.

Give your budget a break. Write or call us today. Worldwide sales and service.

STC

Storage Technology Corporation, 2270 S. 88th Street, Louisville, Colorado 80027 (303) 666-6581

WE CALL THE 840 THE LOADED NOVA.

IT'S TOO BIG AND HAIRY TO BE A MINICOMPUTER.

[illegible]

Floating Point option handles single and double precision arithmetic at speeds that match most big computers.

[illegible]

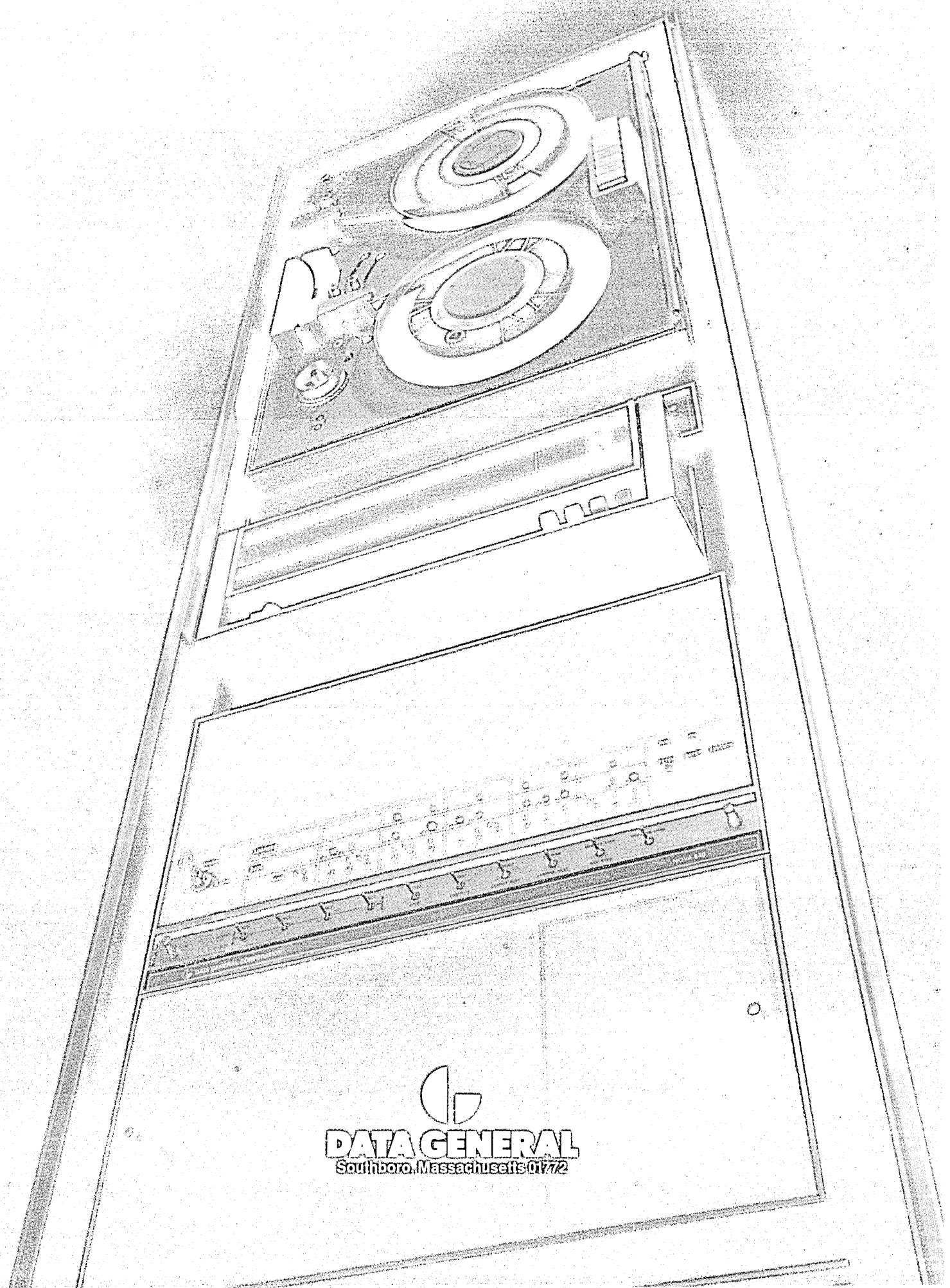
With all that hardware/software muscle, the 840 has embarrassed a lot of far bigger computers in price/performance [illegible]

[illegible]

[illegible] less expensive than the competition.

And we know we can deliver the 840 faster than the competition can deliver theirs.

[illegible]



DATA GENERAL
Southboro, Massachusetts 01772

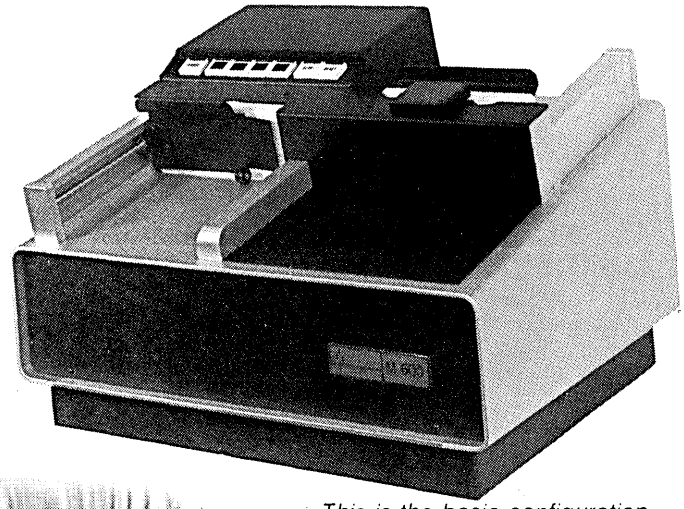
Blow Through A Card Deck to See Why A Documation Reader Should Be in Your Next System Spec

Go ahead. Blow through a card deck. See how air pressure causes the cards to riffle and gently separate. No friction. This basic air flow principle is behind all high speed Documation card readers.

Conventional card readers use wheels or other friction devices to push or drag cards through the throat of a reader. Friction causes card wear. Stress during the critical start up can crumple cards. Jams occur.

A jet of air generates initial thrust on Documation card readers in the 285 to 1200 cpm range. No friction means no wear. Then to virtually eliminate the source of jams, a vacuum pick places only one card at a time on the track.

Today Documation provides card handling equipment for more than 100 computer system manufacturers. Ask your computer representative for more details about how Documation helps make a more reliable computer system. If he can't tell you, then maybe you should be talking with another computer company.



This is the basic configuration for high speed Documation card readers. Look for it in your system.

DOCUMATION
INCORPORATED

Post Office Box 1240
Melbourne, Florida 32901

Calendar

OCTOBER

Edp Auditing: Concepts and Techniques. Oct. 3-5 (New York), **Nov. 14-16** (San Francisco), **Dec. 10-12** (Chicago). Sponsored by the American Management Assns., this seminar will attempt to show participants how to build effective operational controls into their systems, how to choose the latest and most efficient auditing software package, how to become aware of new edp auditing techniques, and how to evaluate systems performance through sampling techniques. Fee (for individuals): $390, members; $450, others; reduced rates for teams from companies. Contact: John F. Devitt, Management Systems and Sciences Div., AMA, 135 W. 50 St., New York, NY 10020, 212/586-8100.

15th Annual Retail Electronic Data Processing Conference, Oct. 7-11, Los Angeles. The 68 sessions of this conference of the National Retail Merchants Assn. will emphasize changes in the retail industry resulting from point-of-sale, POS audit, wanding, feasibility, planning, and payoff. Fee: $125, members; $175, others. Contact: Irving I. Solomon, Information Systems Div., NRMA, 100 W. 31 St., New York, NY 10001.

Data Processing Hardware, Oct. 15-16, and **Data Processing Software, Oct. 17-18,** Chicago. Two separate technical conferences, sponsored by the Assn. for Systems Management, are aimed at people ranging in organizational level from systems analysts to systems vp's. Per conference fee: $75, members of the ASM technical dept.; $95, other ASM members; $125, others. Contact: John N. Gilbride, ASM, 24587 Bagley Rd., Cleveland, OH 44138.

ACM SIGOPS Symposium on Operating Systems Principles, Oct. 15-17, Yorktown Heights, N.Y. Jointly hosted by Yale Univ. and the IBM Thomas J. Watson Research Center dept. of computer science, the program will include 21 papers in five sessions on operating systems and subsystems (including real-time systems), memory management, protection and addressing, and theory of scheduling. Fee: $45, ACM/SIG members; $60, nonmembers. Contact: M. G. Smith, T. J. Watson Research Center, P.O. Box 218, Yorktown Heights, NY 10598.

DPSA Input/Output Systems Seminar '73, Oct. 16-18 (Chicago), **Nov. 13-15** (Los Angeles), **Dec. 4-6** (New York). The theme of this conference, sponsored by the Data Processing Suppliers Assn., will be "The Role of Input/Output Systems in the Future Data Processing Environment." The program, with exhibits, will include discussions of new applications and systems by end-users and peripherals manufacturers. Fee: $150. Contact: Don Hrisak, DPSA, 1116 Summer St., Stamford, CT 06904.

ACM SIGCOSIM Symposium on Management and Evaluation of Computer Technology, Oct. 18-19, Las Cruces, N.M. The major topics of this annual symposium will be: security, virtual systems evaluation, data entry systems, COM, personnel evaluation, measurement and development, job estimation, throughput evaluation, standards, programmer productivity, and schedule and production control. Advance fee: $25, ACM/SIG members; $35, nonmembers; after Oct. 5, add $5. Contact: J. M. Mann, Computer Center—Box 3AT, New Mexico State Univ., Las Cruces, NM 88003.

18th Annual Conference of the American Records Management Assn., Oct. 21-24, Philadelphia. The theme of this year's conference, with exhibits, will be "Records Management in the Computer Environment." Over 70 government and public officials, business leaders, educators, and specialized technicians will present a program of speeches, tutorial sessions, panel discussions, and problem-solving clinics. Fee: $100, members; $125, others. Contact: ARMA, P.O. Box 7446, Philadelphia, PA 19101.

Annual Conference of the American Society for Information Science. Oct. 21-25, Los Angeles. On the theme "Innovative Developments in Information Systems: Their Benefits and Costs," the program will include speeches, formal debates, panel discussions, member presentations, and exhibits. Advance fee, including Proceedings: $45, members; $60, others; at conference, add $5. Contact: Robert McAfee, Jr., ASIS, Suite 804, 1140 Connecticut Ave., N.W., Washington, DC 20036.

INFO London 1973, Oct. 23-25, London. The first of a series of five European events to be sponsored by Infotech, an independent computer education organization, this technical program consists of two parts: "current awareness," a briefing on key changes and significant new areas of computing, and "real-time computing," a review of real-time computing with tutorials, user experience exchange, and technical presentations. Fee: from £65. Contact: The Registrar, Infotech Education, Nicholson House, Maidenhead, Berkshire, England.

First International Joint Conference on Pattern Recognition. Oct. 30-Nov. 1, Washington, D.C. The 65 papers of tnis multidisciplinary conference will report on such aspects of pattern recognition as: mathematical methods, character recognition, biomedical applications, picture processing, speech, syntactic methods, adaptive pattern recognition, scenes and structures, and remote sensing. Advance fee (before Sept. 30): $45, members of sponsoring societies (ACM, IEEE, IFIPS, OSA, PRS, SPIE); $55, others; at conference, add $10. Contact: Louis S. Rotolo, Pattern Recognition Society, P.O. Box 629, Silver Spring, MD 20901.

DATAMATION Grand Tour, Oct. 30-Nov. 1 (London), **Nov. 6-8** (Stockholm), **Nov. 12-14** (Paris), **Nov. 19-21** (Milan), **Nov. 27-30** (Munich). DATAMATION, with the support of the U.S. Dept. of Commerce, is sponsoring this series of five major exhibitions of U.S. dp products, with emphasis on peripherals, special-purpose systems, terminals, and computers. Accompanying technical symposia will describe advanced systems techniques to top technical, edp-oriented management. (See ad on p. 157.) Contact: Charlie Asmus, DATAMATION, 35 Mason St., Greenwich, CT 06830, 201/444-4271 or 203/661-5400.

NOVEMBER

Management Systems '73. Nov. 27-30, Munich. Held every two years, this is the most important European exhibition devoted exclusively to computers and related equipment. U.S. exhibits will make up 25% of the show, which will be accompanied by technical seminars. Nominal fee. Contact: John L. Wolf, 226, U.S. Dept. of Commerce, Washington, DC 20230, 202/967-4942.

$5,600 BUYS A NEW 16K NOVA 2.

Data General Corporation Department D
Southboro, Massachusetts 01772

☐ Please send me more information on Nova 2.
☐ Please have a salesman call on me.
☐ Please add my name to your mailing list.

Name

Title

Company

Street

City State

Zip Code Telephone

Nova 2 is so inexpensive that it even looks good with a quantity-one price tag of $5,600*. And after our liberal quantity discounts are applied, the price looks even better. Especially when you consider what your money buys.

It buys a Nova 2 that includes a high-speed, multi-accumulator central processor unit, a 16-bit word length, I/O system with programmed data transfer, 16-level programmed priority interrupt, high-speed Direct Memory Access data channel, programmer's console, 4-slot mainframe, and power supply.

It buys 16,384 16-bit words of 1000-nanosecond memory. That's twice the memory of other computers with comparable price and performance.

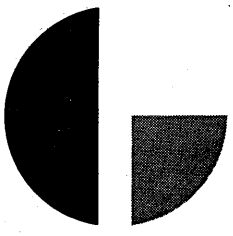
It buys a product concept whose reliability has been proven in over 7,000 installations around the world.

It buys a Nova 2 that's backed by a comprehensive customer-support organization that can provide documentation, training, field and factory service, and applications know-how.

It buys a Nova 2 that's entirely compatible with Data General's options, peripherals, interfaces and software.

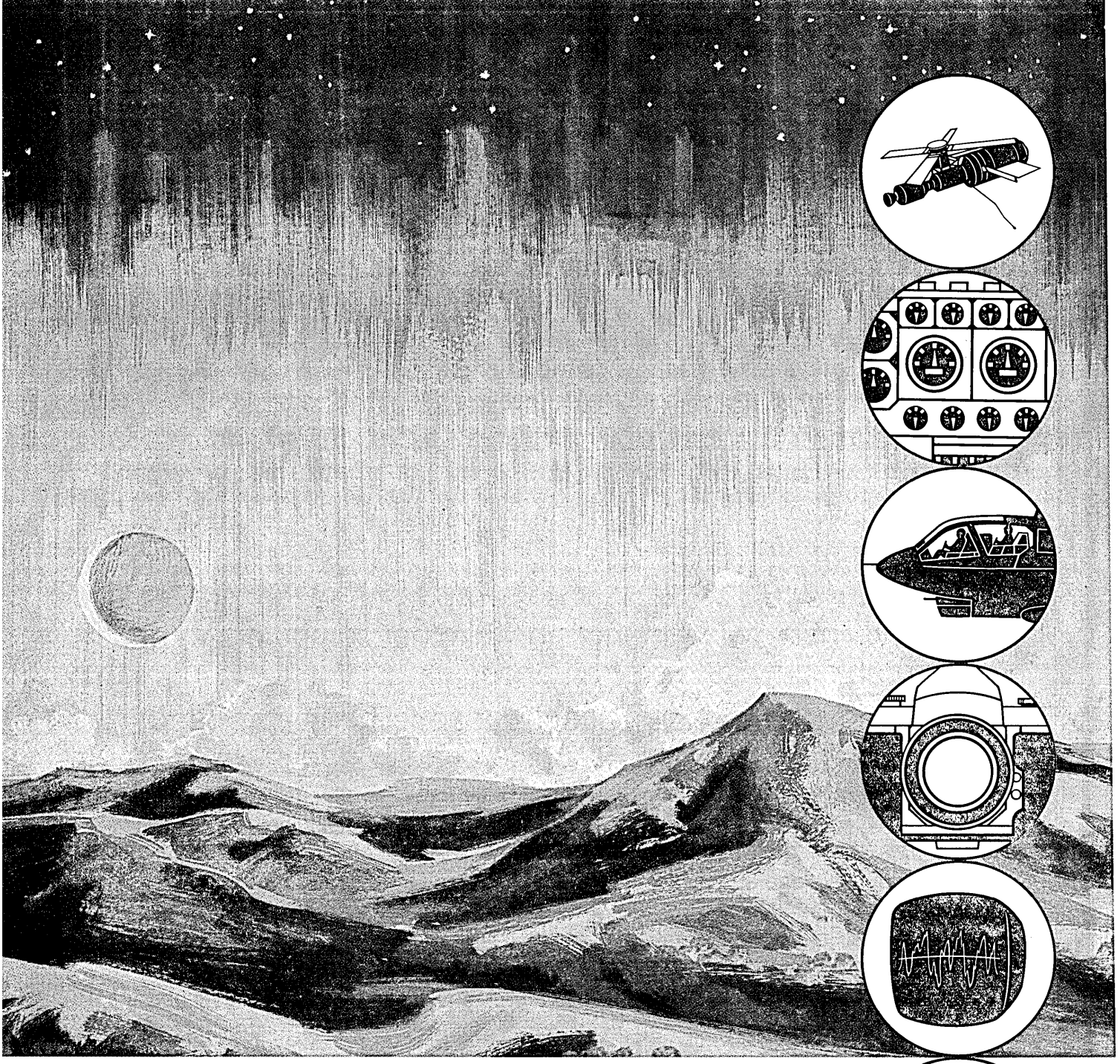
$5,600. You get a lot for your money.

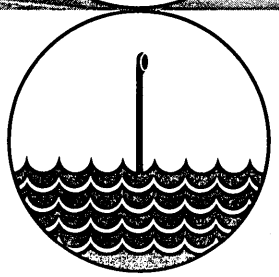
*Minimum order, five systems.



DATA GENERAL CORPORATION

Southboro,
Massachusetts 01772
(617) 485-9100





OCLI Antireflection Coatings Improve the View... nearly everywhere.

It all started with a need to reduce the glare from aircraft instrument covers. Working closely with the U.S. Air Force, OCLI designed and developed a multilayer state-of-the-art coating that reduced reflections five times better than a single layer of MgF_2. For several years now pilots have been able to read their instruments with ease through covers coated by OCLI and our licensees.

A most satisfying development, but that was only the beginning. Today descendants of that coating, each modified to do a specific job, are improving the view in a lot of places.

If you are having trouble with reflections, ghost images, poor visibility, we can probably help you. If yours is a stubborn problem and you let us in at the beginning, chances are you'll benefit from working with our research scientists and design engineers. Try us. We supply more than just a product.

OCLI **OPTICAL COATING LABORATORY, INC.**
Technical Products Division
2789 Giffen Ave., P.O. Box 1599, Santa Rosa, CA 95403
Teletype 510-744-2083. Telephone 707-545-6440.

Manufacturing facilities serving Europe, OCLI Optical Coatings, Ltd., Dunfermline, Fife, Scotland / Represented in Japan by Hakuto Co., Ltd., Tokyo; France, Belgium, Netherlands and Luxembourg by Techmation of Paris, Brussels & Amsterdam; and in Germany, Austria, Switzerland and Italy by Betzelt GMBH, Munich.

CIRCLE 80 ON READER CARD

Look Ahead

SHARE IN MIAMI: ZEROING IN ON DEFECTS

At its Miami meeting last month, IBM's SHARE users group resolved to protest the company's plan to give six months' notice on the withdrawal of major support (class A) for OS (see August, p. 76). It's asked for at least 18 months' notice, although anti-VS users don't want OS support dropped "ever." We're told VS2 (version 1) results reported there were encouraging, although users still have a wait-and-see attitude.

SHARE members were upset by rumors that IBM won't release source code on VS. Armonk won't confirm. If true, this would cripple a user's ability to make modifications. One source comments that this should be done someday -- "the day they come out with a zero defects code."

3705 SOFTWARE: A CASE OF CONFUSION

TCAM level 5 isn't the only software for IBM's 3705 communications processor that has seen its delivery date stretched out (from March to September). IBM now confirms rumors its VTAM products are late too: DOS/VS, September '74; OS/VS1, November '74; and OS/VS2, March '75.

Thus, while TCAM is running about six months late, VTAM looks like it will be nine months behind the target date for release. IBM says the delay is to permit extensive testing for reliability. Users say it's a case of confusion, not only about the 3705 software, but about the direction of IBM's entire data communications thrust. They note that when IBM announced its 3600 finance communications system, customers were informed in an IBM document that "TCAM support is provided through VTAM" -- and that they could learn no more when they asked IBM what that meant. This startled users who already have committed to TCAM and are waiting out delivery of level 5. A CICS interface program is understood to have been perfected by IBM in Palo Alto, but it hasn't been released. No one seems to know precisely why.

Following rumors that IBM has a low-priced communications-oriented minicomputer, users at the SHARE meeting in Miami crowded a session on System 7 teleprocessing, only to find out it was a description of a petroleum process control application. Many who walked out formed a rump session of their own to discuss making a "do-it-yourself" software kit for the 3705.

WAS DATASPEED A WRONG NUMBER?

There are mixed feelings in the executive suites of Armonk over AT&T's new model 40 Dataspeed printer and crt. IBM was jolted by AT&T's entry into what IBM has regarded as its sacred ground in the industry. It could retaliate with an announcement of its hush-hush project Carnation in the U.S. -- the electronic private business telephone exchange and switchboard equipment which is sold only in Europe.

IBM rejected the idea of entering the U.S. market once before because AT&T was a big IBM customer. (Minutes of IBM's Management Review Committee reveal the telephone company was considering buying 4,000 System 7's for direct distance dialing control.)

Ironically, AT&T's product, announced last spring by Teletype Corp., could be just what IBM's lawyers ordered in their anti-trust defense. They can say a government-protected monopoly (AT&T) is moving strongly into segments of the dp industry, and that IBM enjoys

no such government protection.

The Computer Industry Assn., meanwhile, is holding a meeting Sept. 17 in Washington's Madison hotel to discuss the AT&T product, which some contend puts it in a market where it shouldn't be. We hear the CIA will take the issue to both the Federal Communications Commission and the Justice Dept. later that day.

DATA BASE STANDARDS: A THAW IF NOT A TRUCE

The cold war on data base systems thawed at a meeting sponsored by SHARE in Montreal last month. The IBM user group brought together members of all camps -- manufacturers, user groups, and CODASYL, the volunteer group that has developed specifications for various data base components -- for a relatively peaceful discussion (and agreement) on basic concepts.

Chairman Tom Steel noted that SHARE and CODASYL, sometimes bitter opponents on the issue, each realized that the other doesn't have horns. CODASYL's Tax Metaxides said there were no technical disagreements on the concepts discussed. The group put top priority on the issue of data base integrity. They also agreed, said Steel, that there is a "hell of a technological gap between what is being provided and what is really needed. The latter is not beyond technical bounds but is an issue of price/performance."

CDC: FIVE YEAR PLAN IN RUSSIA?

Control Data Corp. hopes to sign a five-year "cooperative agreement" with the Soviet government in Moscow this month. Development of interfaces between CDC peripherals and the troubled RIAD computer series is one likely result. CDC also may help the Soviets market such hybrid systems in the West. Sale of complete CDC systems is another possibility, particularly 6000 and 7000 series number crunchers.

One installation may be at the Serpukhov Research Institute whose present system, dual ICL 1906A's, reportedly "isn't big enough." Loans from Commercial Credit Corp., the CDC financial subsidiary, and from the Export-Import Bank would help pay for these purchases. Some Soviet-made products (like watches) would also be bartered. The Soviets also are talking to Honeywell and to a French government-CII team regarding similar agreements.

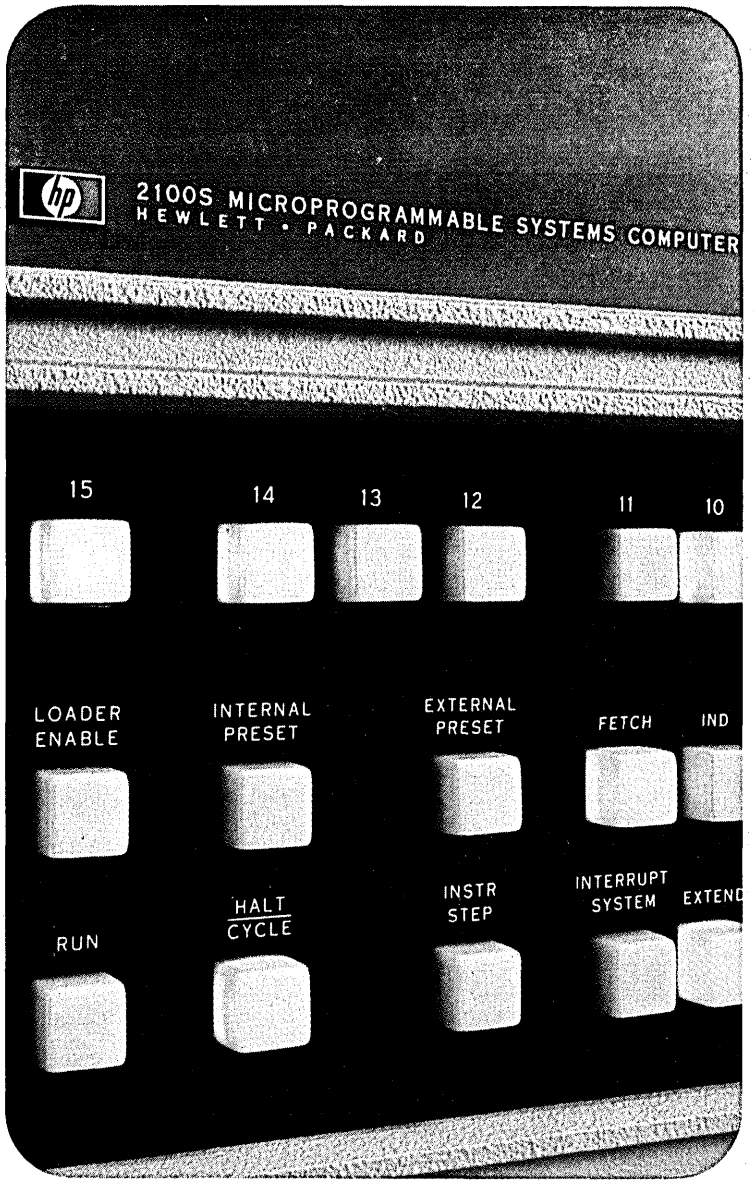
WHAT IT USED TO BE

"I want IBM to be what it was in the Watson days," says Marihelen Jones, of Denver, Colo., who has filed a class action suit against her ex-employer for a billion dollars. She claims to be a victim of IBM's "forced attrition" program, divorced from her 11 years of employment there by managers with quotas of people to unload.

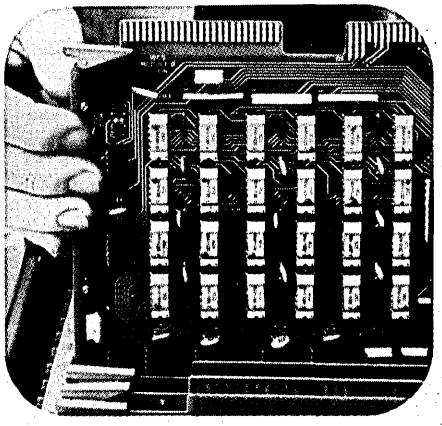
Ms. Jones says she was shocked by the sudden fall of her high performance rating to "unsatisfactory," followed by an impossible "improvement plan" to fulfill. She feels she's among a large cadre of highly-paid workers being invited out of IBM via such unwarranted ratings, noting that she was replaced by a man making about half her salary. So Ms. Jones is looking for other members of that cadre who are willing to join her in the suit, asking they contact attorney Dale Spiegel in Boulder, Colo.

She says she feels IBM isn't living up to its own standards and policies the way it used to. The courts will decide on the legality of her claims early this month (IBM filed for dismissal), but her extreme reaction may be symptomatic of an IBM in change. IBM has

(Continued on page 163)



DESIGNED ESPECIALLY FOR THE SYSTEMS USER, everything is in a single, pretested unit. Just plug it in and you're in business. The HP 2100S lets you come up with a whole new range of minicomputer systems solutions.



THE COMPUTER WITHIN A COMPUTER: A plug-in card lets you microprogram, to speed up subroutine execution of important applications. Frees valuable memory space for added problem-solving capacity.

- **EXTENDED ARITHMETIC INSTRUCTIONS**
- **FLOATING POINT HARDWARE**
- **DUAL-CHANNEL DIRECT MEMORY ACCESS**
- **CRYSTAL-CONTROLLED PROGRAMMABLE TIME-BASE**
- **PARITY CHECK WITH INTERRUPT**
- **POWER-FAIL PROTECT WITH AUTOMATIC RE-START**
- **MEMORY PROTECT**
- **TWELVE I/O CHANNELS**
- **COMMUNICATIONS CONTROL INTERFACE**
- **A 16K, 16-BIT MEMORY (EXPANDABLE TO 32K)**

THE SYSTEMS FEATURES YOU WANT MOST are standard on the HP 2100S. Combine these with microprogrammability, powerful peripherals and a complete selection of software.

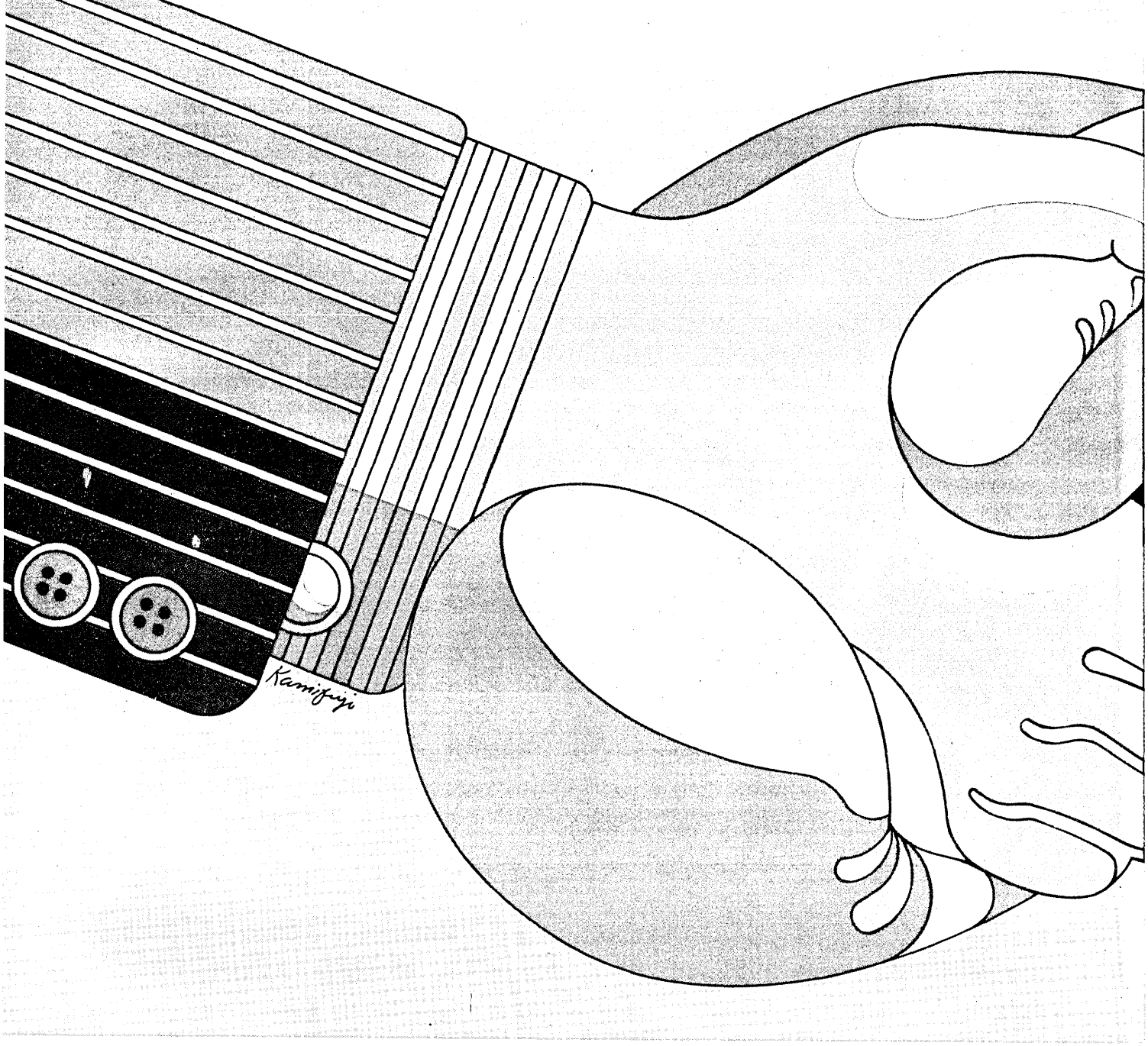
Meet the HP 2100S computer. Specifically designed for solving system problems.

Here's the top-of-the-line HP computer. Specially designed for systems use, the basic package meets most system needs as it is. Yet, its well-thought-out options and peripherals let you customize your HP 2100S for efficiency. Proven software includes Assembly Language, FORTRAN, BASIC, and ALGOL compilers, plus a complete microprogramming software package. Operating systems are available for batch processing, real-time and time-sharing. Send for our new brochure that tells it all.

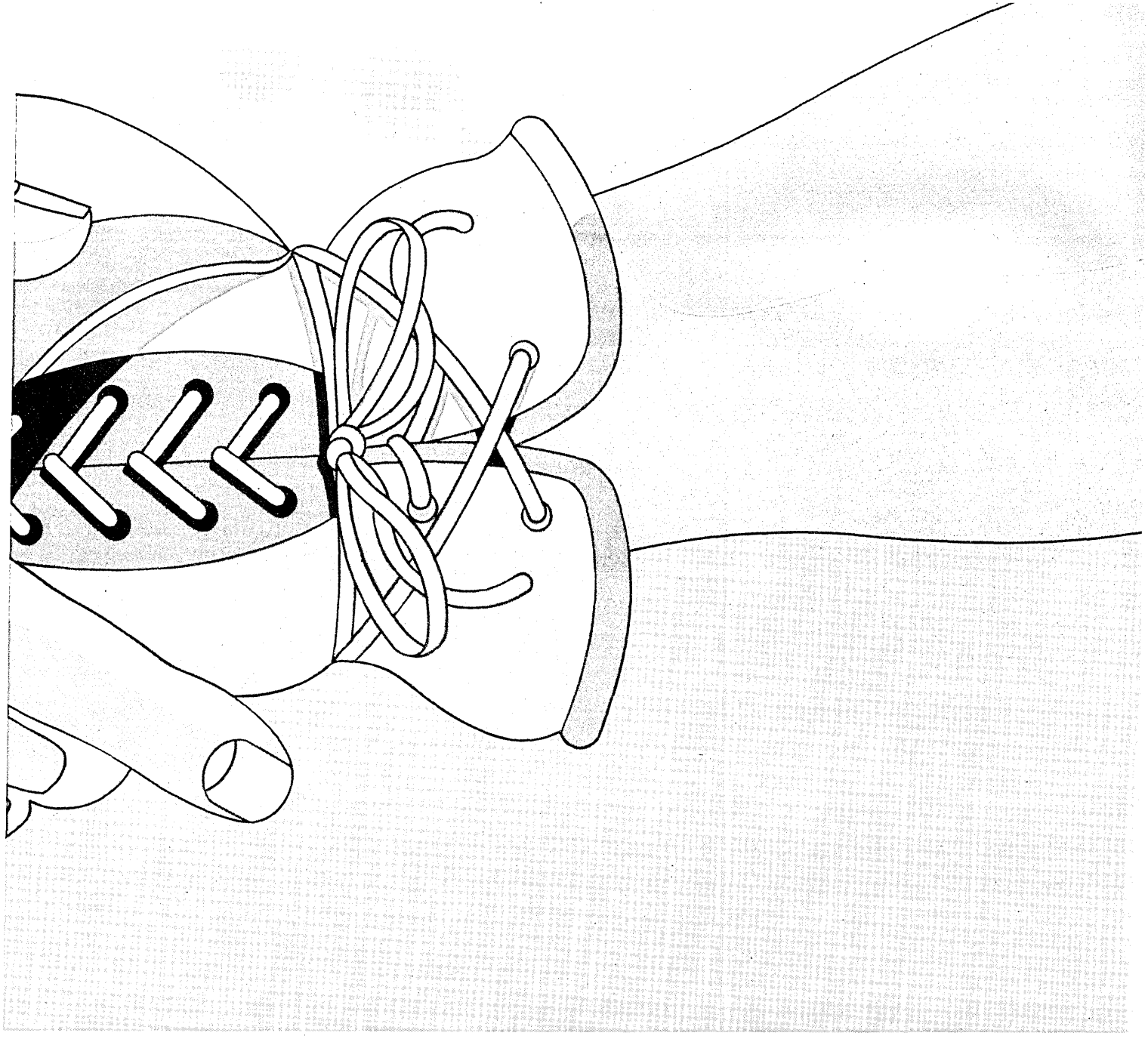
22305

HEWLETT hp PACKARD

Sales, service and support in 172 centers in 65 countries.
Palo Alto, California 94304. Offices in principal cities throughout the U.S.



Why are so many of our competitors also our customers?



We make terminals for the data processing and communications industries.

So do a lot of other manufacturers who specialize in computer and communications equipment. (Over 400—according to latest industry figures.)

The irony of this is that a lot of our competitors use the Teletype® teleprinter as the backbone of many of their systems.

Which says a lot about Teletype equipment. Because who could be a more critical, discerning judge than your competition?

Why do they specify Teletype machines for sub-components? For three good reasons.

Reliability. Nobody has moved more information before or since the information explosion —with greater reliability.

Flexibility. We build our terminals to meet your particular needs. That's why we offer you a choice in arrangements, features, configurations and speed. Interface capabilities? Teletype equipment is compatible with practically any computer-based communications system.

Economy. From initial cost to operation to maintenance, nobody can deliver higher performance at a lower cost. Nobody.

Tough, demanding criteria. But what else would you expect from your competition?

This unusual situation is a good thing for everyone in the data processing industry.

But you benefit most. Because the terminal equipment you buy meets exacting standards for reliability, flexibility and economy.

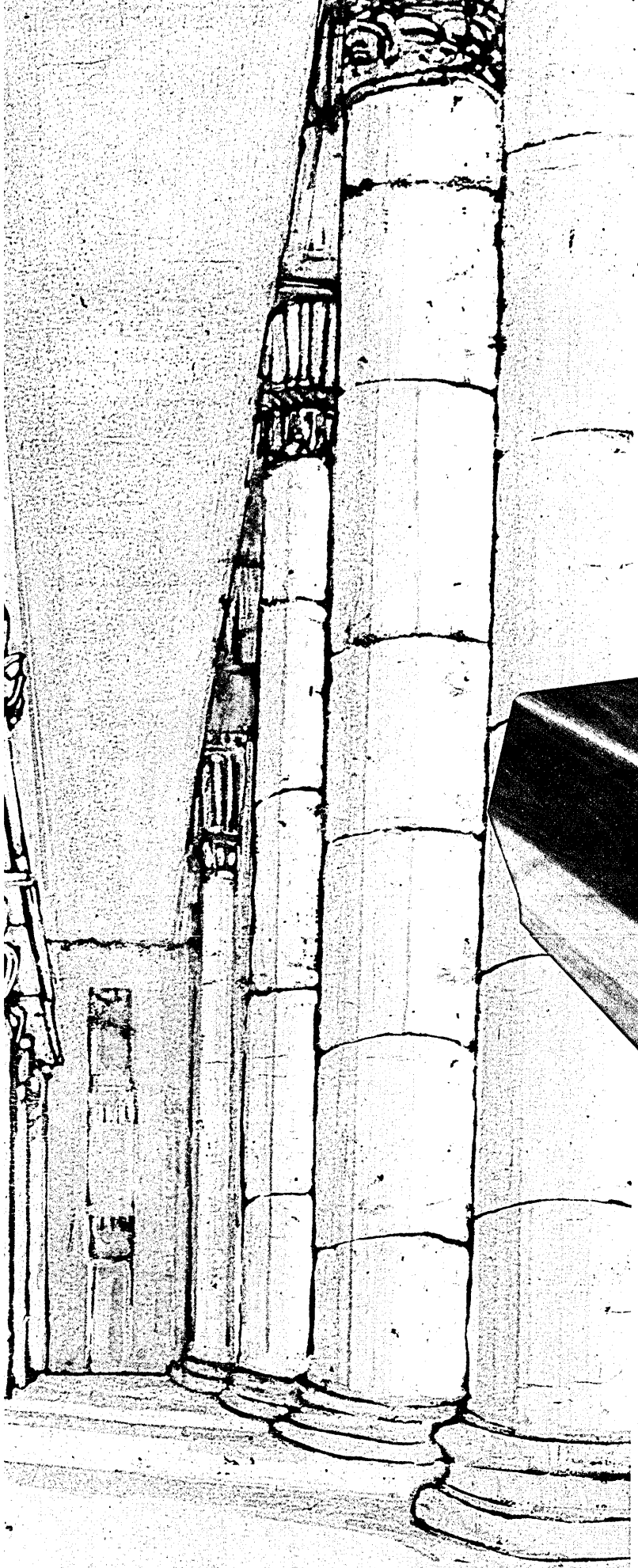
We know. Because we set those standards.

It takes more than manufacturing facilities to build the machines Teletype Corporation offers. It also takes commitment. From people who think service is as important as sales. In terminals for computers and point-to-point communications.

That's why we invented a new name for who we are and what we make. The computercations people.

For more information about any Teletype product, write or call TERMINAL CENTRAL: Teletype Corporation, Dept. 81E, 5555 Touhy Avenue, Skokie, Illinois 60076. Phone 312/982-2500

TELETYPE



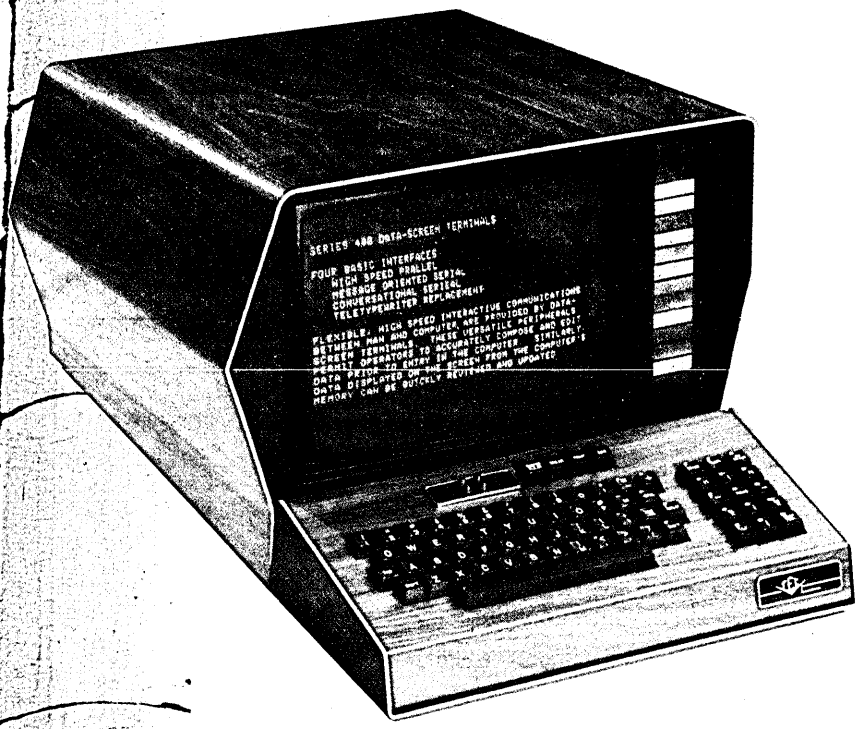
Stability Age Beauty

As important in designing and producing display terminals as in buildings.

At TEC, we've been designing and building highly reliable crt terminals called DATA-SCREEN™ Terminals for 10 years (other visual display products for 15 years). That's "age" in the computer peripheral equipment industry.

For all these 15 years we've been manufacturing high quality information display and control devices — providing the vital link between man and machine in this computer-oriented world. That's "stability," especially when its been done profitably.

We offer our carefully styled terminals in esthetically compatible colors and vinyl finishes to match any decor, any application — from mahogany row to production floor. That's "beauty."



These vinyl clad textures and finishes — and many more — are available with DATA-SCREEN™ Terminals that offer parallel, serial and teletypewriter replacement interfaces — 13 models — all work proved, world-wide, in countless data communication and information systems.

Call or write for brochures describing popular, versatile, low cost DATA-SCREEN™ Terminals priced from $995*

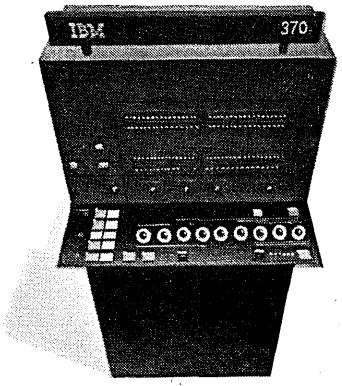
*MINI-TEC General Purpose Terminal, with keyboard, in OEM quantities.

CIRCLE 31 ON READER CARD

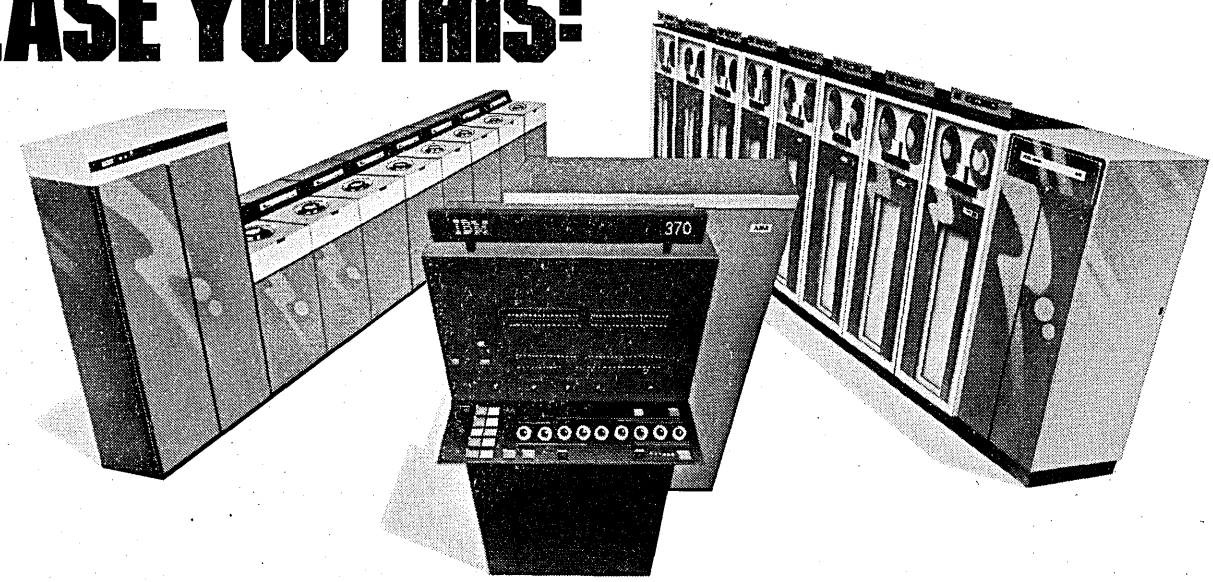
TEC® INCORPORATED

9800 NORTH ORACLE ROAD
TUCSON, ARIZONA USA 85704
(602) 297-1111

FOR $26,123 A MONTH, IBM WILL RENT YOU THIS:



FOR $25,022 A MONTH, ITEL WILL LEASE YOU THIS:



The big difference between IBM and ITEL shows up on your financial statement.

As an example, for $26,123 a month, IBM rents you a System/370 Central Processing Unit alone, but for $25,022, ITEL will give you the 370 CPU plus one megabyte of AMS Monolithic Memory, 8 ITEL disk drives plus controller, as well as 8 ITEL tape drives and one controller.

A full computer system for less than the IBM cost of the CPU alone.

Rented from IBM, the same complete system would cost you $51,405 per month, more than double the ITEL cost.

And that's only one example. We'll lease any kind of computer package (360 or 370) on 3- to 8-year terms at proportional savings. Which explains why we have $300 million of IBM computer equipment on lease right now.

When you're making a data processing move, you'll save big by calling the Data Products Group at ITEL—the financial alternative to IBM.

ITEL CORPORATION One Embarcadero Center, San Francisco, Calif. 94111 (415) 989-4220

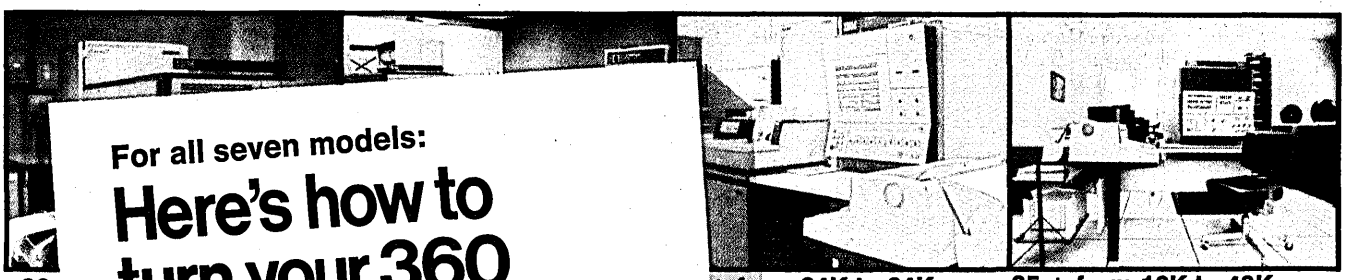
I'm interested. Please send me more detailed information.

Name _____ Title _____

Company _____ Phone _____

Address _____

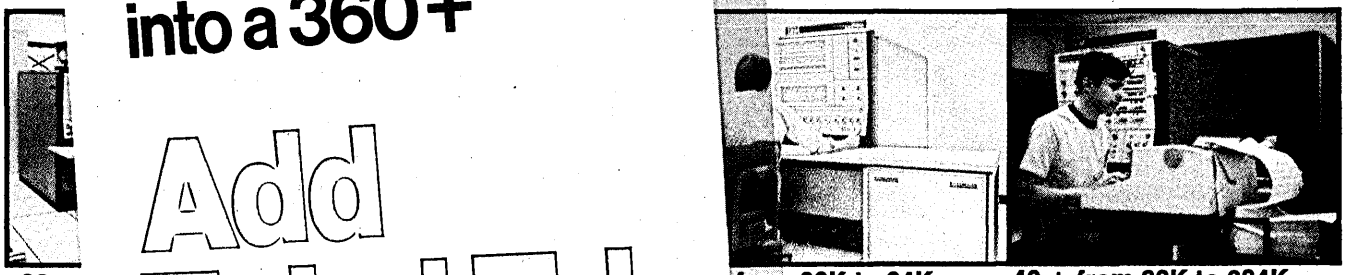
City _____ State _____ Zip _____ D-9



22

+ from 24K to 64K

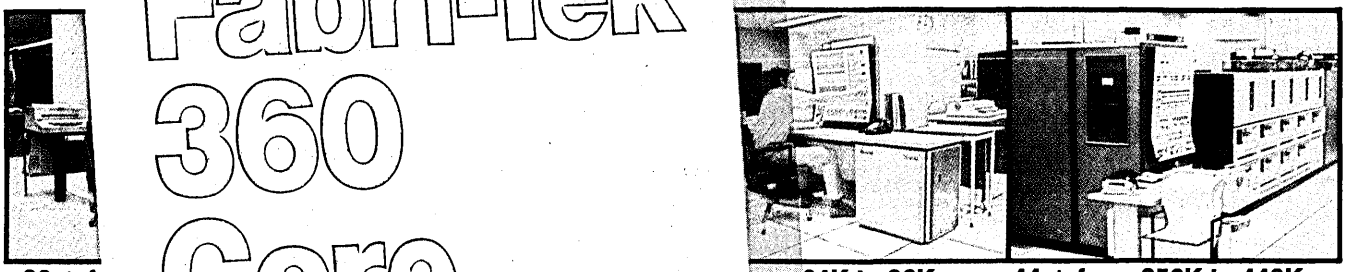
25 + from 16K to 48K



30 +

from 32K to 64K

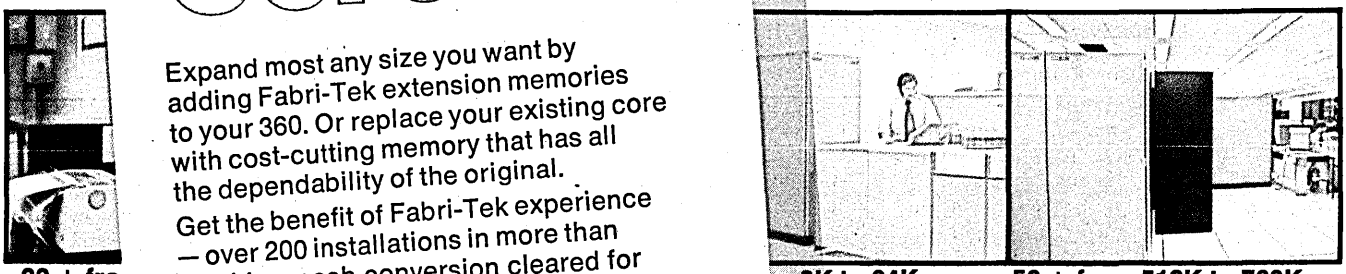
40 + from 32K to 384K



30 + fi

om 64K to 96K

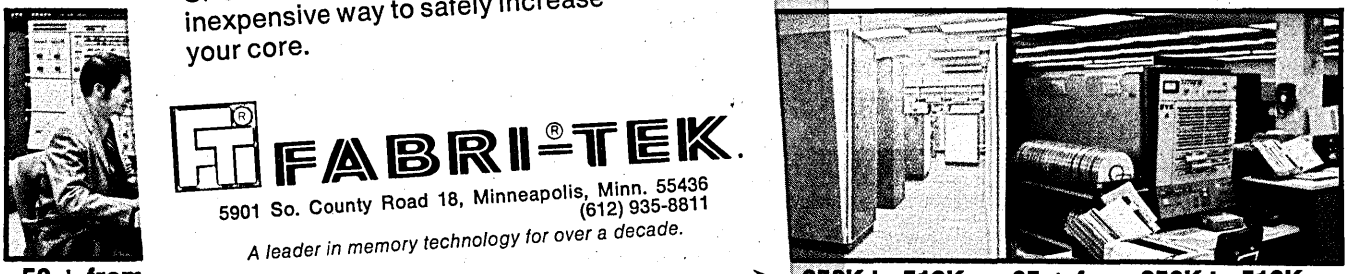
44 + from 256K to 448K



30 + fro

m 8K to 64K

50 + from 512K to 768K



50 + from

256K to 512K

65 + from 256K to 512K

For all seven models:

Here's how to turn your 360 into a 360+

Add Fabri-Tek 360 Core.

Expand most any size you want by adding Fabri-Tek extension memories to your 360. Or replace your existing core with cost-cutting memory that has all the dependability of the original.

Get the benefit of Fabri-Tek experience — over 200 installations in more than 90 cities, each conversion cleared for CPU maintenance by IBM. It's the fast, inexpensive way to safely increase your core.

FABRI-TEK®

5901 So. County Road 18, Minneapolis, Minn. 55436
(612) 935-8811

A leader in memory technology for over a decade.

← These 360 users agree on → Fabri-Tek service and savings

Call for full details:

EASTERN: Atlanta (404) 284-7670 ☐ Boston Area (617) 969-5077 ☐ Miami Area (305) 724-0900 ☐ New York Area (201) 694-4770 ☐ Philadelphia Area (215) 643-6950 ☐ Pittsburgh Area (412) 391-6390 ☐ Rochester (716) 586-1960 ☐ Stamford (203) 359-1315 ☐ Washington (703) 525-6435

CENTRAL: Chicago (312) 437-4116 ☐ Columbus (614) 262-7966 ☐ Dallas (214) 233-0872 ☐ Houston (713) 772-7050 ☐ Milwaukee (414) 276-3352 ☐ Oklahoma City (405) 843-6444 ☐ St. Louis (314) 721-0004 ☐ Detroit (313) 538-7480

MOUNTAIN: Denver (303) 573-5535 ☐ Phoenix (602) 266-4448 ☐ Salt Lake City (801) 359-4594

PACIFIC: Los Angeles Area (213) 420-2493 ☐ Portland (American Data Processing Supplies) (503) 222-2996 ☐ San Francisco Area (408) 739-4780 ☐ Seattle (American Data Processing Supplies) (206) 623-2413

EUROPE: NCA Nordisk Computer AB (Stockholm, Sweden) 08-52 52 90 ☐ Fleischhauer Datentraeger GmbH (Hausastrasse, West Germany) (02327) 8061 ☐ Computer Time and Hardware Brokers Ltd. (London, England) 01-748-0106 ☐ Promodata (Paris, France) 225 36-71 ☐ International Marketing and Consulting (Zimmelstrasse, Switzerland) (042) 72 25 45

Letters

Backspace bungle

A great number of terminals were shown in action at the National Computer Conference. Unfortunately, most of the crt terminals had a major logical flaw, one that the designers and exhibitors apparently do not understand.

The flaw is in using the backspace character to move backward in the entry string to a desired point, effectively erasing those characters so that new characters may be input from that point.

The backspace is 0/8 in the ISO Code (ASCII for the provincial), encoded 00001000. It is defined as moving the printing position backward on the line. It is *not* defined as *erasing* the character in the position. On the contrary, it is generally used for diacritical and other marks to be overprinted (i.e. underline, overline, umlaut, accent acute, accent grave, tilde) to form composite symbols.

It is my contention that the backspace character must be used in a standard manner, as defined by the international standard. A file that prints to a typewriter-like terminal must print the same on a crt terminal or a photocomposition device.

If the crt terminal designers wish to operate in this combined backspace-erase mode, then they should use the soft copy controls presently being standardized in X3. Examples are the control characters for cursor movement and clearing the screen or line from the cursor position. Write to Bob Brown, Secretary of X3, at CBEMA, 1828 L Street NW, Washington, DC 20036, to get this information. Designers! do not, repeat, do not use backspace as you are. Change it, and use another separate and distinct key. Please. You are jeopardizing your position in the huge photocomposition and publishing market!

R. W. BEMER
Honeywell Information Systems Inc.
Phoenix, Arizona

Tilting at windmills

Should you have a "Don Quixote" award, Mr. Ferguson should win in an "IBM walk." ("System/3 Doesn't Belong to IBM," June, p. 62.)

While he preaches "typical IBM user —IBM sold him a system and that's the end of it"—he forgot to mention:

1. The company has less expensive products—1130/50, 1401H and 360/20 subs . . . that outperform the 3—for less money. (Burroughs 1700s run circles around the 3.)
2. Ask any IBM sales rep what his commission is for "selling" a 3.
3. "S/3's a user market." The applications customizer and field-developed programs prove the dependence on IBM.
4. I tried to buy compilers—IBM said they're not for sale!

I wish he were right.

GEORGE AHMUTY
Allis & George, Inc.
Westport, Connecticut

Mr. Ferguson replies: If, indeed, I am to receive the DATAMATION Don Quixote award, then I must be permitted to quote from my creator, Miguel de Cervantes: "There's not the least thing can be said or done, but people will talk and find fault."

The faults that Mr. Ahmuty raises are interesting ones, although I don't know particularly what they have to do with the article in question.

First, I'd like to suggest that he do a little more homework regarding "less expensive products . . . that outperform the 3." He specifically mentions the 360/20 as a better cost performer than the System/3, when the figures quoted in the article refute that stand without question.

Also, I fail to see the relevance of an IBM sales rep's commission for selling a System/3, although I wouldn't mind having it. Even though I am enthusiastic about its future potential, IBM's "Application Customizer" has been somewhat less than a rousing success. However, IBM does sell a lot of software (although most of it is not in the form of FDPs) just as they sell a lot of hardware. So?

Finally, I don't understand Mr. Ahmuty's fourth point at all. Let me state as a fact that IBM will sell their compilers (like any other software house) but not for reproduction, whether you own a System/3 or not.

And to return to Senor Cervantes, "You're leaping over the hedge before you come to the stile."

Testing . . . one . . . two

The article "Suspense Won't Kill Us" by Paul Armer (Editor's Readout, June, p. 53) could have better been titled "One Giant Leap Backwards." That is the idea that Mr. Armer appears to be trying to get across. To follow his logic, ACM and various colleges and universities across the nation should discontinue their curriculum in data processing science. They certainly cannot certify to the competence of graduates of their actual or suggested curriculum.

Mr. Armer rightly states that the present examination for the Certificate of Data Processing is not a perfect tool to attest to one's competence in data processing. Many years ago we certified equipment operators on the basis of multiple choice examinations. Today, after employing the techniques of systems engineering and performance testing in these same areas, we can look back and see how ridiculous those early methods were. In those days we could have discontinued our test. However, we felt they were a better measurement of one's abilities than no test at all. These imperfect tests gave us the statistical and practical background to devise the present performance-oriented test. They have proven beyond any doubt that they were, in fact, profitable.

Some years ago, the Data Processing Management Association saw a need for some method of certification. A body of knowledge had been building up in the field of data processing. We had exams that could give an idea of one's capability of assimilating knowledge in the field, but nothing that would show how much actual knowledge one had assimilated. The membership of DPMA worked together to devise some method to measure this assimilation. The result was the examination for a Certificate in Data Processing. Over the intervening years they have attempted in good faith to improve the capability of the examination to measure how much knowedge one has assimilated. At the same time, they have worked diligently to keep the examination updated with the rapidly changing field of data processing.

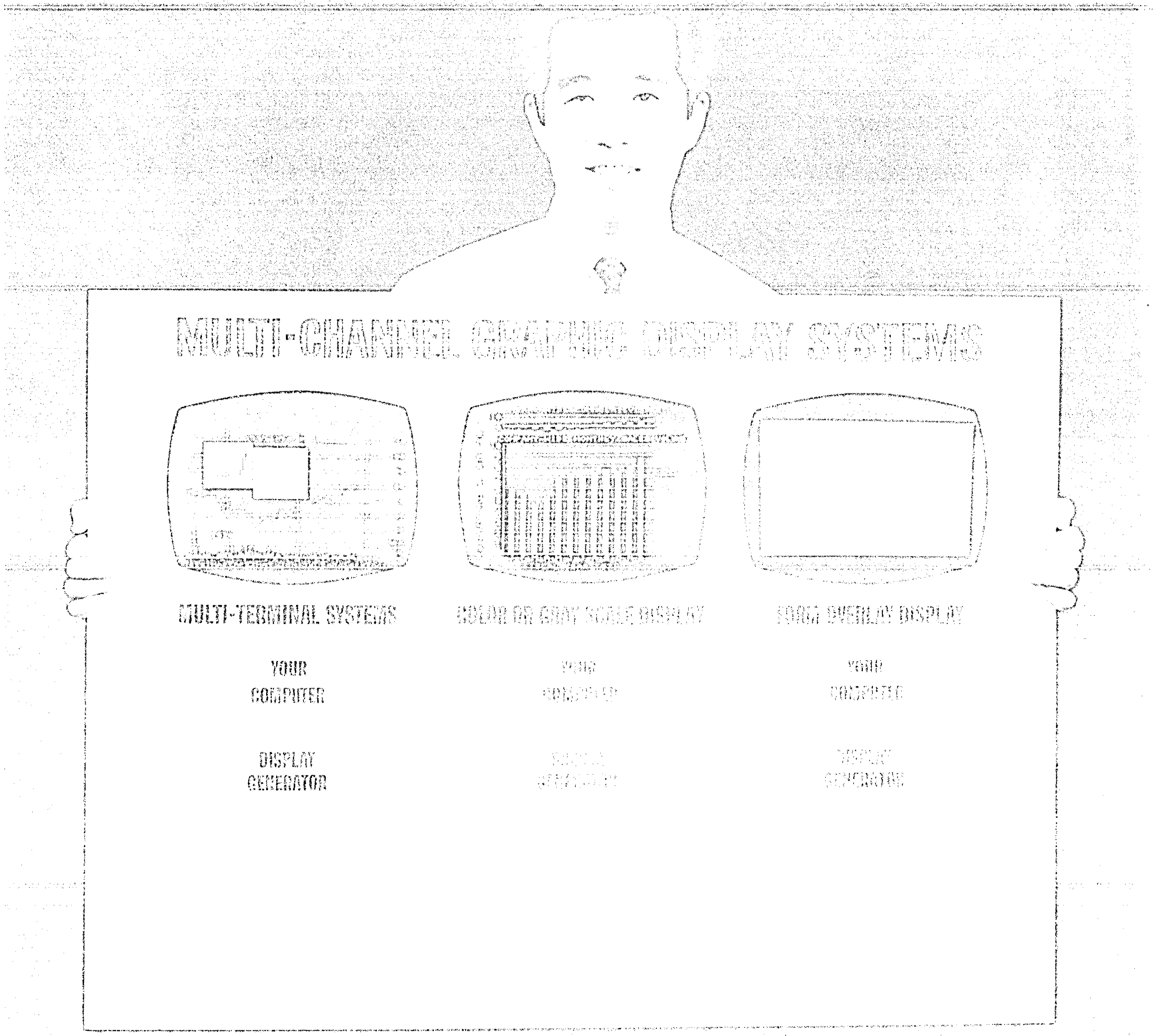
As with all things of this nature, the field has grown tremendously and has developed many specialized sub-fields. No longer can DPMA alone provide the base for the expertise necessary to continue updating the exam and developing a better tool of measurement. They have called upon the entire professional data processing community to assist. When we first heard about the idea of the Computer Foundation, many of us thought that DPMA was demanding too much power. Now that we have had time to analyze it, and to hear the criticism, I think it is clear why DPMA so wisely demanded some control. They knew that there would be a group of negative-thinking individuals who would attempt to destroy the program rather than build on it. This control which they asked for would assist in insuring the continuation of the program and its eventual improvement.

Now I think it is time for all of us to discontinue criticizing and to roll up our sleeves and get to work. Rather than killing the only tool of measurement we have, let's apply our efforts toward its improvement.

CORNELIUS M. HEAD
Indianapolis, Indiana

If we don't start to organize our societies, we may end up with as many as we have practitioners. My feelings on this situation are as follows:

1. Any organizational effort by the Computer Foundation, etc. . . . must be based on need—the need of a profession seeking identity and standards, not merely the need to spread the economies of a functioning dp organization.



Or choose all from column C, or . . .

Because this is a multichannel graphic display system, you can choose most any combination you wish. And like a Chinese dinner, any way you order it, you get an excellent buy. [illegible] to drive up to 16 independent, high-resolution channels.

For **multiterminal applications**, [illegible] monochrome [illegible] with [illegible] monitors [illegible] and typical computer interface [illegible]

If you want **color or gray scale displays**, just combine channels. Two channels give you three colors and black, [illegible] channels give you 16 colors, plus [illegible]

[illegible] ies underscore [illegible]

You can also [illegible] multiple channels for [illegible]

[illegible] need generate each [illegible]

[illegible] of the multichannel display system when you need computer graphics. Call your Data Disc representative for more information [illegible]

2. The CDP exam, rather than trying to be the one hurdle to professionalism, should be broken down into four separate certifications:
   a. Certified Hardware Specialist (CHS).
   b. Certified Software Specialist (CSS).
   c. Certified Management Scientist (CMS).
   d. Certified Design Specialist (CDS).

   All four certifications would render a CDP. This way a more comprehensive test of a person's ability could be given rather than 60 multi-guess questions. All four exams would be given every six months with all the parts given simultaneously. Thus, it would take a minimum of 18 months to become a CDP after the experience requirement had been met.
3. After a person became a CDP, a yearly status report would have to be filed to insure reissuance of the certificate. This report would indicate the current position of the CDP and his achievements for the past year. This way people not remaining in data processing for two consecutive years would have to requalify for the certificate.
4. The periodicals of data processing must serve the purpose of coordination and publicity. The communication of the populace is the most necessary ingredient in this development period.
5. The cost of organizing must be borne by the organizers and the organizees! I, therefore, suggest a "get-the-ball-rolling" fee of $1.00 be collected from every truly concerned dp person.
6. Edp manufacturers must get involved as organizations, not just individuals.

All concerned must recognize that the objective is not going to be easy to attain. Also the outcome will *not* satisfy all dp personnel. However, we've been flying two feet off the ground long enough; let's change the trajectory upward and we won't bump into all those obstacles.

MICHAEL D. CAMPION, CDP-73
The Insco Systems Corporation
Neptune, New Jersey

Drop that wanton pen

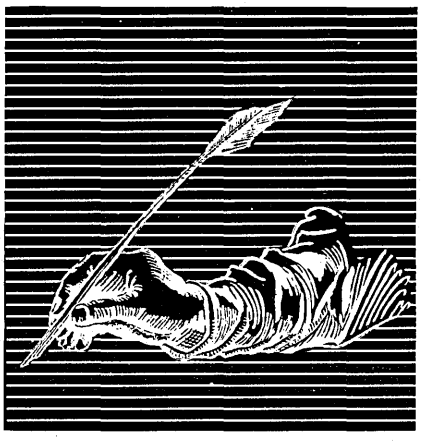
I cannot help but wonder at the implications of including dp equipment manufacturers in a class action fraud suit because their products were capable of being misused. ("Equity Funding," June, p. 88.) Will we now see similar suits against the manufacturers of calculators, typewriters and ballpoint pens because they "so carelessly, negligently and wantonly designed, constructed and manufactured" their products that they could be used "for the purpose of defrauding the public?" Let's face it; machines don't perpetrate fraud, people do—and no matter what mechanical safeguards are placed on the machines, people can circumvent them.

The problems brought to light by this incident seem to me to highlight several shortcomings within the auditing function. In order to fulfill their responsibilities completely within a mechanized society, auditors must abandon quill-pen technology and come into the computer age. Only in this way can we hope to detect and overcome similar attempts at "defrauding the public."

DAVID G. SMITH
Ottawa, Ontario

Dataroute explicated

In the April '73 issue, p. 109, you present some promising information about Canada's Dataroute System. Could you expand more on describing the system or publish the relevant bibliographic data about it? Some of the questions which come to mind are:



1. What is the multiplexing scheme used on the 56K bps channels: size of the multiplexed unit of information, static or dynamic allocation of subchannels, service possibilities imbedded in the system?
2. Is there a relation between the digital local loops in the Dataroute system and PIERCE ring concept, as presented in various articles published by BSTJ (in particular: "Network for Block Switching of Data," J. R. Pierce, Vol 51, nb 6, p. 1133)?
3. Does the Trans-Canada telephone system plan to augment the point-to-point and multi-point services offered with some form of switching, and if so, how and when?

My interest in this system comes from its not being a servile reproduction of the ARPA Network as are so many projects here and there. Data communications, apart from the actual carriage of information, are mainly composed of some routine processing performed very many times. This is usually not a job for conventional stored program computers but for specialized devices. Another point against the packet-switching concept as implemented in ARPANET is that there are too many computers doing too many times the same store-and-forward action on the data. One can compare the functioning of the system with an underground transportation system where the passengers would have to change trains at every station instead of selecting one line and either sitting in the same train until they reach their destination or switching to a different line at a few specific stations.

I know this is a very controversial point and the "packet-switchers by computer" are going to shrug their shoulders. Nevertheless I would like to see a discussion on this subject.

P. LETEURTRE
Manager of Systems Engineering
Control Data France S.A.
Tour Gamma. A,-195 Rue De Bercy
Paris, France

DATAMATION's communications advisor Ray W. Sanders, replies: At the present time, the Canadian Dataroute System involves channel derivation using time-division multiplexing techniques to provide both synchronous and asynchronous private line channels. Both byte-oriented multiplexing are used and the system has been configured to include extensive diagnostic and alarm capability. In the future, this system can be expanded to provide a number of switched services; however, these are not implemented at this time. Multi-point services are currently being included as well as point-to-point service. Market demand today appears to be primarily for these as opposed to switched services.

The local distribution system utilizes digital transmission techniques which have been optimally designed for use on local telephone plant facilities as opposed to long-haul voice grade channels. The result of these techniques provides high grade service at lower cost than would have been the case if conventional modem techniques were used. Error rates are extremely low and circuit reliability is very high.

As far as the overall approach is concerned, you are correct in your assessment that Dataroute certainly does not represent a "servile reproduction of the ARPA Network." It indeed does contain devices which have been specifically designed for data communications service. Your com-

Continued on page 161

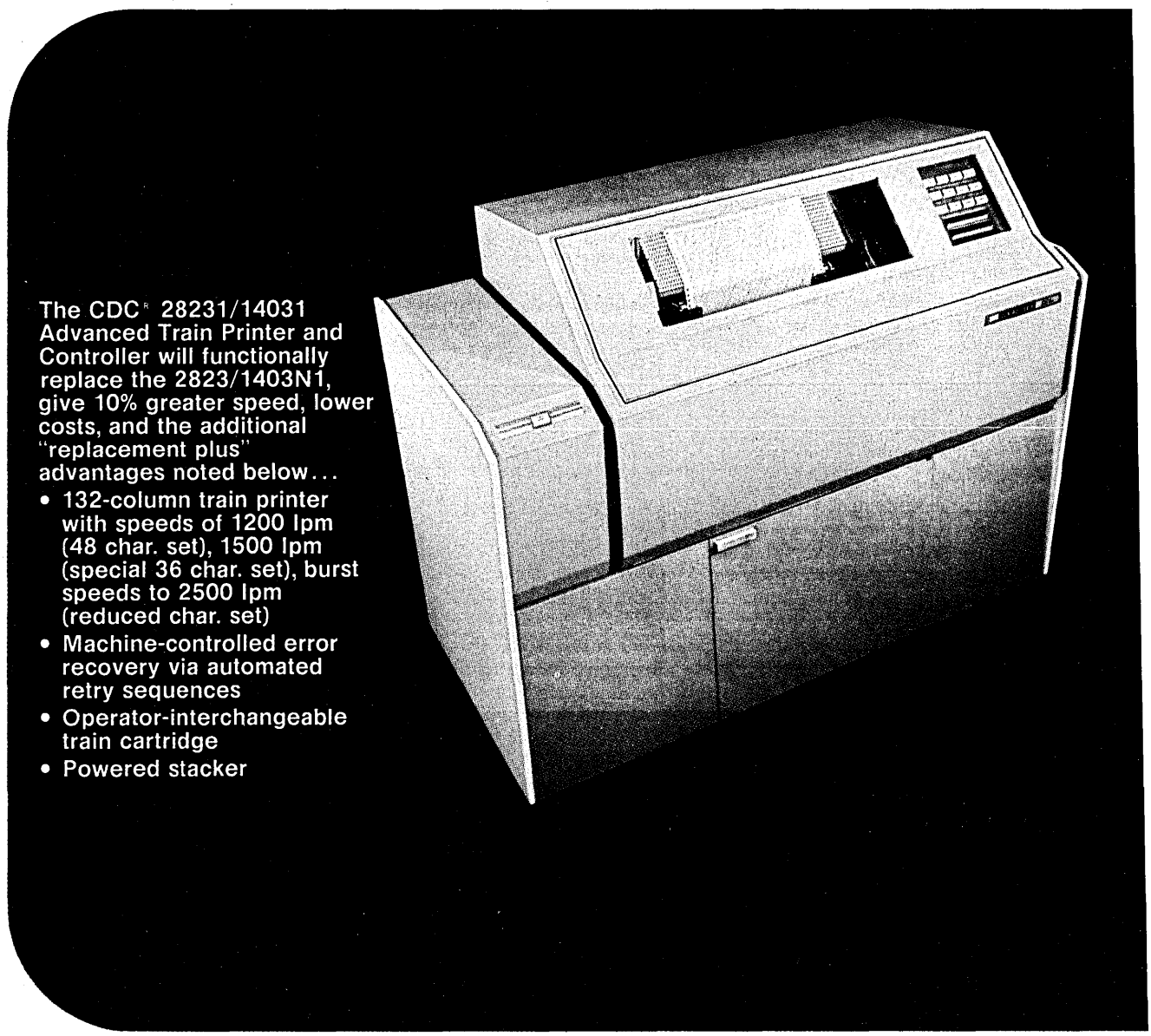
Control Data offers you more peripheral products and services

including these new "replacement plus" sub-systems

There are many reasons for considering CDC as the alternate source for the next peripheral product you add to your IBM system, but here are the three we believe will be most important to you . . .

EXCLUSIVES CDC has product and service advantages (flexible financing plans, for example) that no one else offers you.

SELECTION We have more products and services for you to choose from.



The CDC® 28231/14031 Advanced Train Printer and Controller will functionally replace the 2823/1403N1, give 10% greater speed, lower costs, and the additional "replacement plus" advantages noted below...

- 132-column train printer with speeds of 1200 lpm (48 char. set), 1500 lpm (special 36 char. set), burst speeds to 2500 lpm (reduced char. set)
- Machine-controlled error recovery via automated retry sequences
- Operator-interchangeable train cartridge
- Powered stacker

PRINTERS • DATA ENTRY • TERMINALS • DISK SUBSYSTEMS •

QUALITY We're the only major mainframe manufacturer in the IBM-replacement business. In addition, we offer you the same equipment and services we use in our own computer systems, worldwide.

WANT DETAILS? Get the facts from your nearby Control Data Representative, call our HOT-LINE collect (612/853-3535) or mail the coupon.

Control Data Corporation
P.O. Box 1980, Airport Station,
Minneapolis, Minnesota 55440.

I'd like the details on_____

_____

Name_____

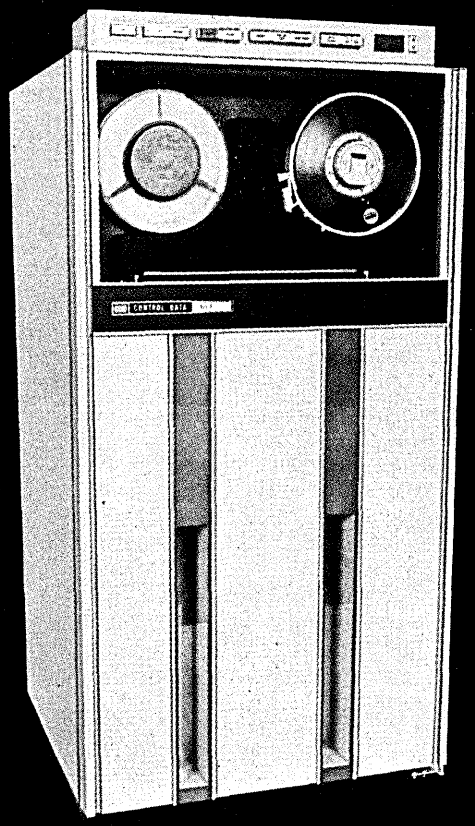
Title_____ Phone_____

Company_____

Address_____

City_____

State_____ Zip_____

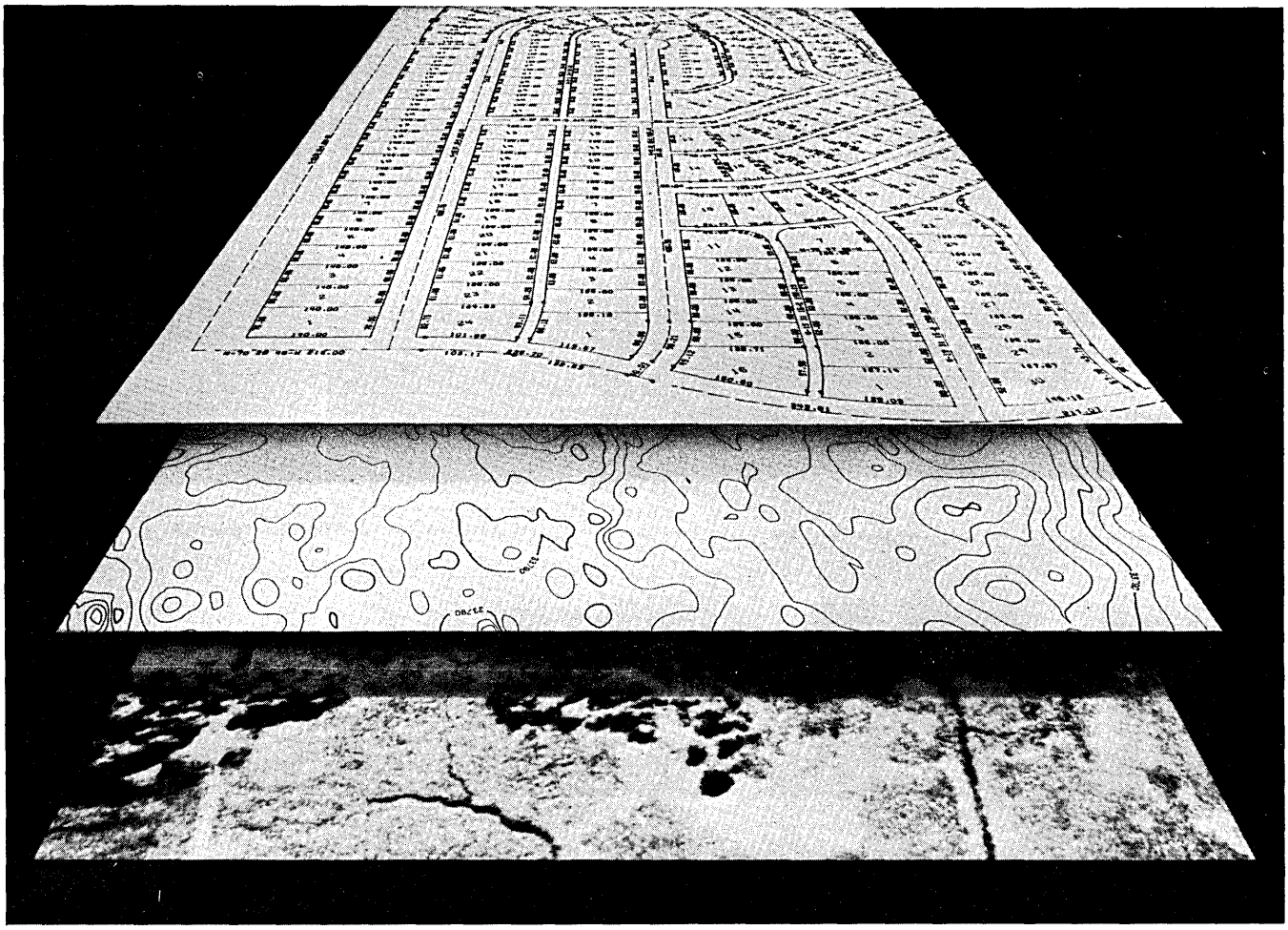


The CDC 38031/3421 Magnetic Tape Drive and Controller functionally replace the 3803/3420 at improved price performance. They also offer such important "replacement plus" features as...

- Successive motion command capability without program restrictions
- Single-capstan drive with precision tape guiding system, automatic threading and powered windows
- 75, 100, 125, 150 and 200 ips models available... 9 and 7-track drives can be intermixed using same controllers... PE, NRZI, dual-density, 2-channel, 2 x 16, 3 x 16 and 4 x 16 controller/drive combinations... recording densities of 556, 800 and 1600 BPI available

MONOLITHIC MEMORY • TAPE TRANSPORTS • CORE MEMORY

CONTROL DATA CORPORATION



Plot Your Project- From the Bottom Up

EAI makes your data do more. Because we've got a great new computer-controlled graphics system plus the software to make it work. Just feed your project information into the EAI 930 Graphics System and take your choice of a variety of special-purpose plots.

You can start, for instance, with contour plotting, based on surface variables. Then three-dimensionalize it for a perspective view. And go on to map out the entire tract.

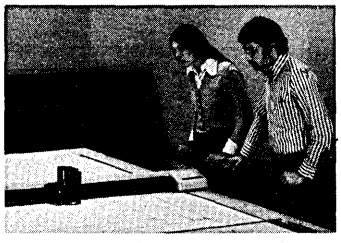
Your plots are complete. A tract map, for instance, includes boundaries, line labels, bearing lines, distances and bearings... including the calculations. You can even have street names printed out.

Because there's a DATAPLOTTER® at the output end of the system, you get high-speed plotting. Variable, up to 16 inches per second. Even on curves. All in smooth, continuous lines with no "sawtooth" effect.

Built-in error detection protects your plot. Tape noise, dropouts, static electricity . . . anything that might generate errors stops the system. Until corrected.

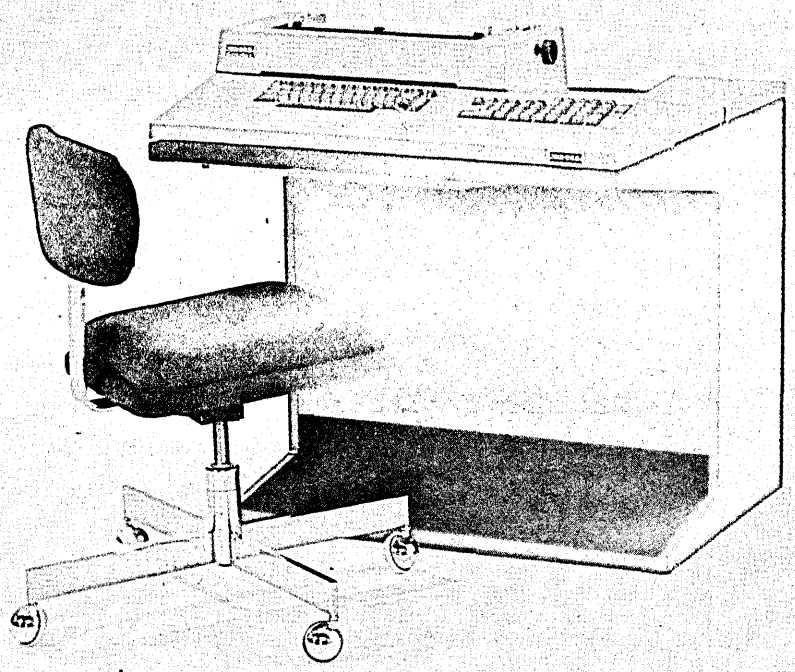
You can play with the plot. Shrink it, stretch it or rotate it around any point you choose. Or do the same with any area inside the plot. It's yours to command.

Plot on a multitude of materials with a variety of instruments. You have complete flexibility—from your systems and software to your peripheral equipment. Our EAI 930 Graphics System delivers total computer-aided drafting. And now a quick note or phone call will bring you the whole picture. From the bottom up.



EAI

Electronic Associates, Inc.
185 Monmouth Parkway
West Long Branch, New Jersey 07764
(201) 229-1100



Nixdorf...the simple way to build your business.

If you're in a small business, the Nixdorf Business Computer is the way to grow. It can do all your receivables, payables, payroll, inventory, sales analyses, everything. It's as big as your job, and costs as little as $7,990.

Other small computers become obsolete as you grow bigger. But you can't outgrow Nixdorf. Because the Nixdorf computer is modular. Memory cells, discs, printers and cassettes simply plug into it like accessories on a stereo.

Nixdorf is simple to program, too. We actually program it before you pay for it. And to service the system, all we do is unplug one module and plug in a spare.

If you're buying your first small computer or even a complete data processing system, you'll find it at one of Nixdorf's 20 U.S. offices. You'll also find Nixdorf fits in nicely with your present operations... or as on-line terminals to large-scale computers.

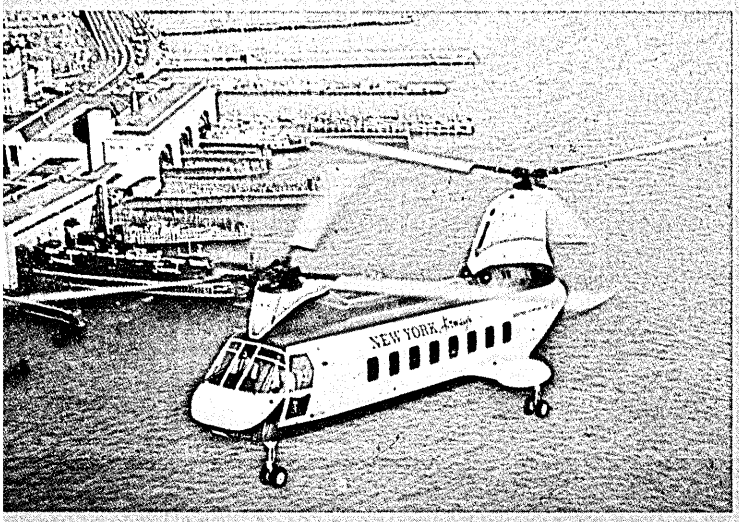
For a full color brochure on how Nixdorf can help build your business, write us now: Nixdorf Computer, Inc., O'Hare Plaza, 5725 East River Road, Chicago, Illinois 60631. It's that simple.

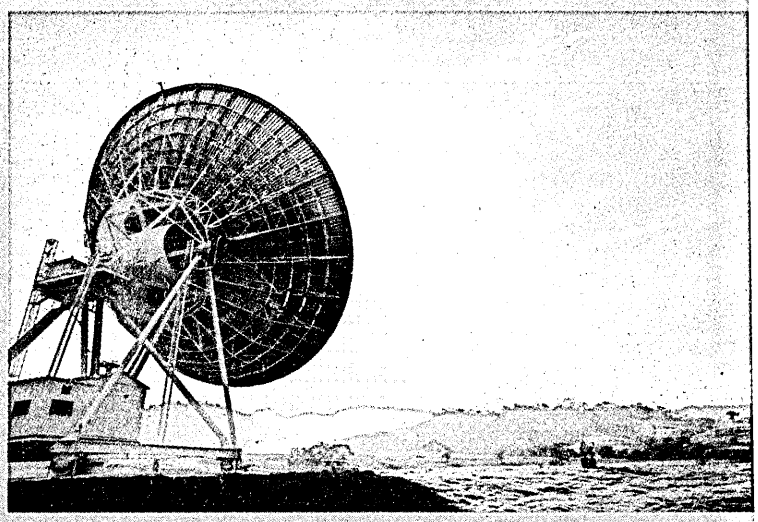
NIXDORF
COMPUTER

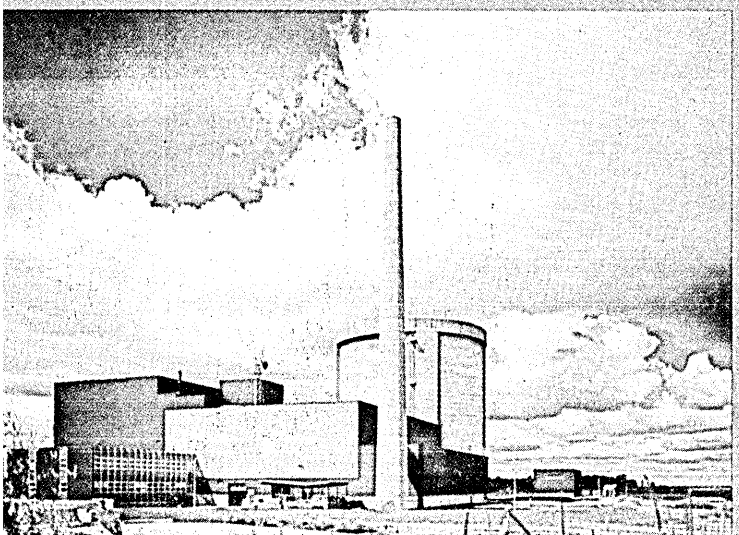
More than 30,000 computers installed around the world.

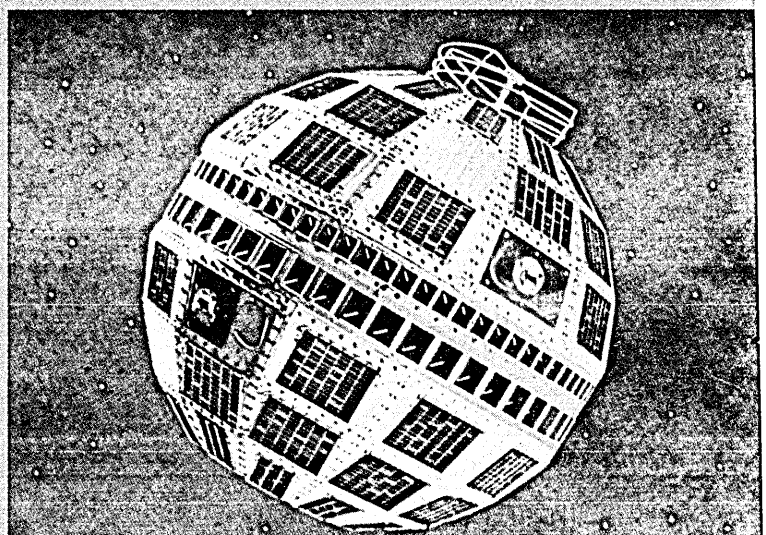
CIRCLE 17 ON READER CARD

SYSTEMS 85 and SYSTEMS 86 train pilots, control nuclear power, test auto parts, talk to satellites, forecast storms, run high-voltage experiments...









Now, what can they do for you?

Name your toughest real-time problem and chances are a SYSTEMS 85/86 has solved it. Or one pretty close to it.

Like simulators. Pilots of the nation's newest jet planes are trained in simulators controlled by SYSTEMS 86 computer systems. And telemetry. A top helicopter manufacturer uses an 86 to provide real-time and on-line answers for on-site helicopter flight test programs.

In power plant control — nuclear and fossil — we're big, and getting bigger. A leading supplier of nuclear steam supply systems has recently chosen our SYSTEMS 85 to monitor and supervise future pressurized water reactor (PWR) plants. An exacting hardware test. An even tougher software challenge.

Industrial control has always been our bag. For instance, in the auto industry alone, we have over 50 computer systems performing tasks that range from testing critical auto components to monitoring exhaust emission levels.

Communications? In one of the most sensitive and critical computer applications in history, a SYSTEMS 85 keeps the country's highest governmental figures in constant and instant contact via communications satellite and a comprehensive, worldwide air and ground terminal network.

In real-time lab operations and research jobs, scientists recognize us as a leader. For example, a SYSTEMS 86 conducts high-voltage experiments for the most comprehensive electrical research and testing center in North America. Another 86 helps a federal weather research lab improve storm tracking and forecasting throughout the central U. S.

And the list goes on. Telephone traffic simulation and voice synthesization studies for the nation's major communications research facility. Radar signal processing for the military. Mission simulation for the manned space shuttle development program.

But you get the idea.

Now, what was *your* real-time problem? We've either solved it already, or we'll devise a better solution than anyone else's.

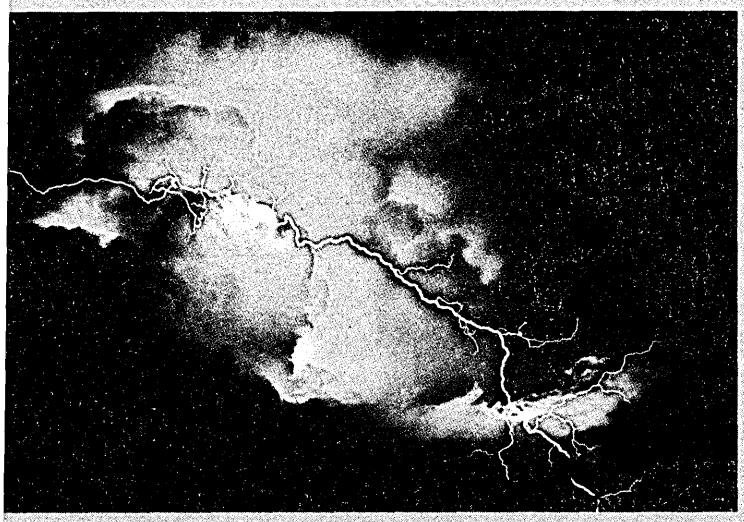
For more information, call or write SYSTEMS Engineering Laboratories, 6901 W. Sunrise Blvd., Fort Lauderdale, Florida 33313. Telephone (305) 587-2900.

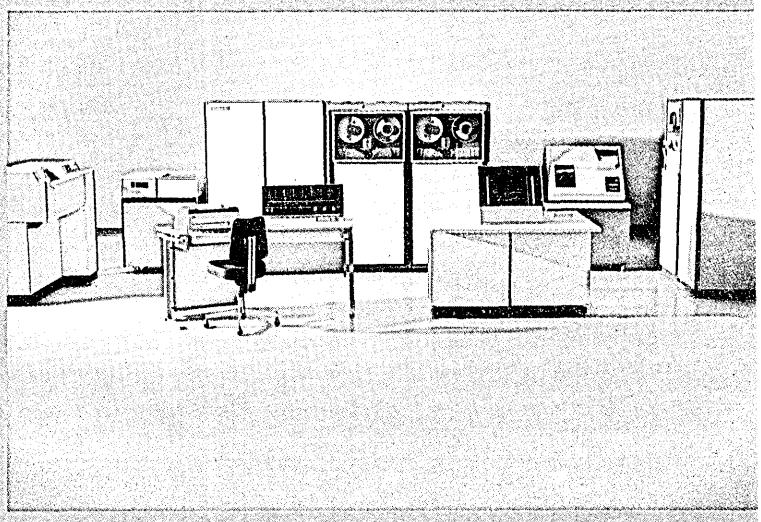
THE REAL-TIME COMPUTER COMPANY

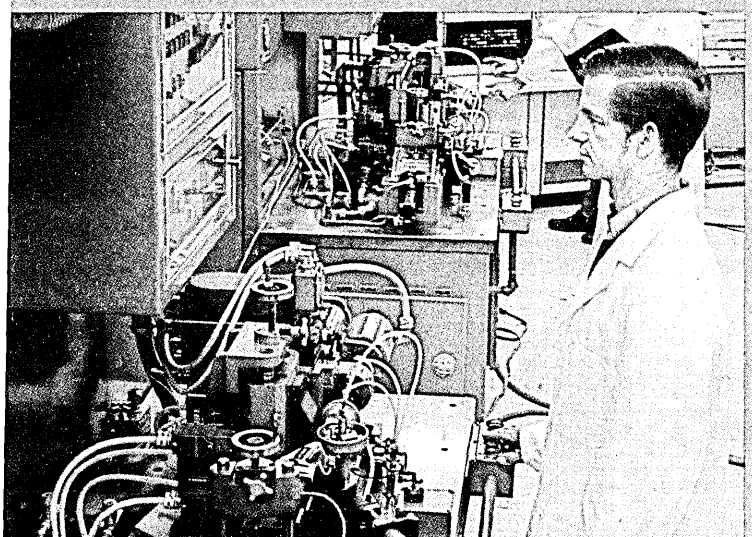
SYSTEMS

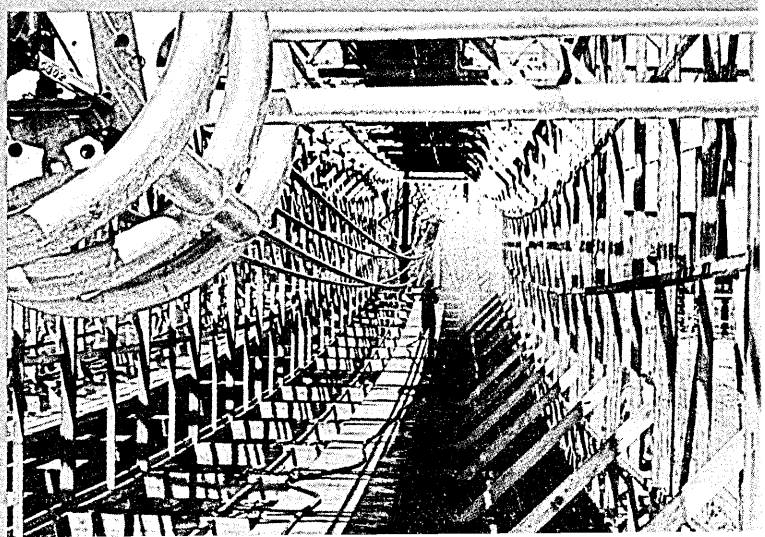
ENGINEERING LABORATORIES

CIRCLE 94 ON READER CARD









WE RENT/LEASE MINICOMPUTERS.

We're Rental Electronics, Inc., and the minicomputers we rent/lease are Data Generals Nova 1200 series, with up to 32k core memory, and standard central processor options, interfaces, peripherals, and software (availability of software based on hardware configuration). Field service is performed by Data General's own field engineers. With a three-year lease, an 8k Nova 1200 with a teletypewriter (purchase price approximately $9,800) costs less than $250 per month, plus maintenance if desired. The same system, on a month-to-month basis, with maintenance, costs about $784 per month. Or, under a rental-purchase agreement, it's $980 per month, with a full 80% applied to your purchase after six months. For complete details, just write or call. We'll send along a detailed brochure.

Rental Electronics, Inc.

A PEPSICO LEASING COMPANY

99 Hartwell Avenue, P. O. Box 223
Lexington, Massachusetts 02173 Tel. 617/862-6905

Gaithersburg, Maryland 301/948-0620 / Lexington, Massachusetts 617/861-0667 / Anaheim, California 714/879-0561 / Rosemont, Illinois 312/671-2464 / Fort Lauderdale, Florida 305/771-3500 / Dallas, Texas 214/638-4180 / Oakland, New Jersey 201/337-3757 / Ontario, Canada 416/677-7513 / Palo Alto, California 415/328-4525

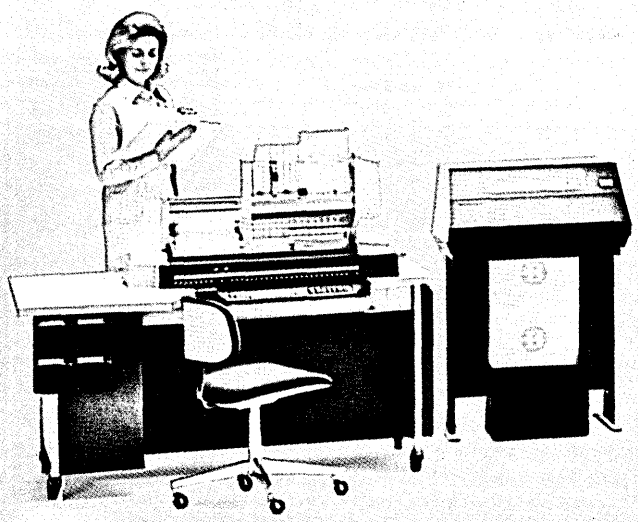
CIRCLE 50 ON READER CARD

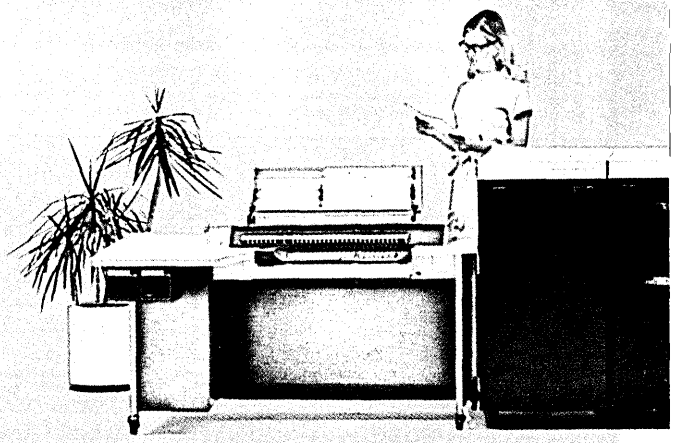
NOW... Burroughs technology offers *small* computer users the management information and control advantages available to *large* computer users.

through leadership in advanced systems design...

BURROUGHS

...provides *complete,* ready-to-install systems for better business management... including outstanding small computers, operating system software, and Business Management System application programs.





SERIES L BUSINESS MINICOMPUTERS ...the most widely used such systems in the world...are ideal for companies which have outgrown their present accounting systems.

Easy-to-use Series L's store data on randomly accessed magnetic memory records which permit both visual reference and electronic data retrieval. Options include a magnetic memory record reader, a line printer, cassette tape stations, 96- and 80-column card equipment, and computer-compatible magnetic tape for data collection.

A typical L 8000 System costs $25,000, or may be leased for $725 monthly.

B 700 SYSTEMS represent a major step up in processing power and productivity, and retain Series L operating simplicity. B 700 Systems are designed to provide a direct transition from semi-automatic to fully automatic disk and magnetic tape files.

Burroughs "audit entry" concept makes data input easy and promotes accuracy. Data entered through the console is verified and edited automatically; the console printer creates a detailed audit trail. Advanced peripheral units are available for these systems.

B 700 purchase prices average $50,000; lease prices average $1,250.

Now, the operating and control information every business needs is available in a *complete,* ready-to-install small-system package.

What makes it possible? Burroughs family of technologically advanced small computers and Burroughs Business Management System application programs.

These small but powerful computers incorporate many of the features and capabilities found in Burroughs larger computer systems. They are easy to work with, even for the first-time computer user. Their modularity permits easy expansion right in step with your data processing requirements.

To complement these computers, Burroughs offers Business Management Systems—interrelated application programs designed to handle the job of capturing, recording and classifying data, and to provide full-range operating and control information.

With a Business Management System, the Burroughs small computer user can realize immediate productivity, without the delay that new program development entails and at a small fraction of the cost.

This combination of Burroughs small computers and Business Management Systems can help you run your business more profitably now, and in the future.

B 1700 SYSTEMS satisfy business management requirements and can serve engineering and production, as well. Like Burroughs larger scale computers, the B 1700 Systems operate on multiple data processing jobs at the same time. Their advanced features include "virtual memory" operation for high system efficiency, and a Master Control Program for system self-management.

These powerful, 4th-generation systems are priced in the $100,000 range, and may be leased for about $2,500.

BUSINESS MANAGEMENT SYSTEMS from Burroughs BMS™ library include application programs designed to coordinate management reporting functions with the accounting activity. The user can select individual program products, or a complete BMS system, developed by Burroughs for his line of business.

This *integrated* business programing concept saves time and money, particularly for the organization that does not normally employ a professional data processing staff.

BURROUGHS
has brought together
a *complete* system package

. . . that includes sale or lease of the equipment; licensing of application program products and Business Management Systems; training in the use of equipment, system software and application programs; business forms and supplies; and maintenance of hardware and software.

The small computer user can look to Burroughs as a *complete* source for his data processing requirements.

Contact your nearest Burroughs office for a demonstration.

Or, for additional information, mail your business card to Mr. Jack Arbour in care of Burroughs, Detroit 48232.

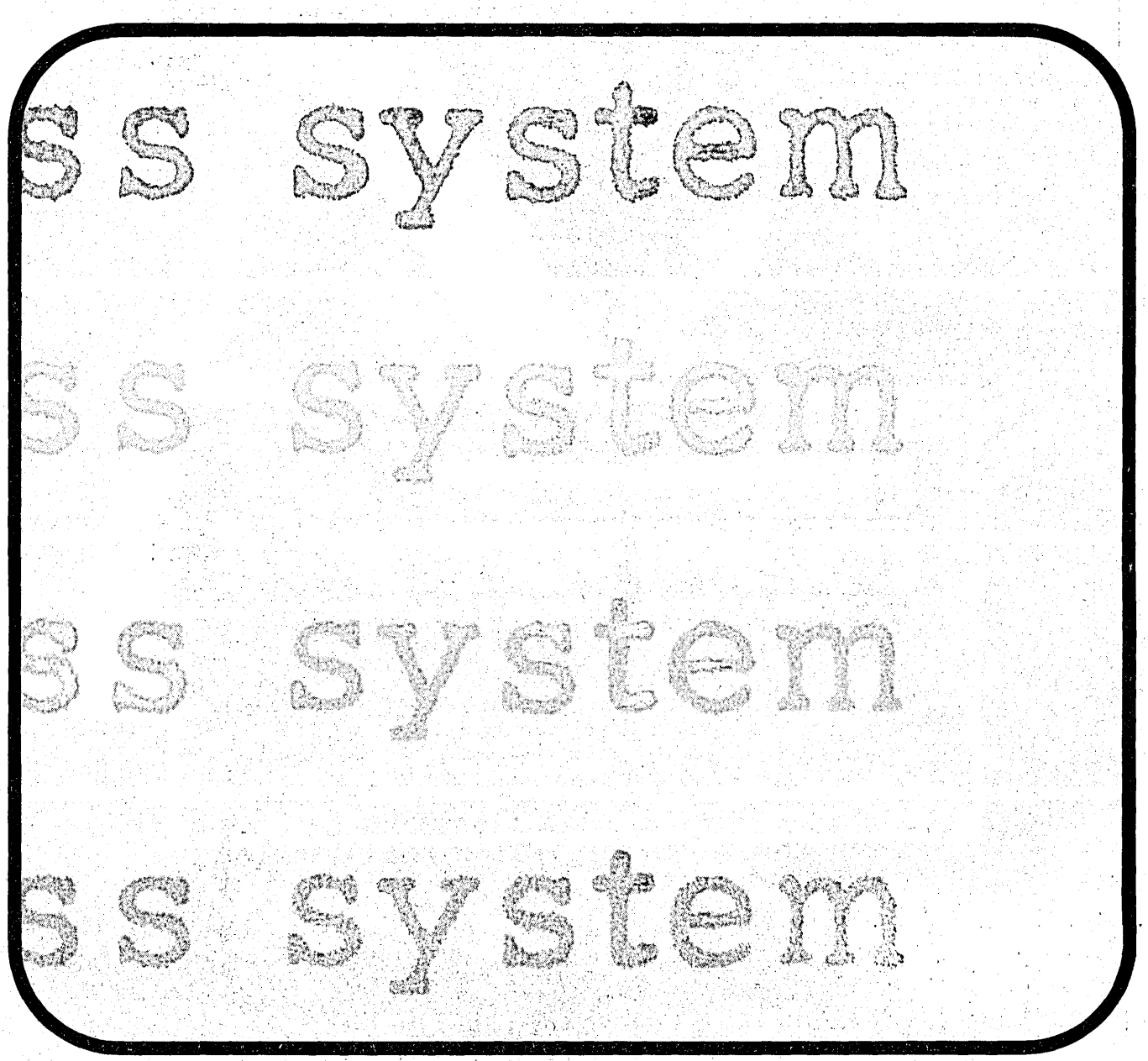
Or, just call Burroughs Information Center anytime at (313) 356-8442 and tell us what you want to know. We'll reply promptly.

Burroughs

1068764
Litho in U.S.A.

Only NCR Paper has the deep blue system. Don't settle for anything less.

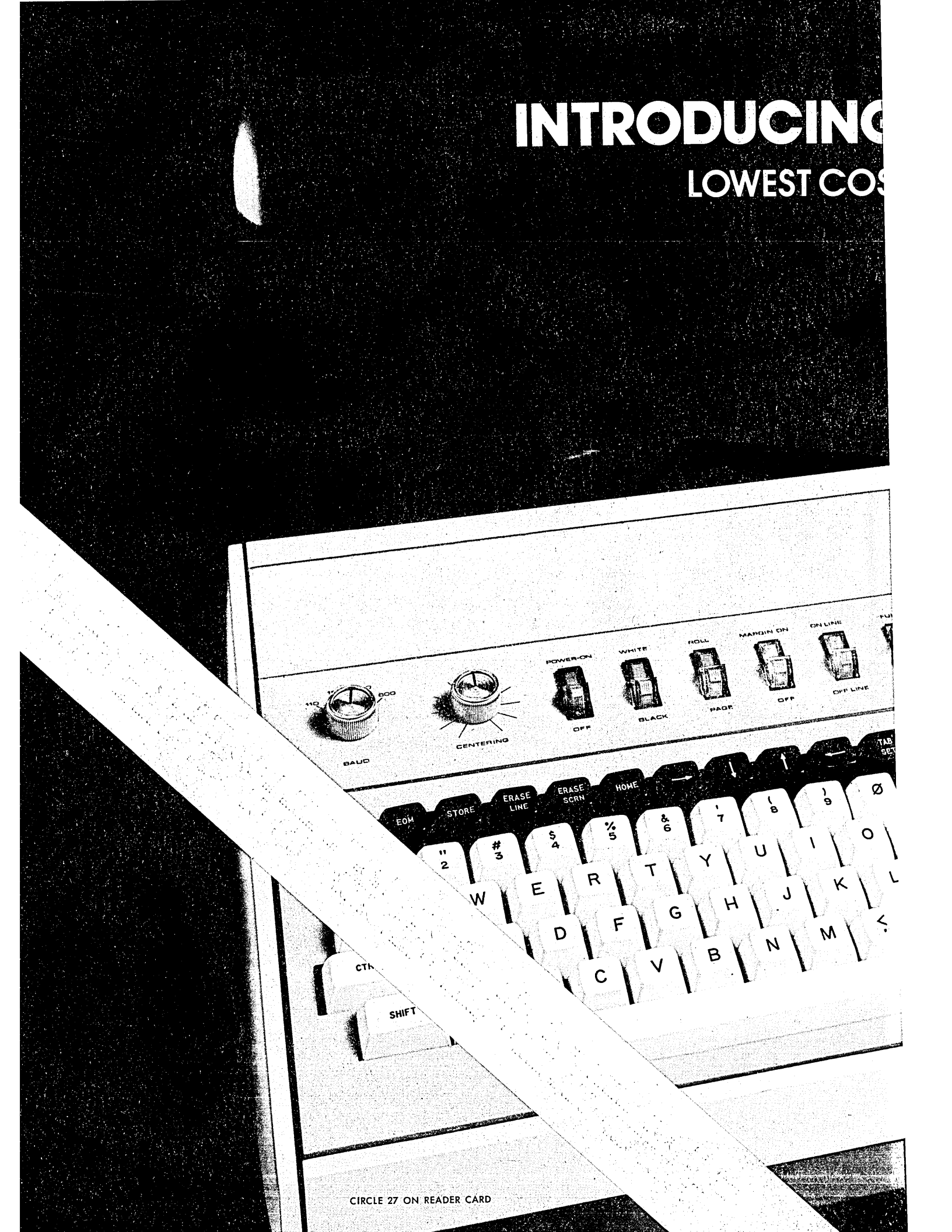
Shown below are the colors of various carbonless paper images. The top sample shows the new NCR Paper deep blue system. The others show systems you might receive if you don't specify NCR Paper. The new NCR Paper deep blue image, tested on-the-job for a full year, resists fade, is significantly easier to read, and makes copies on "blue blind" copiers. Some of our imitators are using the other colors. That's one reason why we're the leader. NCR Paper Sales, Appleton Papers, Box 348, Appleton, Wisconsin 54911.



The dye image colors are illustrative examples using process pigment inks.

NCR Paper®

APPLETON PAPERS
Division of NCR



FINALLY---AT LAST!!
THE DATATERM 101A*

TERMINAL IN THE WORLD WITH THESE CAPABILITIES:

- 40 Characters Across
- 15 Lines Down
- 4 Full Pages (screens) Of Memory
- 10, 15, 30, 60 Characters Per Second
- Full Editing Capabilities
- Built In Modem Included
- Erase-Line
- Erase Screen
- Screen Reverse
- Home Cursor
- Unit To Unit Capabilities
- Teletype Plug (RS232C) For Hard Copy
- Margin Tone At 35th Character
- Blinking Cursor
- Transmit Storage To Any Computer With Send Key Capabilities

USES ANY STANDARD HOME TELEVISION

$1350.00 FULL PRICE (No Extras!)

1 year full parts & labor – Guarantee Included

$44.00 Per Month/w/Service (36 month full service))

*Patent Applied For

DATA COMMUNICATIONS CORPORATION

650 Algonquin Road

Des Plaines, Ill. 60016

200 tracks per inch!
100 million bit capacity!

That's the kind of performance that keeps the competitors playing catch-up, while Diablo's Series 40 drives set new industry standards of cost/effectiveness for direct access storage in mini computer systems.

Diablo's unique head positioner gives you big system access time and accuracy, an average access time of 38 milliseconds at 100 and 200 tracks per inch.

A computerized inspection procedure, pioneered by Diablo, uses industrial lasers to verify the accuracy of the inductive transducer positioning system and insures disk pack interchangeability.

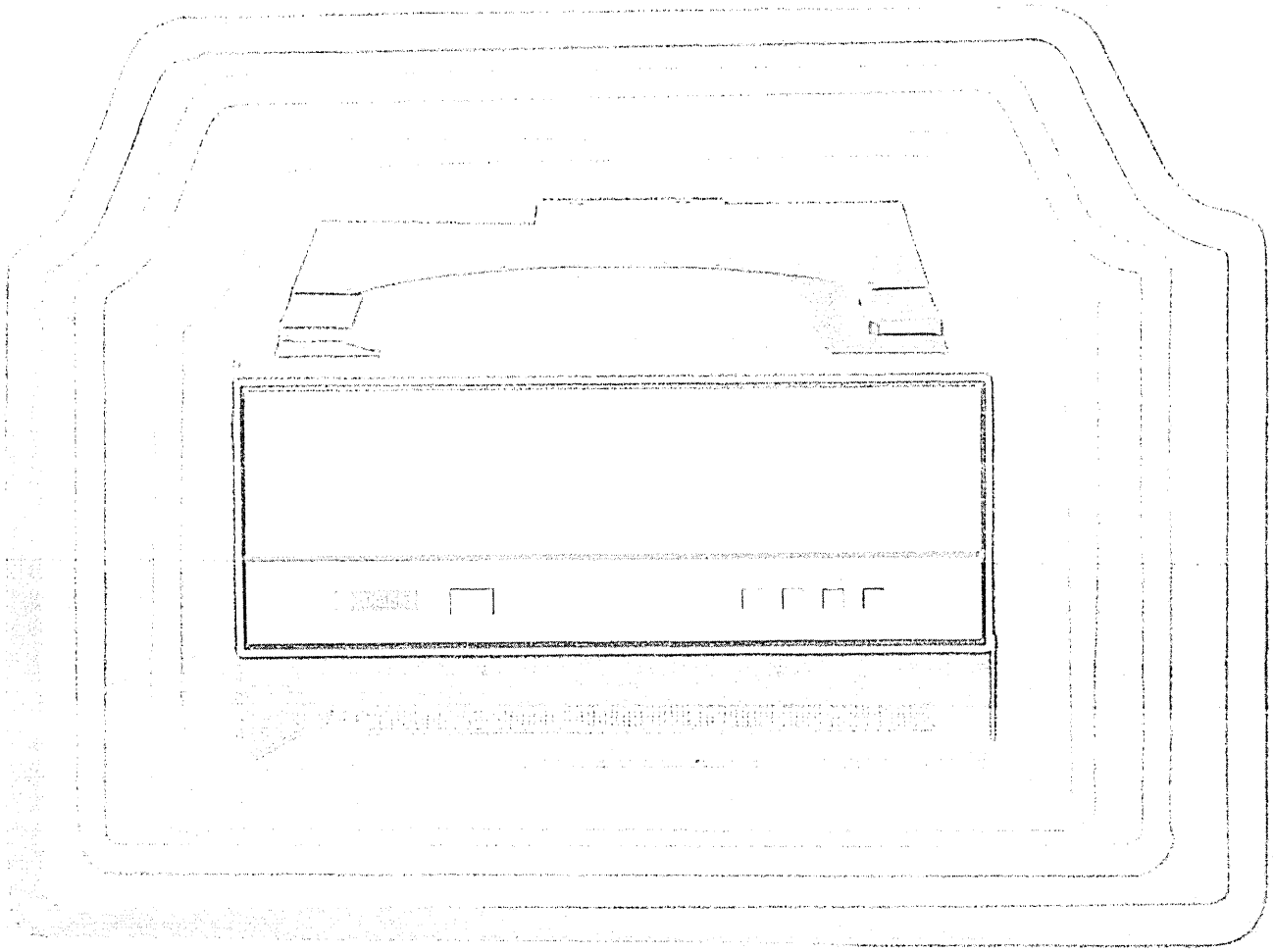
Series 40 drives are provided in dual disk configurations (one removable and one fixed with 50 or 100 million bit capacity) using IBM 5440 or equivalent cartridges. No mechanical or electrical adjustments are required, and a built-in I/O entry box provides further ease of customer service and system integration.

For full technical information on Diablo Series 40 disk drives, call or write Diablo Systems, Incorporated, 2500 Industrial Boulevard, Hayward, California 94545, (415) 783-6810.

Diablo

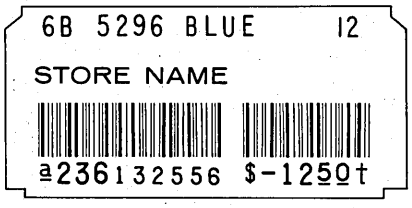
Diablo Systems, Incorporated
A Xerox Company

DIABLO'S SERIES 40: DELIVERING 200 TRACKS PER INCH!



XEROX® is a trademark of XEROX Corporation

Monarch has the bar code that works, and a choice of "tools" to create and capture data accurately, efficiently, economically.



The bar code that fits you.

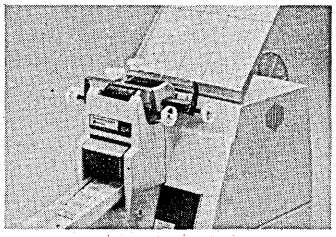
Whatever your size, Monarch has the bar code and complete systems you need for fast, accurate information control. The CODABAR™ code is flexible and reliable; compatible with your present operation. Complementing the code is a choice of systems to create and capture it economically; plus a wide range of equipment for attaching encoded tags to merchandise. The CODABAR code and related Monarch bar code products are currently in use with Pitney Bowes-Alpex SPICE®/PEPPER™ Systems.

An automated input system is vital to your future. Monarch has one that fits you. For more information on the CODABAR code and related products . . . how and why they can serve you best . . . write to Vice President for Marketing, Dept. 288, Monarch Marking Systems, P.O. Box 608, Dayton, Ohio 45401.

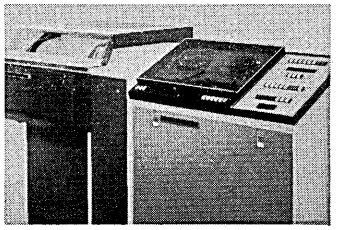
Monarch Marking Systems

Pitney Bowes

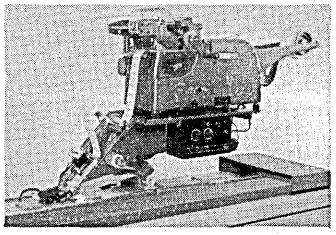
3 ways to create it.



Model 104 Dial Printer is a low-cost, easy-to-operate in-store printer. Accurate . . . you can see what you dial. It prints what you see . . . both eye readable and machine readable. Has a nominal speed of 174 impressions per minute on all sizes of tags and labels.

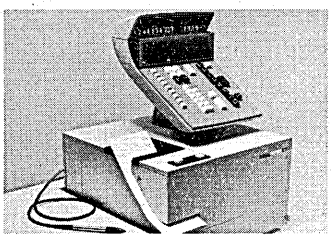


Monarch 2000 CODABAR Encoding System is a high-speed computer-controlled line printer with programmable logic and expandable memory. Ideal for high-volume distribution center printing of bar-coded tags and labels.

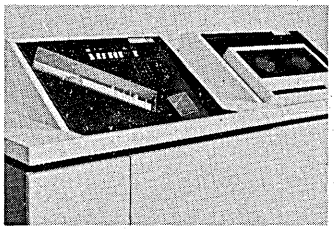


Model 2023 Rotary Imprinter is a fast, simple and reliable rotary mat printer. Enables vendors to print data on conventional merchandise tag and label supplies right on their packaging lines.

2 ways to capture it.



Model 2243 Bar Code Scanner is connected to the Pitney Bowes-Alpex SPICE® terminal to read the CODABAR code at point of sale. Data is checked seven times in the logic to assure accuracy before being released to the interface and transmitted to the terminal.



Model 2310 Batch Reading System is a high-speed data collection center. Reads 400 encoded tags per minute, feeds automatically, requires no tag orientation, records data on computer-compatible magnetic tape.

Get Monarch into your system... to get the most out of it.

PACK 50 MEGABITS of DISC STORAGE INTO YOUR 25 MEGABIT SPACE!

Replace your Diablo Model 31 with the new WANGCO Series-F Disc Drive, and double your existing disc storage capacity. The Series-F fits into the same 7 inches of rack space and has the same interface, plug for plug.

If you're using virtually any minicomputer in general use today, the Series-F does more than double your disc storage capacity. It also improves throughput; the Series-F has an average access time of 45 milliseconds compared to 70 milliseconds for the Model 31. With its modern, efficient design, the Series-F assures you of high reliability and low maintenance cost.

Let us help you learn how quickly and easily the Series-F can be installed in your system. Call collect, or write WANGCO Incorporated, 5404 Jandy Place, Los Angeles, Calif. 90066.

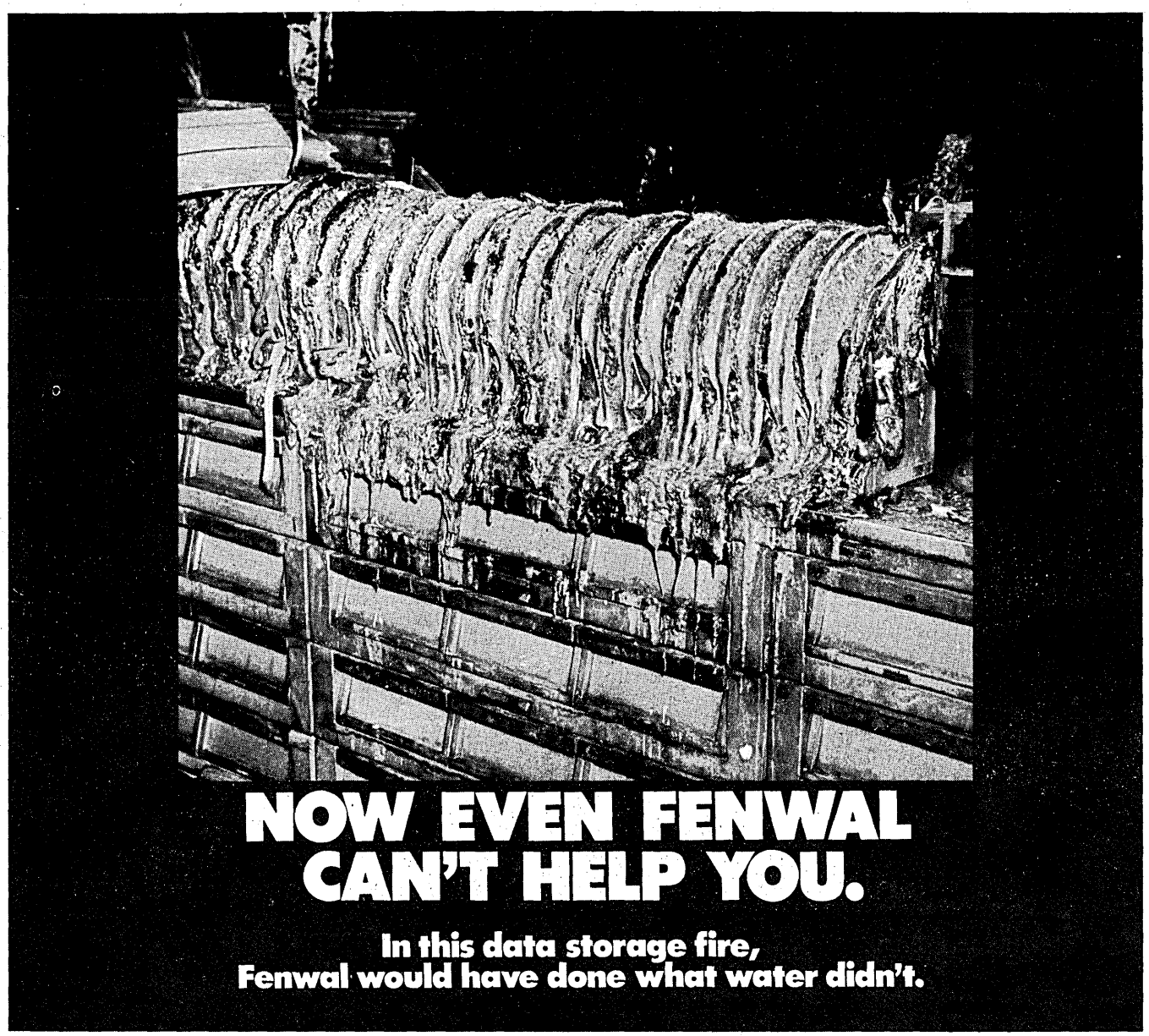
CALL COLLECT
(213) 390-8081

and ask for Ron Bentley or call the WANGCO office nearest you

WANGCO

SETTING THE PACE IN PERIPHERALS

New York, N.Y. 519/294-0893 • Boston, Mass. 617/444-9264 • Washington, D.C. 801/937-2215
Huntsville, Ala. 205/881-9225 • Chicago, Ill. 312/336-1555 • Houston, Tex. 713/785-0571
Dallas, Tex. 214/620-1551 • Denver, Colo. 303/355-3521 • Phoenix, Ariz. 602/956-5300 • San Francisco, Calif. 408/732-6210 • Seattle, Wash. 206/632-0710



NOW EVEN FENWAL CAN'T HELP YOU.

In this data storage fire, Fenwal would have done what water didn't.

Fenwal would have put out the fire *without* business interruption.

Fighting a fire with water isn't fast enough to prevent heat and smoke damage to your master tapes, discs and other records. You'd have heavy costs that start with downtime and catch-up overtime, and end with expensive replacement costs.

Things are different when you fight fire with Fenwal. A Fenwal Automatic Fire Suppression System,* using Halon 1301, stops a fire dry just seconds after it starts. It's non-corrosive and safe for people, too. So you can get right back to business as usual.

You see, Fenwal is by far the most experienced in the field of fire and explosion suppression. And our experience has taught us that Halon 1301 is the fastest and most effective weapon against fire in high-value areas. That's why we specialize in Halon systems.

When you want foolproof fire protection, talk to Fenwal. It makes good sense when you have something precious to protect. We'll be pleased to arrange a showing of our color film, "The FIREATERS," featuring our systems in action. Fenwal Incorporated, Ashland, Mass. 01721. Phone (617) 881-2000. A Division of Walter Kidde & Co., Inc.

*FM approved — UL listed

FENWAL

In fire and explosion suppression systems, Fenwal has more experience than any other company in the world.

Telerate triples business after going "real time" with TI computers

Last October, Telerate Systems of New York installed Cantor Fitzgerald Securities Corp's real-time Government Securities Trading (GST) system... the first of its kind. Telerate also uses the system to supply real-time information on the short-term money markets.

Since seconds are often crucial in money markets, Telerate customers have a big advantage... so big, in fact, that the Telerate customer list jumped from 60 to more than 200 in the first six months.

Texas Instruments supplied both hardware and software for the system. Cost was low because two 960A mini-computers were used instead of the large-scale computers usually considered necessary.

Other equipment included disc, card reader, multiplexer, and CRT terminals located in customer offices across the nation.

Information is organized on a page basis. A customer can call for the desired page... and real-time information is displayed on his screen.

Neil Hirsch, President of Telerate, reports:

"TI was able to demonstrate the high reliability required, and performance has been good.

"Response time on service has been excellent. TI is much easier to work with than many large companies. It's almost like working with an individual."

What's your problem? Maybe it's process control, manufacturing automation, or a different type of data communication. TI engineers are working every day to improve productivity and profits in all these fields. Put them to work for you by writing or calling Texas Instruments Incorporated, P. O. Box 1444, Houston, Texas 77001. Phone (713) 494-5115, Ext. 2745.

TEXAS INSTRUMENTS
INCORPORATED

CIRCLE 39 ON READER CARD

SYCOR PRESENTS THE LATE, LATE SHOW.

Late at night, long after your office people are asleep, your Sycor 340 is hard at work.

Alone.

Polled by the master station via dial-up lines, it automatically transmits the data your people entered the day before.

Next day, the processed data is waiting with your morning coffee.

Our Sycor 340's knack for clean source data entry is what makes it all possible. By making it impossible to enter the wrong data in the first place.

Using our powerful, yet easy to use T.A.L. programming language, you can tailor the 340's 8K bytes of memory to your specific applications.

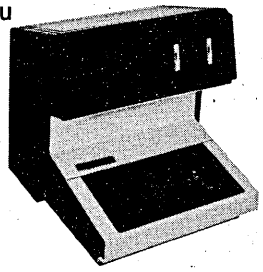
In fact, you can further enhance the 340's built-in error detection and arithmetic capabilities to include operations like Range Checking, Table Look-Up, Multiply and Conditional Data Entry.

And, thanks to T.A.L., you do it at a fraction of the cost of developing your own software.

As you might imagine, unattended communications is just one of the advantages of our Sycor 340. Advantages only an intelligent terminal can deliver.

To find out more, contact your Sycor representative today.

You might sleep a little easier tonight.



SYCOR

Corporate Offices: Ann Arbor, Michigan 48104 (313) 971-0900. **District Sales Offices:** Atlanta (404) 457-1166 • Boston (617) 890-7290 • Chicago (312) 986-1833 • Cleveland (216) 831-8625 • Dallas (214) 521-6710 • Detroit (313) 522-0080 • Hartford (203) 529-1100 • Houston (713) 688-5224 • Indianapolis (317) 784-6779 • Los Angeles (213) 640-0120 • New York (212) 371-9050 • Philadelphia (609) 665-1170 • Pittsburgh (412) 922-3350 • San Francisco (415) 349-6626 • St. Louis (314) 878-0090 • Washington (703) 525-7300. **Canada:** Sycor International Ltd., Toronto (416) 429-0883. **Service Centers in 80 cities.**

Sycor has opportunities for experienced data processing equipment salesmen and systems engineers in major cities.

RBT

In the good old days, it was RFD. Today, it's RBT . . . the INCOTERM® SPD® 900 Remote Batch Terminal Systems. They deliver.

And because of INCOTERM "push-button" compatibility, what you receive is a bundle of unsurpassed user options. You can mix and match . . . with batch . . . and interactive. Select 2780, 3780, and 2740, 360/20 and 2265, 1004 and Uniscope 100, 200 User Terminal and Series 710. You can interface with your CPU, with your service bureau . . . or with a combination of multiple CPU's or service bureaus.

You get card reading at 150 or 300 cpm and printing at 200 or 400 lpm. And if you want a lot of storage for programs, formats, or data, choose the INCOTERM SPD Diskette. You get up to 500,000 bytes.

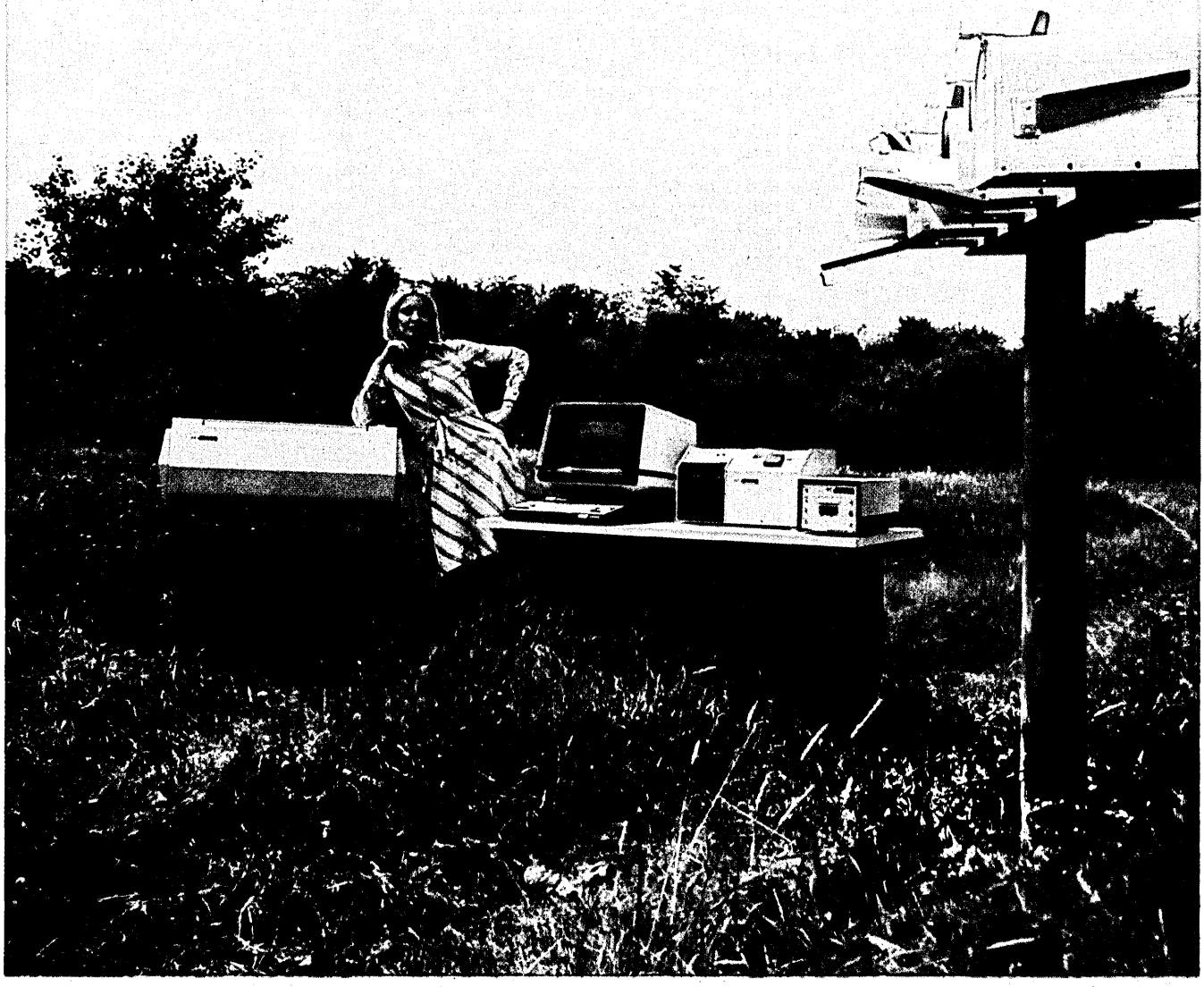
But the SPD 900 is far more than just a remote batch terminal. Use it for order entry, remote job entry, file inquiry, and a host of other applications. It all adds up to true multi-function capability.

There are many models available. One of them can deliver for you.

®INCOTERM®
CORPORATION

6 Strathmore Road • Natick, Massachusetts 01760 • (617) 655-6100

INCOTERM Sales Offices: Boston (617) 655-6100 • New York (212) 541-5780 • Washington, D.C. (703) 524-8610 • Atlanta (404) 289-4230 • Chicago (312) 593-2230 • Dallas (214) 634-2600 • Los Angeles (213) 640-0328 • San Francisco (415) 697-3643



In data communications, it's not so much what you say.

It's how you say it.

Say it right with the Computek 200.

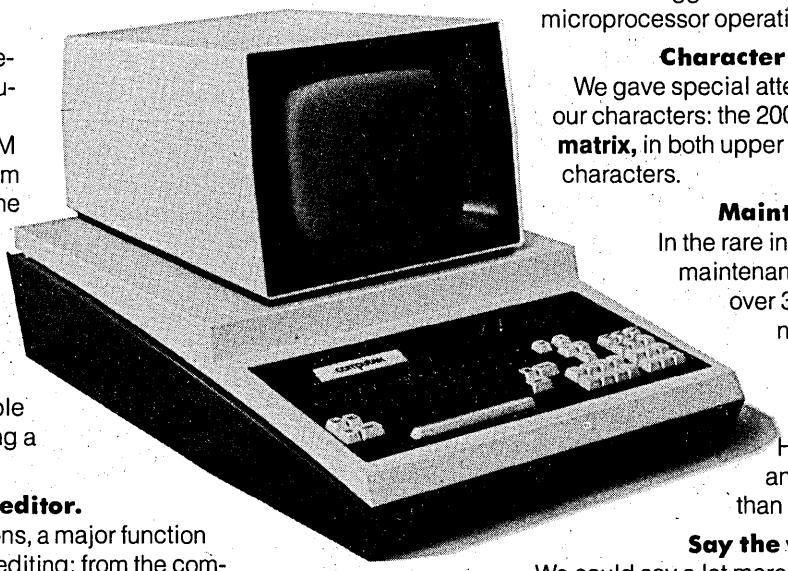
When you get right down to it, how you get your message across is just as important as the message itself. So if we can have a minute or two of your time we'd like to tell you about the Computek 200, a proven data communications terminal that our many customers consider the best on the market. For starters:

The 200 is programmable.

Thanks to its bombproof read-only memory and its random access read-write memory with up to 18,000 available bytes, the 200 can be programmed to perform communications and editing to meet any requirement—standard or special.

Communications.

When the 200 has something to say, all the computers that matter—both big and small—listen. The IBM 360/370. The big ones from Burroughs and Univac. The Honeywell Series 6000. And the CDC Series 3000 and 6000. The 200 talks in 3275 protocol, bi sync protocol, and TTY communications. And because it's programmable the 200 will even talk using a unique protocol.



The 200 as an editor.

Besides communications, a major function of the 200's processor is editing: from the common kind, like protected formats, tabbing, blinking, underlining, and intensification; to the more sophisticated kind, like justifying, centering, and word wraparound.

An interface you can trust.

We have a whole line of proven interfaces, including RS-232, MIL-188, and Current Loop. They allow the 200 to operate synchronously and asynchronously to 19,000 bits per second. Or in parallel to 300,000 bits per second.

The faster the better.

The 200 is so fast it can actually allow simultaneous printing and keyboard entry. And because of its speed, it can also control cassettes up to 500 CPS, printers up to 300 LPM, card readers up to 300 CPM, and paper tape readers...all in the same terminal station.

Do it yourself programming.

Computek has extensive experience in tailoring special programs for special needs. But if you want, you can do it yourself—many of our customers already have—with a fully supported programming development system which includes an assembler (FASS), an on-line debugger and loader (FOS), and a microprocessor operating system (MIOS).

Character reference.

We gave special attention to the design of our characters: the 200 uses a **14 x 20 dot matrix,** in both upper and lower case characters.

Maintainability.

In the rare instances when you need maintenance (our MTBF is well over 3000 hours), we'll diagnose the problem ourselves with a special test set which attaches to the terminal's processor. Happily, this allows for an MTTR of no more than 15 minutes.

Say the word.

We could say a lot more about the 200, and if you'll get in touch with us we'll send you some very interesting literature. But we'd also like to arrange a demonstration. Because no matter what we say, this terminal knows how to say it better.

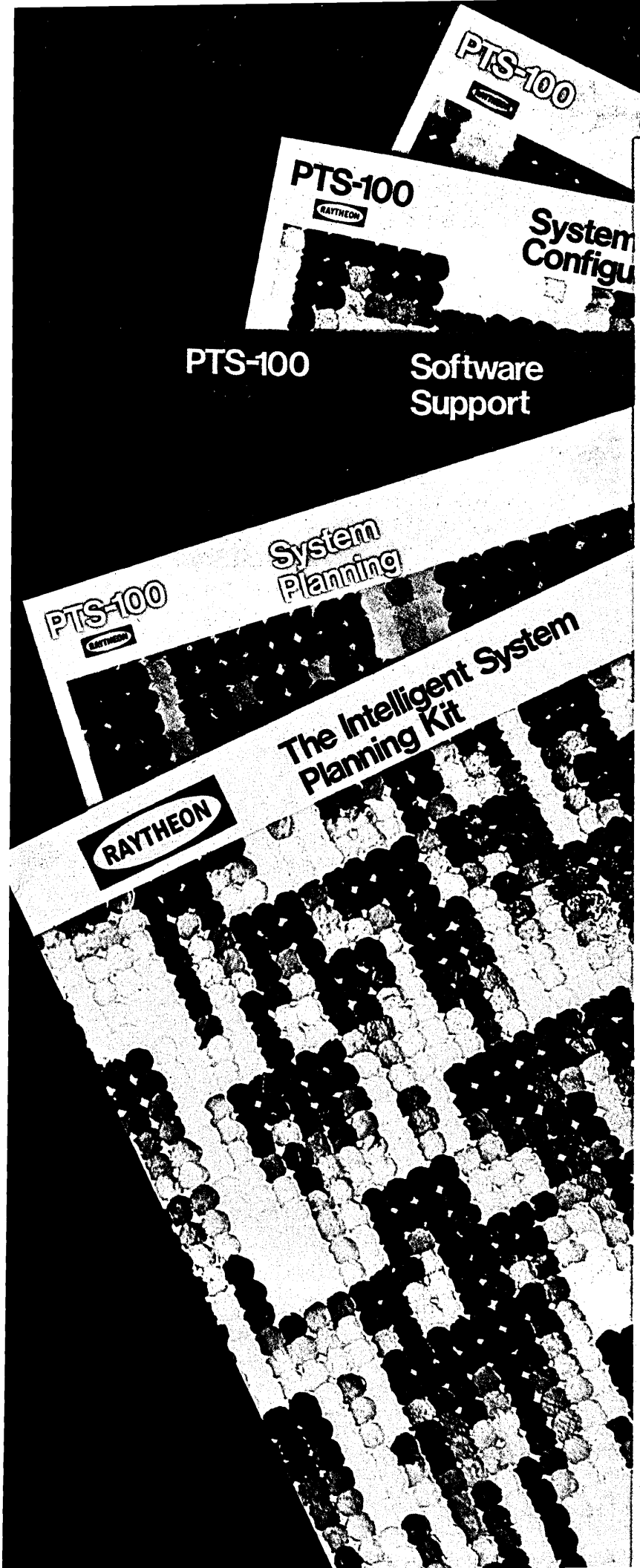
The Computek 200.

It speaks for itself.

computek™ INCORPORATED

143 Albany Street, Cambridge, Mass. 02139

(617) 864-5140, Telex 92-1464



Almost Free.

(It will cost you an 8¢ stamp.) If you're thinking of installing, expanding, or replacing a display terminal system, you ought to send for our Intelligent System Planning Kit. Just staple the coupon below to your letterhead, and mail to us.

The Kit is like a 4-part library. Naturally, it tells you about our PTS-100 Programmable Terminal Systems. But look what it covers:

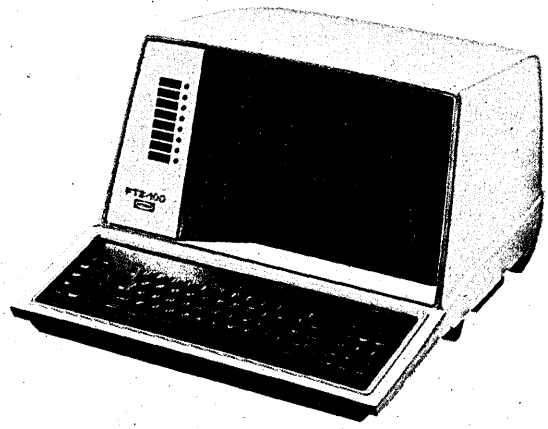
System Planning. Models and configurations. Compatibility with 360/370. Hardware. Software. Diagrams of stand-alone, medium cluster, expanded stand-alone, large cluster systems.

Software Support. Including IBM 2260 and 3270 emulator packages and user programming aids for custom application software.

System Configurations. Diagrams of small, medium and large PTS-100 systems. Subsystems using PTS-100 in place of IBM equipment. PTS-100 PARS/IPARS airline system.

Applications. PTS-100 as used by airlines, stock exchanges, brokerage firms, credit bureaus.

The 4-part Raytheon Intelligent System Planning Kit tells you just about everything you and your management are likely to ask. Why not send for it? It's the intelligent way to start planning an Intelligent System. Raytheon – for better ways to transmit, process and display your data.



Raytheon Data Systems, 1415 Boston-Providence Turnpike, Norwood, Mass. 02062. (617) 762-6700. TWX: 710-336-0646. Cable: RAYTHEONEX. Att: Hugh Bannon. In Europe: Raytheon Data Sales, Spaklerweg 53, Amsterdam, Netherlands. Tel: 020-924-344

Please send me your Intelligent System Planning Kit.
I'm thinking of ☐ installing ☐ expanding ☐ replacing ☐ just thinking.

Name_____ Title_____

Company_____

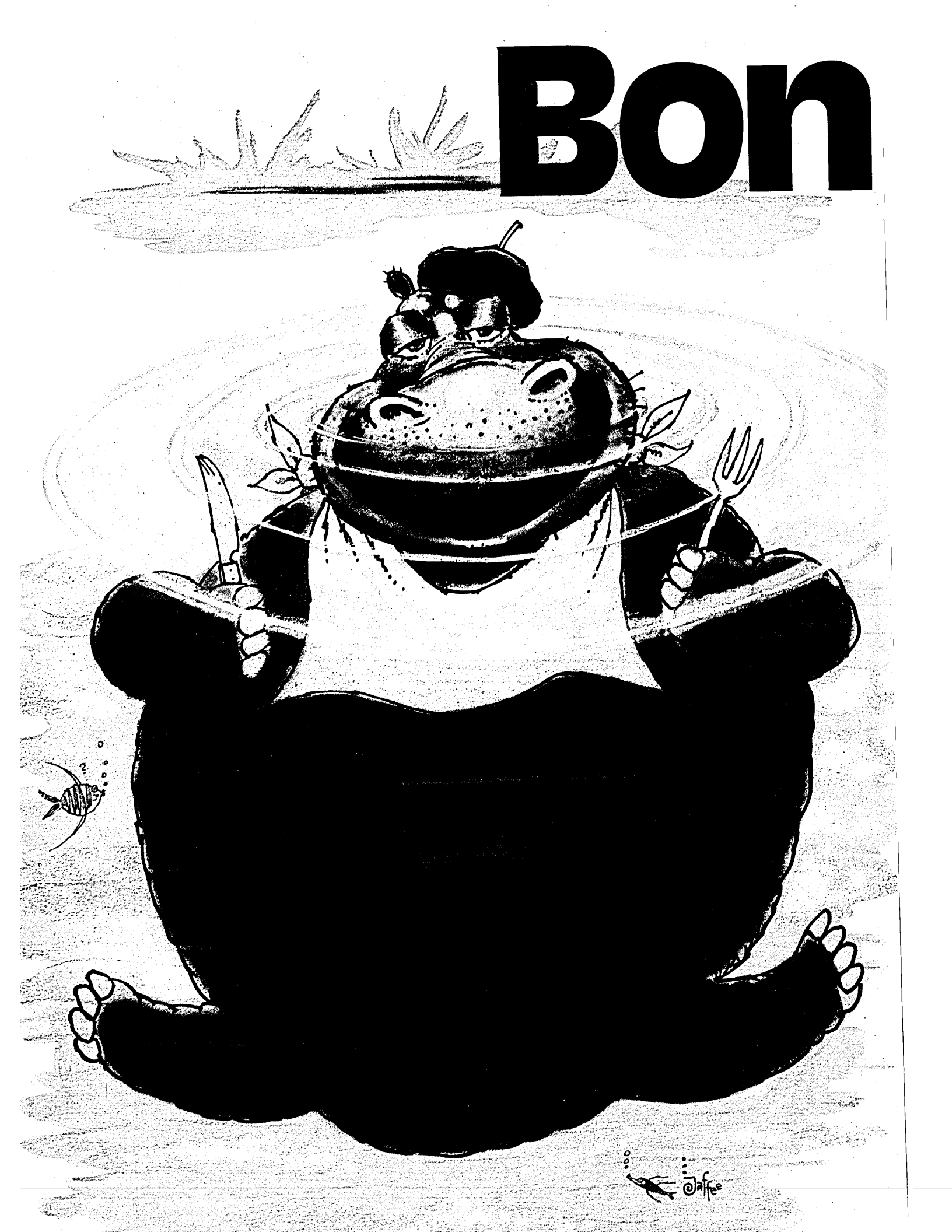
Address_____

City_____

State_____ Zip_____

RAYTHEON

RAYTHEON DATA SYSTEMS


Bon
Jaffee

appétit

Large, Hippo-like computers are gluttons for data. But even wallowing in rivers of watered down data isn't the answer. Your computer needs a gourmet diet of high quality data – great mouthfuls at a time.

Inforex Data Entry Systems give you both quantity *and* quality.

For example, concurrent data entry and verification improves throughput. Full record display simplifies error detection and correction. System-generated messages assist operators. Processor logic and checks make sure only the choicest data gets to your computer.

Plus a full range of data entry functions: Virtual Program Control, Keystroke Counting, Automatic Batch Transfer, Keystation Command Mode...and more. In addition, only Inforex Systems let you do file searching and update in place on both disc and tape.

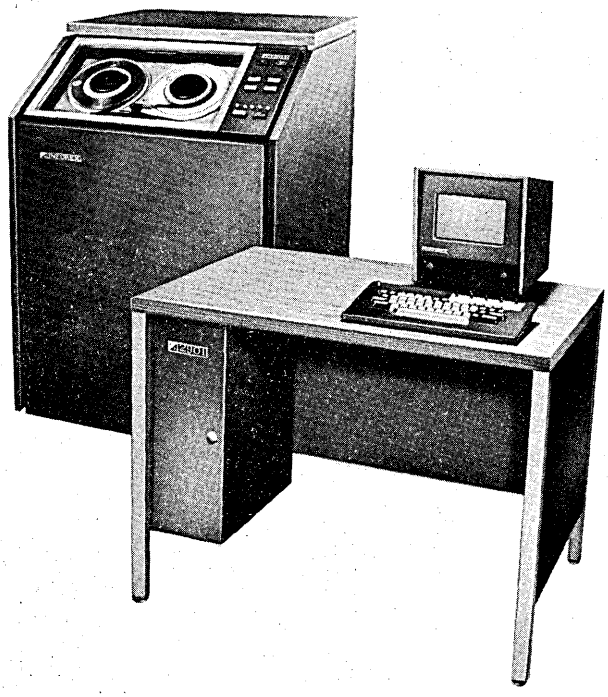
You can get more than just data entry, too. Line and Serial Printing, fully formatted, On- and Off-Line Communications for local or remote locations, and advanced 1600 BPI Phase Encoded tape output for high performance tape transports.

No wonder Inforex has more key-to-disc systems installed than anyone else in the world.

Oui.

Choose system 1301, 1302, 1303 or In-Line Data Entry for the price/performance/backup mix that best meets your needs.

Inforex. The high performance feed company for your computers. Offices in major cities throughout the United States, Canada and Europe. Distributors world wide. Talk to us. Inforex, Inc., 21 North Avenue, Burlington, Mass. 01803.



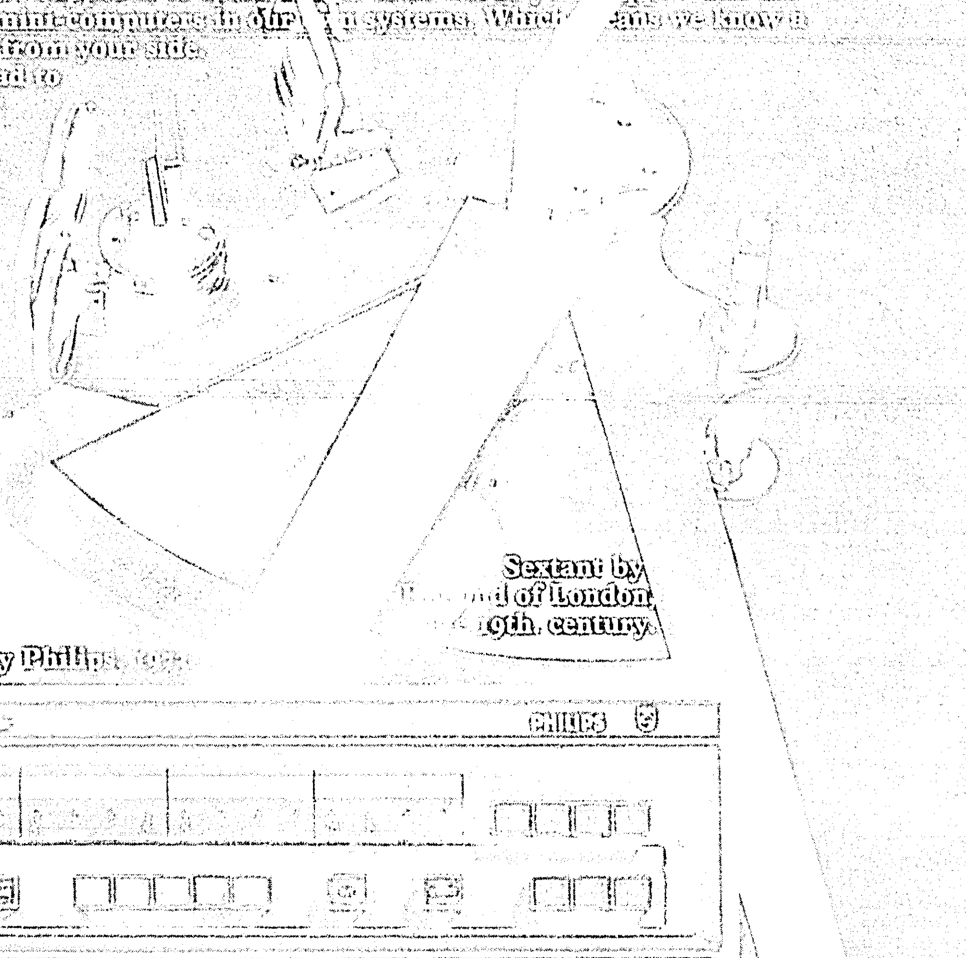
INFOREX

Staying power

Everybody knows that a chain is only as strong as its weakest link. So when we came to design and build the P 800 mini-computer we packed it full of the finest components you can buy, our own. And since actions are supposed to speak louder than words you'll appreciate the fact that we use these same mini-computers in our own systems. Which means we know a little of an OEM's problems from your side.

For example, the software had to be right, simply to make our own systems work properly!

On top of that you get the backing of a worldwide organisation that's there wherever your system goes. On price, too, we've something to interest you. There's a lot to be said for a mini computer company that isn't just a mini-computer company. Full details are at the end of your phone.



Sextant by ... of London, 19th century.

Mini-computer by Philips, 197...

Philips P800 M series plus points

Memory capacity from 0,5k to 32k 16 bit words
Cycle time down to 850 nanoseconds
16 Hardware registers for efficient processing
Multiplex channel with 15 subchannels, plus DMA
Up to 63 interrupt lines on 48 hardware levels
Easy interfacing
OEM quantity discounts up to 41%

○ Apeldoorn 05760 30123 ○ Brussels 02 193900 ○ Copenhagen 01 27 2222 ○ Essen 02141 23 6001 ○ Helsinki 90 17271 ○ London 01 730 3416 ○ Milan 02 643 6541 ○ New York 212 697 3600 ○ Oslo 02 679380 ○ Paris 01 702 2991/ 01 734 7759 ○ Stockholm 08 635000 ○ Tokyo 03 435 5211 ○ Toronto 416 752 1980 ○ Zurich 01 44 22 11

Philips considers your reputation

PHILIPS Data Systems

PHILIPS

Editor's Readout

The U.S. v. IBM

No Contest So Far

If the real computer industry exclusive of IBM were asked to stand up, it probably couldn't because it needs a transfusion. It all has to do with competition, and competition in the heart of the computer industry—among the mainframe companies commonly referred to as Snow White and the Seven Dwarfs—is not exactly vigorous. Two of the Dwarfs are dead. GE and RCA each gave up the computer ghost after they formulated elaborate assaults on IBM, and then withdrew after they felt they couldn't compete effectively. Honeywell and Univac are growing chiefly because they picked up the GE and RCA computer pieces, respectively, at bargain basement prices. National Cash Register admits it is in trouble, and Control Data, which has been easing out of the mainframe business anyway, is in good shape at long last primarily because it was the recipient of a fat subsidy from IBM (worth $100 million, give or take a few million) in the form of a settlement in the CDC-IBM antitrust case. Only Burroughs, which operates in more or less specialized markets, continues to thrive on its own.

The competition picture is worse when the various subsegments are examined. New start-up companies—the spawning grounds for ideas have virtually dried up. The ideas may still be there, but the seed money isn't.

The competition generated by the plug compatible companies while they were healthy also resulted in cheaper and better products for computer users. The independent software business—once the darling of the entire industry—is a mere shadow of what most thought it would be. Others point out that the minicomputer business is booming and indeed, it is thriving, but minis are to IBM 370s as Piper Cubs are to Boeing 747s.

This unhappy situation looks even bleaker against the background of the Justice Dept.'s 4½-year anti-trust suit against IBM. At the rate the case is progressing, and the industry is consolidating, the computer industry could look like the telephone industry when the case is resolved. Another 4½ years like the last 4½ years and there won't be very much of a computer industry left, plus as one wag has noted, at least there won't be many companies around to institute anti-trust suits against IBM. Clearly, the time has come for something decisive to be done to move the case along. But what?

It is to IBM's advantage that the case drag out over a period of years and that appears likely if the current pace of the case is maintained. And, in fairness to IBM, it can be argued that there would be nothing wrong if IBM deliberately protracted the case. IBM feels it hasn't broken the anti-trust laws of the land, so why should it want to bring the case to a speedy trial? However, if that is so, we should get on with the case, so that IBM can be publicly exonerated.

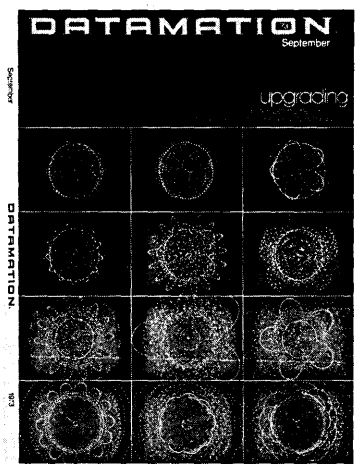
Since IBM cannot be expected—indeed, should not be expected—to expedite the case, and the Justice Dept. and the Court appear to be unable to expedite the case, there are two other courses available for speeding it along. The simplest of these is represented by the so-called Expediting Act of the Judicial Code. The U.S. Attorney General simply has to certify that the case is "of general public importance" and a three-judge panel would be "immediately" called in to "cause the case to be in every way expedited". More than a year ago, the Association of Data Processing Service Organizations, Inc. (ADAPSO) urged the U.S. Attorney General to invoke the Expediting Act to move the case along, and the organization has made a similar request recently to the new Attorney General, Elliot L. Richardson. Presumably Judge David Edelstein, who has been presiding over the case in New York City in recent months, would be one of the three judges if the Expediting Act were used.

Judge Edelstein, who also presided over the 1956 IBM-Justice Dept. consent decree, is known to have an extremely heavy work load and this is certainly not helping speed the case along. For instance, the judge has been unable to lead IBM and the Justice Dept. through a year-old legal thicket on the production of what IBM claims are privileged documents, and his most recent order on that issue has drawn sharp criticism from another judge sitting in appeal in the case. Last November, Judge Edelstein spoke of a "schedule that I hope to lay out in somewhat greater detail in the very near future" for speeding up the case. As this is written in August, the schedule had still not been announced by the judge.

In addition, Judge Edelstein asked that the Justice Dept. consider beefing up its staff in an effort to get the case moving. There is no evidence that the Justice Dept. has augmented its staff since then. On the contrary, key Justice Dept. attorneys assigned to the IBM case have left the department in recent months. The Justice Dept. is snarled up—hopelessly, it seems—in secondary issues and, largely because of its puny resources, has been unable to move the case effectively. The momentum of the case thus far is such that it is IBM, and not the Justice Dept., that fills the role of prosecutor. Virtually all of the action in the case is initiated by IBM and the Justice Dept. has been bogged down responding to the IBM legal maneuvers on tangential issues and away from the central issues of the case.

While the evocation of the Expediting Act is relatively simple and clear-cut, there is still another more common and perhaps more effective way to speed the case along: a special assistant attorney general could be appointed for the case. Most important though, he should be given adequate resources —both financial and manpower—to pursue the case effectively enough to make a contest of it. Most educated estimates place the Justice Dept.'s staff and budget at about 20 and $1 million a year respectively, for the IBM case, while IBM has many times that amount dedicated to the case. (*Fortune* magazine estimated that IBM spent more than $60 million on the Control Data case alone.) There are few precedents for appointing a special prosecutor, but considering the fact that the computer industry is expected to be the largest industry in the world in the 1980s, such a move would not be unusual, but an intelligent way to approach the case.

—W. David Gardner



Our cover design this month was developed from the computer film "Permutations" by John Whitney. Exploring the capability of the graphic crt to produce hundreds of thousands of incrementally different images, Whitney has produced several films in the past few years that have won international acclaim. Under research grants from IBM and lately, working at Cal Tech with a grant from the National Endowment of the Arts and the Disney Foundation, he is demonstrating that the computer defines a totally new realm for the arts of movement.

"Periodicity," comments Whitney, "is a strange word in the lexicon of the artist or composer. Yet it connotes the raw material of music and it underlie the patterns and designs of art as well. The computer is an ideal instrument to construct architectonic periodicity, whether output by cathode ray tube or loudspeaker. Notwithstanding man's historic effort to bridge the two worlds of music and art through dance and theatre, the computer is his first instrument that can do so in a way that is as logical for the visual arts as it is for the auditory arts.

Upgrading requires a well-organized decision-making process from the sell to the switch

So You've Got To Get a New

In every data processing manager's heart there lurks a demon who jumps out every third year and whispers: "Now is the time." Although it is rumored that IBM is paying off the Demons Guild, investigation has revealed that the imps do their dirty work for the sheer pleasure of seeing the chaos and confusion. They do their evil work well.

After the manager has gotten his message, his job becomes a matter of selling his idea to others and creating the necessary supportive ground swell. Eventually he will reach his promised land: an upgraded system. This article will discuss a number of aspects of the decision-making process.

Really?

To convince management that a new computer is needed, the easiest course to try is to prove that the existing system is totally saturated and is going to buckle under the ever-increasing demands placed upon it. There are standard ways to generate this proof; today's fashionable technique is to use impressive machine-related statistics.

The new pseudo-science, computer performance evaluation and measurement, has created interesting hardware and software tools with which to work. It is easy to demonstrate that channel one is busy 87.3% of the time or that the cpu is churning away for 53.7% of the power-on time. Using software, it can be shown that the production programs have filled the disc space or that the memory is so crowded with system that problem programs cannot load. The numbers are impressively easy to get with each passing year. Too little attempt is made to discover what the data actually means; for justification purposes, raw figures are sufficient. With a little imagination and proper sampling techniques, lovely curves can be drawn to "prove" that the machine will be tied up in knots before six months elapse.

A simple system measurement is turnaround time. No user ever admits that the turnaround time is satisfactory. Even instantaneous results are not emotionally satisfactory in spite of documented evidence that there is a finite limit to the number of turnarounds a programmer can use in a day.[1] There is always user opinion that results are not being returned fast enough or that somebody else is getting all the priority shots. With a little inspired gamesmanship, the opinion can be upgraded to a demand.

Another standard ploy is the "I'm sorry but there simply is no more memory or disc or tape available for another application" approach. Most users have a "wish list"; one or two projects that would be nice but are less than essential. A typical project in this category uses 400K bytes on-line all day to update 500 transactions, a task now being performed satisfactorily by two clerks. Users know that with just a bit more of the resources, this project could be completed.

Proper handling of measurements, turnaround data or new project demands, ought to make it a simple task for a data processing manager to prove that his machine is groaning under the load and ready for upgrading.

Sometimes, however, sterner measures are required.

A data processing manager who enjoys a good relationship with his user community may elect to ignore the numbers, curves and timings and have the users press him for on-line, large scale systems. The problem is that the users may not know they need the systems which they are contemplating or which are being contemplated for them.

An edp manager hasn't the time to "sell" all his users on the glories of the on-line, data base revolution. But every installation has somebody with the time and interest to perform this task and will do it whether you want it done or not. Your friendly salesman has a manual crammed with new hardware and "easy to install" software packages. Turn a salesman loose among the users and there will be more pressure

1 Weinberg, Dr. Gerald, *The Psychology of Computer Programming*, Van Nostrand Reinhold, New York, 1971.

One

by Philip H. Dorn, Contributing Editor

choice	probability	comments
DO NOTHING	.001	Almost never; edp people love to make changes.
WORKLOAD REDUCTION	.02	Reduces load by eliminating marginal programs. Rarely used. Users protest too much.
SERVICE BUREAU	.05	Effective but not done because of loss of control and dangerous to resident edp personnel.
FACILITIES MANAGEMENT	.08	Excellent for smaller organizations but requires top management approval. Suicide for the dp manager.
NEW VENDOR	.10	Requires courage and daring. Conversion is usually a financial disaster. Multi-vendor operations can be difficult.
REFINANCING	.25	More for the money, although requires a long-term commitment and sufficient planning to recognize future needs.
NEW OPERATING SYSTEM	.40	Regularly done once a year by installations although results are often disappointing. Parallel test in commercial shops is expensive and time consuming.
DUPLICATE SYSTEM	.50	Comfortable back-up is provided and no special training is required, but tends to result in over-capacity in areas where not needed rather than pin-pointing problem.
UPGRADE	.75	Selective upgrading adds needed capacity and sometimes unneeded capacity. Doesn't tackle back-up problem. Configuration often forces more cpu than is really necessary.

for new applications than can be handled. The only trouble with this approach is that once it gets turned on, it is almost impossible to stop.

This system is well-known to IBM users; the blue-clads have perfected the tactic. Unless put under tight control, a swarm descends on the users. Starting first with friendly talks it eventually becomes trips to plants, presentations, and finally, a proposal for a jointly done system design. The design somehow always seems to require hardware and software marked IBM.

If the sales team cannot generate enough heat among the users, an old-fashioned strategy known as the executive visit remains as a last resort. This involves a whirlwind visit by executive jet, a sumptuous lunch and a brief peek into the glorious future of edp. Otherwise tough-minded executives appear to wilt under the blandishments with astonishing rapidity, perhaps a case of a salesman conning a salesman. If the goal is an on-line decision making system, look at somebody who has one. Only be sure that the visited site has about three times as much hardware as yours; then it is easy to claim that you can do it for half.

Should all the public relations gimmicks fail, an edp manager can always retreat to prosaic projections of current loads, systems being developed and systems in planning, multiply by his corporation's annual growth rate

Get a New One

and show what is required rather easily. However, a straightforward approach isn't nearly the fun of a clever sales campaign.

Alternatives

Management has been sold on more capacity and the dollars will be forthcoming. Which of the alternatives to get more power ought to be selected? Physically upgrading the present system is one way, but there are other choices to be explored. The opening act is usually a quick call to put more hardware on order; looking at the choices comes later. This may lead to an interesting situation in which management is locked into a position and movement is difficult. But the other routes must be examined.

The least popular choice is reduction of current work load by elimination of marginal programs and cutting back tests. Hardly a crowd pleaser, it is often the best move and is only rarely executed. Few users are apt to give up their runs if others are perking along.

One way to start a programmed reduction is to make a report disappear and see what happens. If two or three cycles go by and nobody asks for the output, it is probable that the department was discontinued last year and the paper is going into the waste basket. Another method involves taking a hard look at what's running, peeling off 10% from each group's quota and awaiting the screams. Raising in-house machine time rates can have the same result if budget accountability is practiced.

A second alternative is taking easily encapsulated work and sending it to the local service bureau. Bureaus which survived the 1970/1971 shakeouts are thriving; they know how to run machines effectively or they would not be in business. However, in the corporate empire-builders' world, letting a job get outside is rarely done. Somebody is apt to discover that the bureau can run the job better and cheaper than the in-house organization. This potential resource is rarely used.

Facilities management is another unlikely road. Giving the entire load to an outsider is almost never done among the top 500 American corporations. The smaller user, overloaded on his tired 360/40, Honeywell 115 or Univac 9300, can probably get a lot more for his money if consolidated onto a 370/165, a Honeywell 6050 or a Univac 1108. It is rare for an edp manager to take this step voluntarily because it would mean giving up control, reducing his budget, losing his

Should you upgrade? How do you know?

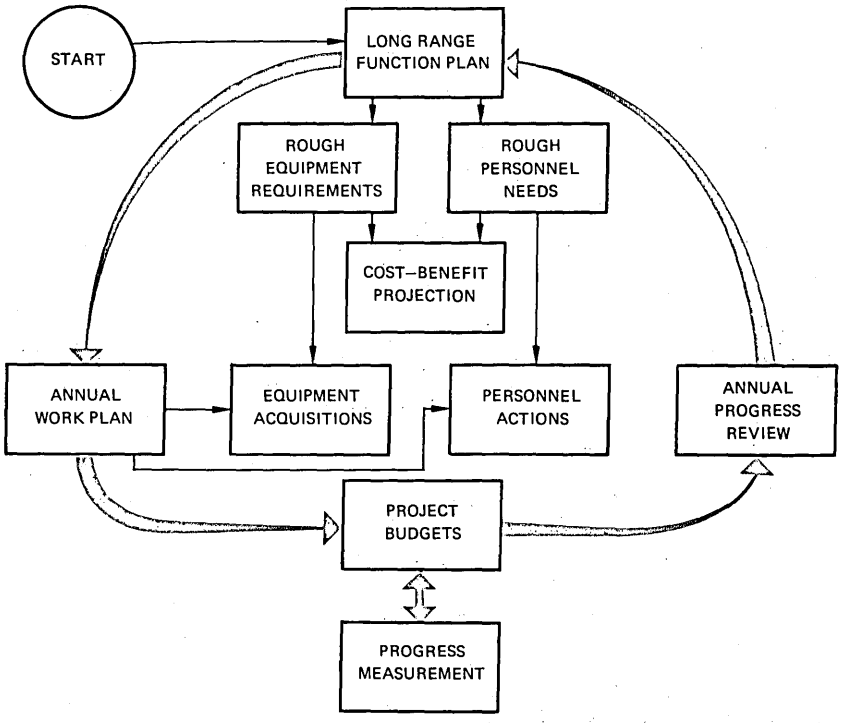
These days many fine new things are available to the user who will consider upgrading his equipment. The large user can have virtual storage, virtual machines, multiprocessors, advanced communications processors and improved file managers. Most of these are also available to the small user. More directly, for most small users the latent systems offer the means of entering the on-line, real-time world at a price which is for the first time feasible.

But why? To say "everyone should have the new features because they're better" is like saying "every motorist should have a Ferrari," and makes as much sense. Do you need the new features? Especially at a time when most manufacturers' offerings are not demonstrable, cannot be benchmarked, and are not understood by the local representatives? Will your employer's profits be greater if you have them, and is there no better way to contribute to profits than by buying a virtual pig in a poke? There is, but it requires a little effort.

Let us first excuse those who simply need more capacity. If you stick with an unchanged OS, DOS, GECOS, MCP or MULTICS, the latest machines offer you more capacity at moderate prices and those who need it should get it. But most users appear to be going for the new functionalities, often without a clear idea why. You should know why before you buy, and you can know why if you can answer the following questions.

- What services will your information systems be providing to your users several years out?
- What computing tools, at what cost, will be justified to provide these services?
- Is it time to buy any of these (or their prototypes) now? What this means is: you should have a long-range plan for the functions data processing will perform in your organization, and without it, you can't know whether you need upgraded equipment functions.

You may turn off at this point, saying: "My users can't tell me what they'll be doing years ahead, so how do I know what they'll need?" Or maybe: "How can I tell if I don't know what technology will offer then?" Sorry, but these copouts won't work. Most of your users will still be people in five years, and engaged in most of the same businesses. Technological change may be great in terms of hardware cost-effectiveness several years from now, but it is unlikely to be so great in terms of function. How much have operating systems, much less languages and methods, changed during the past five years? No one said the long-range plan had to be precise, and many generals can attest that even a broad strategic plan is a lot better than none at all, even if tactical improvisation is necessary. Planning can be done, many organizations (including rapidly



changing ones) have done it, and here's a brief sketch of how it can be done (Fig. 1).

First you need a starting version of the long-range data processing plan . . . the plan of the functions to be performed for users. You may have to prepare this first version unaided and it may be pretty strange, but the plan will evolve in cycles and get better. Besides, once you let users know that all they'll ever get is what's in the plan they'll quickly get serious about it. So will your management, which will probably comprehend this iterative planning process perfectly.

Next, you need to derive a set of rough implications of the function plan: equipment and personnel requirements and cost-benefit projections. Without these, the desirability of the plan can't be established. With them, you can begin to get an idea if equipment should be upgraded. Don't worry about the cost-effectiveness improvement of equipment in the years projected: use today's measures, and assume that the inevitable improvements will be offset by over-optimism in your projections.

Now, prepare your annual budget in terms of the actions that will be required next year if the long-range plan is to be met. These will include mostly system development projects, but also will include personnel and equipment acquisitions. Now it becomes clear how equipment upgrading can be planned this way: a series of increases in capacity and function will be indicated to support the function plan, and both the nature and timing of the first step should fall out.

Of course things won't work out as planned. The carefully planned and budgeted projects for the year won't track the actual measurement of progress. More important, new developments from left field will upset the plan (acquisitions, new legal requirements, user enthusiasms). This is normal, it just means that the long-range function plan has to be revised again. This should happen at least annually in phase with the budget cycle, and more often when significant perturbations occur. Revision of the long-range plan needn't be a big deal, and with luck each revision gives it greater reality. With such a long-range plan you can tell if and when you should upgrade, both in capacity and function. Without it, you're a weathervane in the salesman's wind. Why not try it?

—**Frederic G. Withington**

power base and committing corporate suicide. Occasionally, however, top management sees through the fog and orders the move on sound financial grounds. It has apparently been established that a facilities management operation can provide more computing per dollar for a good many corporations.

If an installation is feeling very brave, an option to explore at upgrade time is selection of a new vendor. Is it feasible for even a medium-sized commercial installation to consider a new vendor? Probably not! The cost of conversion is so large that any potential savings disappear. Standard programming languages have not proven a solution to the vexing difficulties of getting from one vendor's system to another. Even when compilation is successful, the systems rarely run properly. Current standards do not concern themselves with data set compatibility, control language or object time capabilities. Even FORTRAN, the most standard of all languages, behaves differently when faced with a divide by zero condition in different systems.

IBM customers constantly hear from other manufacturers that the way to install a non-IBM machine is to slice out a single application and set up a separate center for the new system. This sounds logical, but the problems of running a computing center with two systems are entirely nontrivial. Operator training, shift scheduling, tape library handling, etc., all become major operational snags. Work cannot move from one machine to the other. Users are frustrated when one machine, the one they wrote for, is down and the other sits idle.

In the commercial world, systems are getting harder and harder to isolate on a single machine. The data base concept builds on the availability of all data, not just that on one system. When a large proportion of the data lives outside the central file, has a different format, perhaps even different recording characteristics, the task of administering a data base becomes doubly difficult. Systems rarely stand alone; output from one becomes input to the next. Parallel processing—one system creating reports while another updates the file—is becoming more common. A separate system for just a few applications makes the task that much harder.

If load reduction, service bureaus, facilities management and bringing in a new vendor are among the least likely ways to change the configuration, the more conventional ways are refinancing, changing the operating system, doubling up and finally, upgrading the existing system.

An often overlooked method to obtain more machine without higher cost is refinancing a rented system. If an installation will commit for seven years, a 370/135 may be obtained for 50% of IBM's rental price. This is not a total commitment; leasing companies allow upgrading and adding new devices to change the basic configuration. After four or five years it would be startling to find any of the original components still in place.

Refinancing requires a willingness to make long-term plans and to admit that the current mainframe is the type that will be on the floor for years. Plug-for-plug replacement of memories, tape drives, disc drives and communications control devices, a standard 360 technique to reduce cost, has not worked out quite so well on the newer 370 line. The leasing companies and replacement manufacturers have found IBM's pricing structure, constant announcements of new gear and fixed term leases are making the marketing job much harder.

Obtaining more capacity and better throughput by changing the operating system is an oft-heard suggestion from manufacturers. This can be something fairly elementary such as implementing new system and compiler releases all the way to something as complex as moving to virtual memory approaches.

Looking at OS/360, B-6700 MCP, GECOS III and EXEC 8, the historical fact emerges that none of these systems were worth much until nearly three years after initial release. Perhaps a sad commentary on the state of software, nevertheless teething troubles plagued all third generation operating systems. Given this history it is not surprising that newer versions with tighter code can restore the capacity lost earlier.

If all other potential remedies are ruled out, the data processing team must select from two remaining routes: first, multiplying the present machine by a second system; or second, upgrading the existing system. Both approaches have favorable and unfavorable attributes which must be assessed against the needs of the installation.

When back-up is a problem, real or mental, addition of a similar or identical system quiets the fears since one ought always to be available. And the new partner is probably going to be sufficiently underloaded for a while to get some of the long-delayed experimental work done. New training is bypassed and program conversion is not a problem.

On the "not-so-good" side, adding a second system does not double the power of an installation; at best a gain of 80% can be anticipated. Two operating systems and the machine room problems of two systems will steal 20% or more of the potential capacity. It is most unlikely that all parts of the original system were fully loaded; more

Get a New One

normally, only a single component is saturated. The second system makes additional capacities available for those units which were not saturated as well as relieving the load on the overstressed components. An extra cpu for a man whose cpu is only running at 30% of capacity does not seem too economical. In partial compensation, most second systems are smaller than the installed system: a 370/145 shop adds a 370/135 or a Univac 1108 user adds an 1106. The mainframes may be smaller and slower but it is almost a certainty that the peripherals will be interchangeable.

Finally, there is the upgrade or add-on method, the most common way to obtain more power and throughput. This is accomplished either by swapping components for faster and larger versions or by adding new components. Conventionally, an 1106 becomes an 1108, a Century 200 becomes a 300, a 370/155 becomes a 370/168, or a B-6700 suddenly sprouts a removable disc file and an extra 64K words of memory.

The advantage to a manager is that he can beef up his weakest links and probably not affect the installed programs.

One little-known difficulty is system balancing. It is rarely clear what effect extra memory or a new channel will have and few in the industry will hazard a guess. Balancing a configuration is not a scientific process: there are almost no guidelines to follow. Adding memory opens the way to more jobs in the system which means more peripheral activity and more cpu demand. A few similar cycles and the installation may find itself right back at the point from which it started. But overloading —starting more jobs than the system can handle—is precisely the trap awaiting an operator when he sees memory available. Since the pundits do not understand system balancing, it is unlikely that an operator will do much better.

How far do you go?

It is hard to make the basic decision on how to proceed; it is harder yet to

Before You Jump . . .

Why do hardware and systems software changes almost always appear more simple than they really are? Why do we sometimes jump to enact a change offered by the vendor? Here are some thoughts about those and related questions, the result of some firsthand experience.

How do we determine how difficult a change might be? There are two standard sources of information: the vendor, and users who have experienced similar changes.

When we ask fellow users about a change, we always find something different about their situation, and exhaustive searches may never uncover a situation suitably similar to ours. Even when the computers are the same, we find that few installations are exactly parallel.

The search for commonality continues. Unfortunately, other people will not usually tell you where they have similar conditions. This is not because they don't want to, but because the burden of identification is yours, not theirs.

When you *do* find similarities in "the change" that another user has experienced, he will tend to minimize the difficulty his shop experienced. He is not being difficult. It's just that, as with the member of any infant professional group, he doesn't want to appear ignorant.

And our own attitudes can get in the way of meaningful information exchange. We may have preconceptions about the change, an oblivion to the obvious. Or we may be under heavy pressure to make a change . . . and therefore distort the answers we receive. As a result we may plunge ahead with blinders on, lulled into false security.

As for getting the necessary information about the change from the other source, the first rule to follow is DON'T TRUST THE VENDOR. That friendly salesman across the desk from you is selling change, because most changes mean upgrades that mean more commission dollars.

In addition, the salesman is usually not technically oriented. He has to rely on technical people for many of the most pertinent answers. That means that he must convey your message verbatim and return the answer verbatim to you . . . and be prepared to continue to act as messenger boy through several stages of refinement in the Q-A process. That assumes that he can always reach the best qualified person at Intergalactic HQ to answer your questions. Some salesmen have better pipelines to Truth than others. Some are better at relaying information than others. Be careful.

Another quality of the typical salesman: he will generally oversell. Without actually lying, he will certainly always stress the positive aspects of any offering. A salesman need not be devious and evasive (some wit will here add, "but it helps"), but the end result may be the same. It doesn't hurt to remember that some salesmen *are* liars.

The other source

To use the vendor as a source of accurate, usable information, you have to find the right individuals within the company. They are usually not the ones who walk through your door. Even after you find the correct sources you have the problem of extracting the information that you need. This requires a certain rapport that is developed only over a long period of time.

So if you're in a new region, if you have a new vendor or new vendor personnel on the account, you may have to rely solely on other users.

Back to the user

Before dealing with your counterpart, it would be wise to remember that every company has a personality that hopefully finds its way into the computer room. The intelligent computer professional adjusts his thinking and methods to conform to that of the company. Thus, a strongly conservative company may spend many many years analyzing a major change regardless of the preference of the computer department. Risk-taking companies, on the other hand, may plunge ahead, disregarding obvious safeguards, and placing severe pressure on the computer professional and his staff.

In approaching another company, we should try to assess this "personality." Did the computer people follow a thoughtful pragmatic approach . . . or did they simply react to a strong internal company influence? And how do you find out their thought processes without questioning their integrity?

It is also difficult to analyze and judge the level of data processing expertise within another company. But we have to try. We also must know, of course, about such mundane (and more readily discoverable) matters as the type of applications that they have. Are the systems peripheral- or cpu-bound? How do they operate: batch, job streams with data transfers, multiple job streams, tricky priority schemes, or?

After finding the ideal user—candid, professional, thoughtful, experienced (just like you) *and*

decide how far to go. Giant steps, transitions from a 1401 to a CDC 7600, are rare. The question of step size has a number of aspects and not all of them are related to technology.

The longest step, a great leap forward, is a move to a new vendor. The reasons why this is rarely feasible have been covered earlier and do not need reiteration. Resetting to zero is traumatic and cannot be taken lightly. If it has to be done, sympathy is extended to the installation's users.

Generally, moves are made to a modified form of current technology. New technology, dramatic advances such as laser memory or holographic storage, is the province of the research laboratories and government installations—not the average user. Nobody wants to be first in line for anything new. Even if the technology is essentially familiar, there are serious questions of the capability of the vendor to maintain. The first user becomes the on-site training school for field engineers.

The steps should be small and the technological advances minimal. The goal is to change either the hardware or the software, never the two at the same time. A total shake-up leaves too many opportunities for things to go wrong. Proceeding one step at a time guarantees that the trouble shooting will go easier. It has been established that computers are followers of Murphy's Law, that if anything can go wrong it will. If this is true, each change ought to be as limited as possible because if the new hardware is perfect then the software is sure to be sufficiently buggy to generate false indications of hardware error. The reverse case holds, also. Unless one of the component parts is solid, debugging will be a nightmare.

Contemplated changes have to be spaced to minimize the impact on the users. Commonly this is done by scheduling the changes across several weekends with the nastiest parts of the job reserved for the longer holiday weekends. Fortunately, new peripherals can usually be installed and tested off-line using micro-diagnostics, at least tested to the point where there is confidence that the system will not be destroyed. While the integration is not always smooth, it is usually reversible, and if the new equipment fails to perform, a quick roll-back can be instituted.

Nobody knows a foolproof method for installing a new programming system without impacting the users. The first few weeks on a new system are usually chaotic and anguished in spite of careful parallel testing and side-by-side running. Sooner or later the plug is pulled and the new system put on-stream: extended delays only increase the mental and physical strain on the staff. The users pay the price in reruns, aborted shots and poor response during the first few weeks. It would be nice if each application could live eternally with the operating system and compilers for which it was written, but multiprogramming makes this a practical impossibility and requirements for supporting obsolete systems would decimate the staff in short order.[2]

The decision regarding the size of the change is not easy: too many vague and hard-to-calculate factors are involved. Serious analysis of how much stress the users and staff can withstand without the shop dissolving is required. It is clear that the user community rarely presses for change—operational stability is more their goal—but nevertheless, there are times when the change must be made.

Preparing for change

Long before the actual change date, detailed plans must be drawn to minimize the discomfort. The users, the in-house staff and the vendor will all need to prepare, and corporate top management should be aware of the changes as well. Alerting the users takes a special kind of tact and timing, since they are the ones who will suffer most.

Top management is going to pay for the changes, so they are entitled to know how their money is to be spent.

---

with similar if not identical problems—there are some general guidelines for questioning:

1. Has the hardware been in the field long? If not, I'd advise waiting. If waiting is not possible, check as many current users as possible. How are they using the equipment? What has been their uptime? What support have they received? What problems have they incurred?
2. Will the vendor supply backup? If not, what backup plans can be arranged? When will backup be available?
3. Try to install the new hardware in parallel with the old. The new vendor can be made to support such parallel operation. Even if you had to pay, it would save you money in the end. In our case, we ran parallel systems for one month. I wish it had been longer. Parallel operations allowed us to limit downtime to hours instead of days.

Software:

1. Again, how long has your version been in the field? in your shop?
2. What overhead was incurred? What did (do) you pay (in overhead) for each feature? What do you consider the optimum set?
3. Were benchmarks taken? How closely aligned were they with your own applications? Was a change in hardware coupled with the software change?
4. Did the vendor provide both retraining and field support? What patches were necessary?
5. How good was the documentation? Did you find gaps in message definition?
6. How did the compiler affect existing programs?
7. What did the operator learning curve look like? How did you train second and third shift operators? Did some old habits cause problems?
8. Do you now regret making the change? Why? Are you satisfied? Why?

A little over two years ago our company was the proud prossessor of a three-user cpu with 12K of core, 13KC tapes, a 350-lpm printer, running 1½ shifts, and no operating system. Today we lease a 1.5-user cpu with 65K of core, 144KC tapes, 60M per spindle discs, a 1,100-lpm printer, running three shifts, and operating under OS.

We're not unique: we've had our share of surprises. We've learned that "standard" programming languages and compilers, contrary to sales pitches, are not upward compatible. We find the "universal" features of some hardware can be used only in special circumstances. We find hardware specs that are unachievable under the load of existing software . . . or any upgrade that might be promised for it.

Some of these situations can be anticipated. Others,like weeds, await only sufficient sunshine and water. With enough "weeds," change can, over a period of time, have very bad consequences. But our whole profession is built on change. We can't bury our heads and avoid that: progress means change. And change involves risk.

—Paul Jarvis

---

[2] One of the design objectives of IBM's CP/67 was letting each user keep his own (virtual) copy of OS/360. Multiple OS runs have been made and are particularly valuable in checking out new versions of the system.

Get a New One

Perhaps they will only be interested in the financial aspects, but it's more likely they will be interested in the overall plan if only to insure that the right answers are at hand if the user community gets restive. No manager likes surprises; the higher the officer, the less likely he is to appreciate vice-presidents storming his desk some morning.

Users must be aware of exactly what is planned. Cooperative customers can modify their cyclical schedules by a day or two if given enough notice. At the least they are entitled to know those periods when operations are going to be disturbed and the length of the unsettling. Many a user will slip a regular Monday run to Tuesday if he knows that a change was to take place on the previous weekend. Experience has shown that so-called 48-hour changes usually take an extra day to settle-in smoothly. A user who knows that the system will be unavailable for long periods may elect to schedule projects around the rough spots. Installation dates for major new systems must be moved around if major changes are upcoming.

If it is demonstrably clear that changes have to be coordinated with the using community, it is the edp manager who must insure that alternate facilities are available during the change-over. Nobody is madder than an irate user on a Monday morning who has found his weekend production stalled behind a "trivial" change. Since even the most minor changes occasionally have major results, back-up machines and service bureaus represent an available resource that should be placed on alert during the change. It would be much simpler if systems people knew their workloads well enough to flatly predict the impact of changes; unfortunately, this is rarely the case.

The heavy load during the changes really falls on the systems programmers and operations staff. Without detailed schedules, they will jump around from item to item in an uncoordinated fashion. Training, stand-alone testing, implementation, parallel testing and cut-over are phases that any plan for new features, new hardware or new operating systems must cover.

The most basic step is insuring that adequate light, heat, power and air-conditioning are present and that the cables will stretch. Probably the most complex change is one which involves major operating system changes including control language. This impacts every user program. Data processing personnel have never learned to program and plan for a change: systems are constructed with the tools and techniques that are available at the moment.

Man-hours for change vary widely, a few for a new tape drive, and thousands for a new operating system. No check-list is available, no set of guidelines from a manufacturer's handbook. The hardware side is better documented than the software side, which really has no rules at all except bitter experience.

During change periods, tempers get strained and systems programmers begin to snap and snarl at operations personnel. It also happens to be the time when cooperation is most needed. A well-understood plan with clearly delineated responsibilities helps alleviate the unpleasantness.

A change plan is a continuing effort, not a one-shot job. It has no beginning or end. Any installation of even modest proportions ought to have one man solely responsible for the change plan, keeping it up to date, noting the checkpoints reached and missed and keeping all the detail tied down in one place. Occasional memorandums aren't enough. Large looseleaf binders are necessary since the plans constantly change.

Change must be planned well in advance; a year is not always far enough, although often it will suffice. Large new applications three years in the works will stop dead if the terminals, software and communications equipment are not on hand for the scheduled tests. This presents a special problem: nobody wants to pay rent on unused equipment but the manufacturers will not install on a vague date in hopes of eventual payment at a later time. The timing is delicate and a misstep fatal.

When the hardware is really new, training is an especially difficult problem. Operators do not learn to run a system from a book and operator training courses have not been very successful.[3] There is no practical way to learn to run a system except to practice on the system. This presents a scheduling problem after the new equipment is on hand since only certain operators can be on shift at certain times.

Training programmers to use new system features is usually limited to distribution of informatory memorandums and new manuals. Rarely does an installation require its experienced programmers to go back to school for a few hours. Applications programming managers, who hold the most demanding job in data processing, are already pressed by deadlines, so it is hard for them to view time off for training as a positive investment.

Programmers seem to learn by word of mouth, gossip during user group meetings, casual water cooler conversations and random reading in reference manuals when checking syntax. Analysts almost never learn new features: they stall technically at the level where they were when they were removed from programming. This leads to 1973 designs based on experience with 1965 machines and languages. It is not the fault of the analysts. It is their managers who have let them down by not requiring the training to keep them up to date.

Planning and preparing for change is a difficult job. A change will impact everybody with even the most remote connections with data processing. Change is never easy, but proper planning can make it bearable rather than traumatic.

Opportunities

In spite of the problems and pitfalls, upgrading the installation presents opportunities for improving the overall effectiveness of the operation. Each change-over period is a time when a tightening up process can be undertaken and future planning revised, rechecked and moved forward.

The whole upgrading process was designed to get more power to solve problems. Change for the sake of change is senseless. An old machine that can handle the load will go right on doing so with no evidence of deterioration. Modern computers do not retire themselves because a salesman or an accountant says that they are old.

An upheaval is a time to take a hard look at the workload and the procedures for bringing the work to the machine. Data processing managements rarely schedule total reappraisals; slipshod procedures sneak in unnoticed. When things are being changed there is an opportunity to take a good look at the ways things are done and how long they have been done. No evidence exists that jobs acquire sanctity as they age. It is more likely that a certain seediness of age sets in from the cumulative effects of patches, erroneous documentation and out-of-date operating procedures. Change-over is the time for reexamination.

The decision to upgrade is not trivial or easy. It has ramifications for the data processing staff, the using community and the management. A well-organized decision process can be developed from careful planning, underplaying the traditional emotional commitment to change and insuring that the distance moved is not beyond the capabilities of the people involved. Making the decision to upgrade and carrying through smoothly is a true test of the managerial function. Flunk the test and the users will be in open revolt; pass with high grades and a better relationship can evolve. □

[3] See articles by Amdahl, L.; Head, R.; Patrick, R. L.; and Dorn, P.; "Obsolescence," DATAMATION, Vol. 15, No. 1, Jan. 1969.

Meticulous planning is a necessity in successful upgrading

A Computer-to-Computer Conversion

by John D. Reed and Signal S. Lee, Jr.

The conversion described in this article took place on November 10, 1972, at the Naval Supply Center (NSC), Charleston, South Carolina, one of the three largest supply centers in the U.S. Navy. The supply center provides accounting and payroll services for more than 125 shore activities throughout the Sixth Naval District, as well as purchase and contract services and a wide range of civilian personnel services. The NSC is manned by approximately 1,000 civilian and military personnel. It covers more than 200 acres of land, and includes 39 warehouses which provide storage for more than $350 million worth of materials.

The primary mission of the data processing dept. is to provide dp support requirements to the NSC. The department also provides dp support to the Polaris Material Office (Atlantic Fleet), Naval Station Communications (U.K.), Naval Station Dental Clinic, Fleet Ballistic Missile Submarine Overhaul, Charleston Naval Shipyard, Navy Finance Office, and the Commander Mine Force, among others.

The dp dept. consists of three divisions: applications, analysis and programming; operations; and production control. There are presently 105 personnel throughout the three divisions in the department.

In the beginning

At one time at NSC, the IBM 305 Random Access Memory Accounting Computer (RAMAC) was used for dp functions. This system included six major components: cpu, card reader, output printer, card punch, magnetic disc storage, and a console. It was soon realized that the RAMAC 305 computer system could no longer handle the expanding volume of work. To accommodate the increasing work load, one IBM 1410 system and one IBM 1401 system were installed. The 1410 consisted of six 7330 tape drives; two 1301 model 2 disc files; and one 1301 model 1 disc file, for a total storage capacity of 140 million characters of data. The core of the 1410 was 80K, which represented a significant increase in storage capacity over the RAMAC 305. The new system also included eight IBM 1014 remote terminals.

The conversion (in 1964) from the RAMAC 305 to the 1410 took three months, with eight programmers and four systems analysts each working 70 hours a week throughout the entire period.

A second 1410 was installed in 1965; this system had 80K core and one model 1301 disc file (56 million character capability). It also included four 7330 tape drives and one 1402 read/punch. In February 1967, the core was increased from 80-100K; and in May 1967, the "B" system core was also increased from 80-100K.

The off-line eam equipment consisted of the normal configuration of devices: sorters, 407s, 557 interpreters, etc. In September 1967 several of the peripheral devices were switched for a 360/20 multifunction computer. This was a card processor with no magnetic tape capability.

In November 1972, the computer-to-computer conversion from the IBM systems to the Burroughs B-3500 systems was completed. The Burroughs system consists of two supervisory printer output devices, two on-line 1100-lpm printers, two card readers, two card punchers, 10 Burroughs tape drives, 360K memory, and 440 million bytes of disc storage. The system also includes 13 remote terminals connected through the Charleston Supply Center, the Polaris Material Office (Atlantic Fleet) and the Naval Supply Center at Norfolk, Virginia.

Equipment selection

In 1968 the Naval Supply Systems Command (NAVSUP) began the long process of selecting third-generation computer equipment. After a thorough analysis of technical and economic factors, a dual processor Burroughs B-3500 was selected in March 1971 by the Navy Automatic Data Processing Equipment Supply Office.

Although the cost effectiveness of converting to third-generation equipment had previously been established by headquarters, it became the responsibility of each converting activity to budget for the costs of their individual conversion projects. The following is a breakdown of one-time costs involved in NSC Charleston's conversion: (These costs were in addition to normal operating expenses during the period.)

1. Site preparation $58,600
2. Training (including travel) $41,400
3. Overtime and holiday pay $25,600

Site preparation was the most costly element due to the need for additional environmentally-controlled space for part of the new equipment. The cost of formal training and for extensive travel to existing B-3500 installations for hands-on experience represented the next most costly one-time expense. Overtime and holiday premium pay was given to assure completion of conversion programming within the tight time frames.

It should be emphasized at this point that although one-time expenses may be very high and should certainly be considered in the overall cost analysis leading to a conversion decision, extreme care should be taken not to underfund one-time conversion costs. To do so could result in a well-planned, but poorly executed, conversion project.

NAVSUP scheduled NSC Charleston for conversion in November 1972 and published general guidelines for all activities to follow in their planning. It was obvious from the beginning, however, that a more specific breakdown was required at NSC to assure completion by the conversion deadline.

A meeting was then requested with the commanding officer (C.O.) to gain

high-level guidance and support. At first, the dp dept. recommended that a conversion committee be established consisting of personnel from all operating departments, including computer-sharing customers. The purpose of this approach was to acknowledge that the involvement of everyone receiving computer support was important.

Discussions at the meeting with the C.O. led to the appointment of one person, selected by the dp director, as project coordinator. A permanent committee was not established because the C.O. considered the conversion to be more of a technical project which would be best controlled by a coordinator who would be given the authority to cross departmental lines to insure completion of essential requirements. There was some concern that this method might tend to perpetuate the mysticism so often associated with dp, but it was the C.O.'s contention that it would be less disruptive to the supply center. This decision proved perhaps to be the most important one made during the entire project. The probability of a successful conversion without the full support of top management is doubtful. Minor frictions can become major ones in such a massive undertaking. The project coordinator, with authority and support from the C.O., was able to pull everyone together as needed without undue disruption or personnel friction.

The next course of action was the establishment of a reporting procedure. A milestone chart was devised that itemized every conceivable job to be accomplished, according to priority, and each was assigned to an organizational unit for action or support responsibilities. A member of the dp staff was assigned the responsibility of recording day-to-day progress. This enabled the project coordinator to follow progress of all work and to see where and when action was necessary.

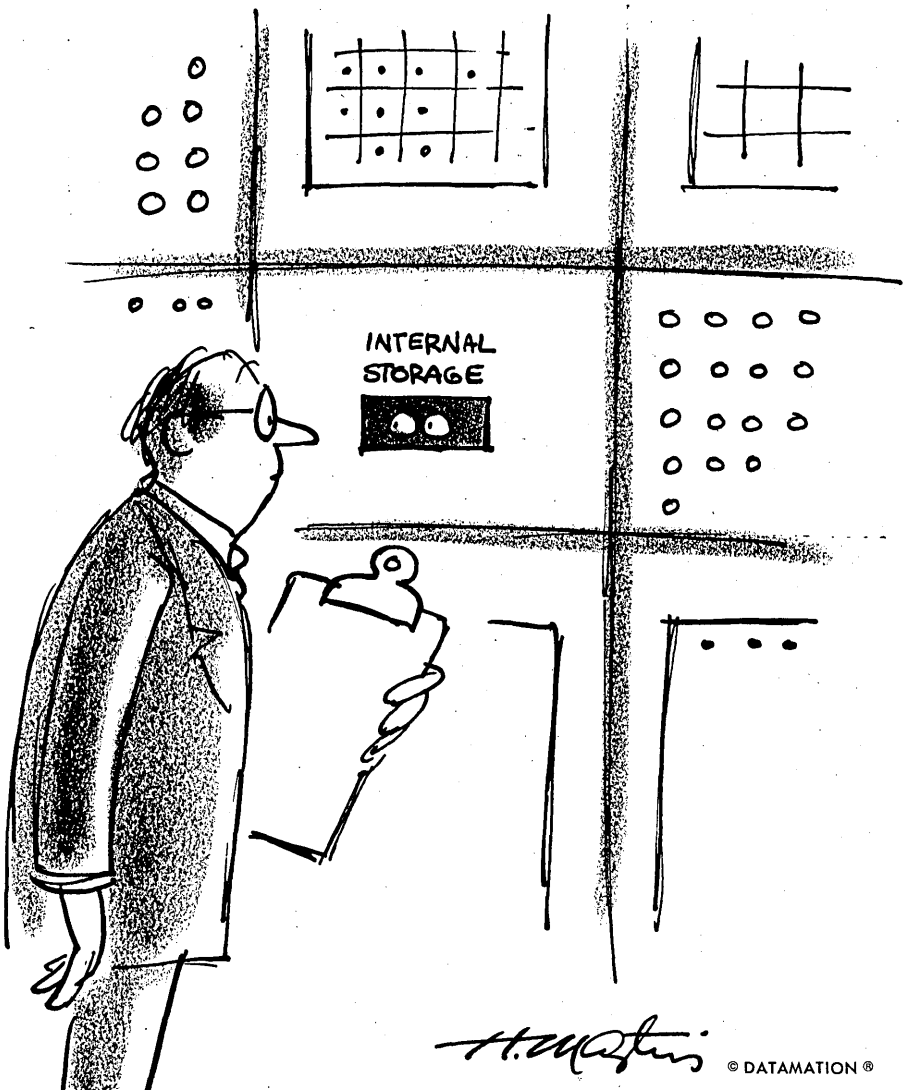
Continual updating was an important aspect in maintaining the milestone chart as a meaningful tool. The original list named 44 jobs; by the time of final conversion, the list had grown to 66. Obviously, had updating not been done, some important ones would have been missed.

Another benefit derived from the milestone chart was that it stimulated continued support and involvement by top management. A monthly progress report was submitted to the C.O. with appropriate comments from the project coordinator and the dp director. After review, the C.O.'s comments went with the report to all involved organizational units. Thus, the participants' attention was assured by the knowledge that the boss had reviewed their progress in detail and had shown interest in it.

Each conversion will have its own key events, and we cannot discuss in detail all that were involved in the conversion at NSC Charleston. There were several situations, however, that involved major efforts, and are generally applicable to all conversions. A prerequisite of any conversion is that of site selection and preparation, which should be carefully planned. The scope and complexities involved make it one of the most critical events in the project. In our case, existing electrical and air conditioning capabilities were evaluated and found to be inadequate. The third-generation equipment to be installed was found to be more sensitive to humidity and temperature fluctuations than the existing second-generation equipment. The physical structure of the current computer area was unsuited to the new system.

Site preparation was scheduled to begin on Oct. 18, 1971, with a target completion date on Sept. 23, 1972. The site was to be totally prepared 30 days in advance of conversion on Nov. 15, 1972. A lack of sufficient space became the first obstacle. The area occupied by the programming staff adjacent to the computer room was chosen, as it was the only space available for expansion. Air conditioning was increased and completely new electrical wiring was added. The floor in the vacated area was raised to accommodate normal under-floor requirements. To compound the problem, all work had to be accomplished during normal working hours of a seven-day-a-week operation, without interrupting existing work schedules.

Less extensive modifications were required in the existing computer room, but all elements of environment control, and the site where the new computers were to be placed, required some change. With no engineering capability available in the dp dept., it was necessary for the project coordinator to depend heavily on the NSC facilities engineering staff to direct the site preparation. This detached control of a key element in the conversion makes communications and liaison between the two extremely vital. It was important that facilities engineers and the computer manufacturer work closely together on all aspects of the site preparation project. Despite numerous vis-



its by the Burroughs engineer and almost daily telephone communications, several problems developed that required special attention and added costs to resolve. Fortunately they were minor.

It was recognized from the beginning that the most demanding job within the dp dept. would be the conversion of programs from IBM Autocoder to COBOL for the B-3500. Sixty percent of NSC's programs were included in the Navy's Uniform Automatic Data Processing System for Stock Points (UADPS-SP) and would be converted by that system's central design agency, the Fleet Material Support Office (FMSO). However, the 226 programs which had been written and were maintained by NSC programmers would have to be converted locally.

Customer activities reviewed their existing local programs and identified those that would still be needed after conversion. Review of these 226 programs proved to be a revealing and profitable venture. It was found that many that had been developed for single-use applications still remained in the inventory. Others were no longer used for various reasons but remained because no one had thought to tell programming. Several programs were found that had been superseded by new, improved systems, yet the old programs were being kept for unknown reasons. The real benefit of the review was the deletion of 55 programs from the list of those to be converted, thus significantly reducing the conversion programming workload.

In order to avoid, or at least minimize, dual programming in both Autocoder and COBOL, a moratorium was established on new adp programming requirements and major program modifications. It was recognized that some dual programming would be necessary to satisfy critical customer requirements, so an adp review committee was formed outside of the dp dept. to review all new programming requests. Those which were considered critical were released to dp and the others were placed in a deferred status until after conversion. This task was very sensitive as adp users, naturally, do not like having new projects or modifications deferred when they are requested. The time this committee spent with adp customers explaining the why's of the moratorium were most beneficial and helped reduce customer frustration.

The goal of controlling and projecting conversion programming progress with a high degree of accuracy was achieved by use of a special algorithm named "REBECK."* The graph produced from the REBECK algorithm enabled management to continually evaluate conversion progress in terms of man-hours required to meet the assigned completion dates. In addition, a weekly summary report was produced from the REBECK data that projected the effort required for completion of each program by the programmer.

REBECK prompted several actions during the conversion. It projected quite early that programmer overtime would be required to finish on time. The overtime was applied and later analysis showed that success would not have been achieved without it. In addition, REBECK prompted a realignment of programming priorities in terms of when each would be required. Programs required the very day of conversion were assigned priority one; those required for following monthly reports were assigned priority two; programs required for the quarterly reports after conversion were assigned priority three. This realignment resulted in a sequence of program completion that enabled continuation of the supply center's mission without slipping the November conversion date.

Program testing

Two computer test sites configured with the Burroughs B-3500 system were established on the east and west coasts. Each activity to be converted was connected directly with a B-3500 test site via a Burroughs TC-500 remote terminal. The arrangement had its advantages and disadvantages. Transmissions could be sent for compilation, thus eliminating the necessity of travel to the test site, but test data (consisting of magnetic tapes and listings) were returned by mail. Up to three days were required to receive the mailed results. This delay disrupted the programmer's continuity of thought, requiring additional time for him to get reoriented to the point when idea and transmission were originally relayed to the test site.

Added problems arose due to inadequate test time available through the remote test. These were resolved by sending programmers with large compiles to the test site on two-to-three-day trips when they could get fast turnaround of their programs during shifts when the remote terminals were not operating. In addition, programming team leaders were assigned to the test site on a rotating schedule. There they assisted in debugging, and remained in constant communication with the programmers at NSC Charleston. The experience gained by the team leaders and programmers was invaluable in comprehending the multi-programming environment. This experience was helpful some months later when the programmers became involved in the actual conversion.

Perhaps the two most important keys to success were training and keeping the people informed. This began with an executive education session presented 13 months prior to conversion and ended with a two-page review of the conversion weekend events in the NSC employee newspaper. During this time several important programs were presented.

Each programmer received six weeks of training in basic hardware, advanced COBOL and B-3500 environment. Several personnel from the operations division and production control division were also included in selected parts of the six-week session.

With programming well under way, concentration was switched to operator training. It was reasoned that the best time to train operators would be as close to the actual conversion date as possible. This caused some apprehension, as the operators felt others were gaining experience on third-generation equipment while they continued to operate a second-generation system. In an effort to prevent a breakdown in communications and poor morale, it was decided that computer operators would accompany programmers on some test site trips and participate in the actual running of the program while it was being tested. This arrangement tremendously increased operator confidence and was advantageous during the actual conversion.

Informal remote-terminal operator training began with the first installation of the Burroughs TC-500 terminal connected to the B-3500 test system. This provided an early start on hands-on training. Remote and computer operators were provided additional training by Burroughs four weeks prior to conversion.

In order to keep supply center personnel, who were not involved in the conversion, up-to-date on its progress, several techniques were used. First the dp director made repeated informal presentations on third-generation computers to management personnel, from first line supervisors up to department heads. These sessions were also used to encourage suggestions of ways to use the increased computing capability when the conversion period moratorium ended. Many favorable reactions to the sessions were received. Also, the invitation for new ideas resulted in the development of a list of ideas that would be developed into new computer systems after the conversion.

Numerous articles and pictures were published in the NSC employee newspaper throughout the period leading up to conversion. These articles were believed to be especially effective in informing non-management personnel.

Arrival of the equipment brought a renewed wave of enthusiasm along

*A detailed explanation of this algorithm is available from Cdr. Reed, U.S. Naval Supply Center, Charleston, S.C. 29411.

with a sense of reality. The programmers had their own equipment to test and observe and the operators became absorbed in the new apparatus. The entire department experienced a real sense of involvement and unity.

Immediate installation of each piece of equipment took place. The scheduled arrival dates had been kept—just five weeks prior to conversion—and everyone was aware that every day counted in the training of the operators.

Two weeks later, Burroughs engineers had installed and balanced one computer system and had connected eight of the 13 remote terminals. This provided an opportunity to further train remote operators while the equipment was actually being tested.

Nine days prior to the NSC Charleston conversion, three members of the dp staff were sent to observe a similar conversion to the B-3500 computer system at the Naval Supply Center in Oakland, Calif. This provided a good opportunity for obtaining file-conversion time estimates and for observing actual conversion events. It also produced many points to ponder; immediately upon return of the three from Oakland, a revision of the final Mark II conversion schedule was made, based upon what had been seen. A point to emphasize here is that much of importance was learned from the Oakland visit, as it was from previous visits made to the test sites. The value of such exposure, if available, is immeasurable.

Forming teams

The formation of four conversion teams, each consisting of a programmer and three operators, was quite effective. The programmer, who at this point had more experience with the equipment than the operator, could identify problems encountered and serve as a communications link. The teams could also assist in writing up problems for evaluation to be used by others during subsequent conversions. These four conversion teams alternated for around-the-clock and weekend coverage and remained intact for approximately 30 days following the conversion. This plan was instrumental to the conversion's success, and it gave the operator a vote of confidence at a time when it was needed. On several occasions, during the conversion weekend and soon after, the teams' skill and experience made the difference between breakdown and smooth, continuous operations.

Since the majority of the programs used by the supply center are part of the UADPS-SP and are programmed and maintained by the central design agency, a team of computer specialists from this agency were sent to assist supply center management with implementation of the new system.

These specialists were sent not only for their knowledge of the UADPS-SP programs, but also for their understanding of the B-3500 system and their previous experience in conversions. They arrived approximately two weeks prior to conversion and were most helpful in reviewing programming techniques and operating procedures, and insuring that all the test data and records necessary in proceeding with the conversion were ready.

Participation of conversion specialists from Burroughs has not been discussed up to this point, as they were not under control of the supply center for planning purposes or assignment of responsibilities. Needless to say, however, their help was most important. They directed much of the training, assisted with the conversion programming and were a vital part of the overall conversion during the actual event. Without the special help of the manufacturer, it is difficult to believe that successful conversion would have been possible.

It is also important to realize that coordination between the conversion team, the installing contractor, and the contractor removing the old equipment must be well coordinated.

All of the efforts in this aspect of conversion were carefully reviewed a month beforehand. When the actual installation and removal of equipment began, everyone knew when to arrive and how much time was allotted for each step.

The next major job was that of preparing for the actual conversion. Initially a five-day period was planned for completing conversion to one B-3500 computer. Twenty-five days later, after the first system had been balanced, the second B-3500 computer was to be installed and converted. However, as the conversion date neared, it was decided that it would be less complicated to install both computers concurrently. The five-day conversion period previously agreed upon for one system was not increased—the second computer was scheduled for conversion within the same time frame.

A major effort during the week leading up to the conversion weekend was the development of a formal conversion plan. Much time was spent detailing the happenings of the weekend step-by-step, and approximating time frames involved. An outline of those steps finally developed and was lettered onto a large poster placed near the computer room, so that management and everyone else involved could see it. Again, the importance of communications cannot be over-emphasized. Everyone involved acquired a needed sense of confidence and understanding.

During the final week, last-minute details were being reviewed in meetings between management, FMSO personnel and conversion team members. Meetings were held with users to update them on what would be happening on conversion weekend and what they should expect upon returning to work on the following Monday morning.

Conversion weekend

Then came the actual conversion. Nine months of waiting does not always prepare the mother for the baby—neither does planned anticipation always prepare a dp organization for conversion.

The conversion of computer files from the IBM 1410 to the B-3500 began at 0300 Friday, November 10, 1972. The total file conversion was completed and loaded onto the B-3500 disc files at 0800 Saturday, November 11, 1972—a total computer-to-computer conversion time of 29 hours.

Before the primary IBM 1410 system was removed, a parallel test was conducted. Several programs were processed on both systems, the output data was compared, and the parallel test was determined successful.

The point of no return had been reached, and the word was given: "remove the 1410." Following the removal, Burroughs installed the second B-3500 computer system adjacent to the first and the physical exchange of computers was complete.

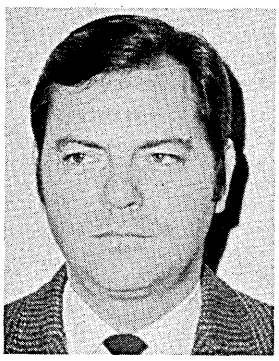
The objective of the conversion plan was to have all necessary programs and files converted to the B-3500 system so that normal supply center operations could begin on Monday morning. Operations began on Monday as planned—but with bloodied brow! Due to a faulty part in a memory unit, one B-3500 was down. Four remote terminals were down. Numerous other problems were encountered—program bugs, minor equipment malfunctions, tape parities, and lack of proficiency of the computer operators and Burroughs engineers. But the primary system was, in fact, working and basic customer services were being provided.

It was anticipated that in a straight translation programming conversion of nearly 600 programs many inaccuracies would occur. This conversion was no exception. Fortunately the types of problems encountered were anticipated and the means to meet and correct them had been previously established. Again, this was the result of preliminary planning involving the various user and planning groups that normally handled computer-related problems. The only difference in this

case was the number of problems encountered and the need to correct them expeditiously.

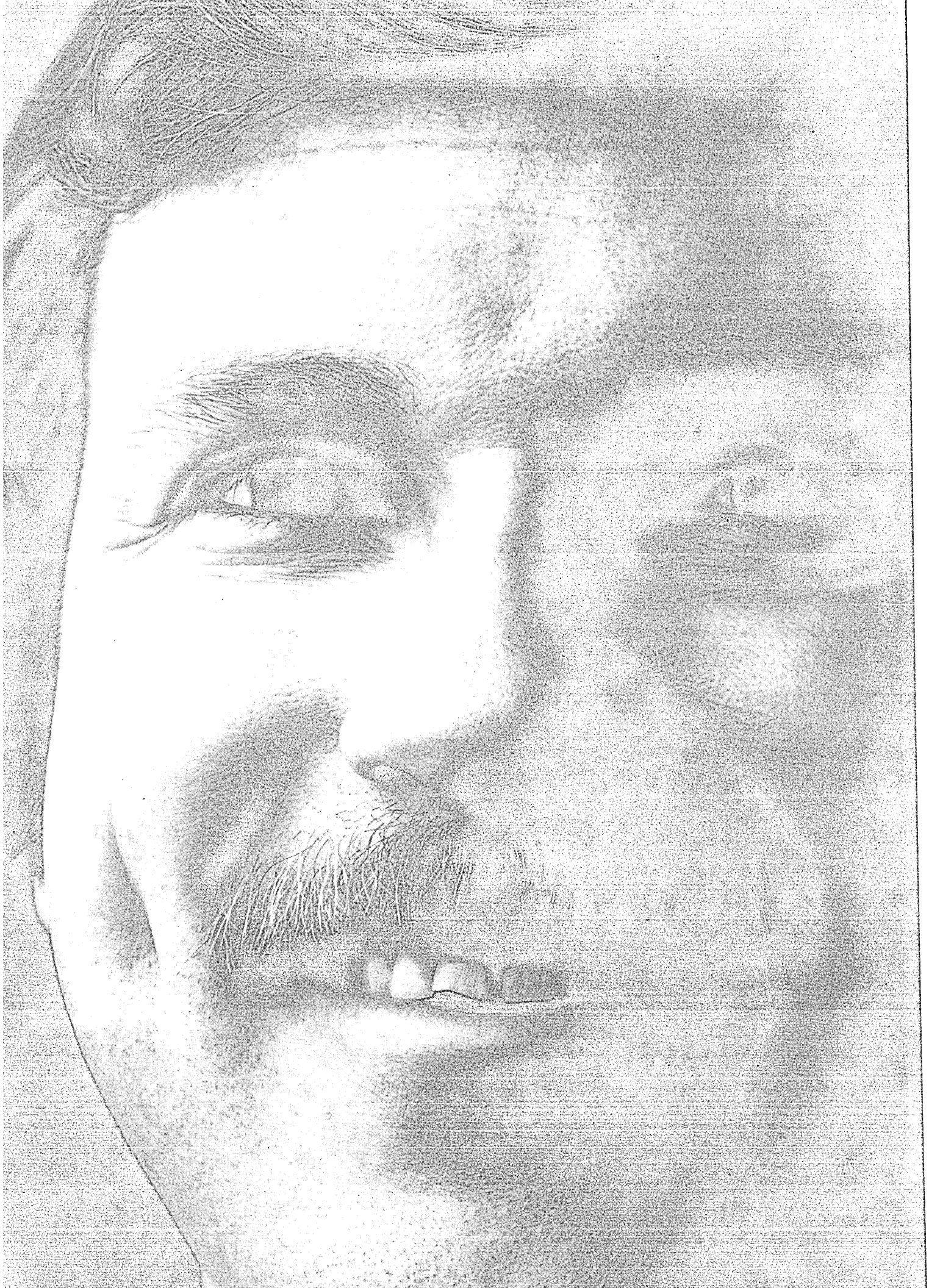
In many regards, the problems after conversion took place were far more complicated and difficult to cope with than those encountered during conversion. The dependence of an activity upon its computer becomes apparent when problems with the overall system disrupt day-to-day operations. This was found to be a greater cause for concern than was the actual physical equipment change.

In conclusion, the dp dept. of NSC Charleston recommends that anyone considering upgrading his present computer system begin preparations early. Such a conversion requires detailed and intensive planning in order to insure a smooth transition with minimum disruption to operations of customer activities. Perhaps, in the final analysis, it is the degree of dependency on the computer that determines the amount and degree of planning required. In any case, it is a most demanding and most challenging experience. □



Cdr. Reed is the director of data processing at the Naval Supply Center, Charleston, S.C. He has directed a conversion from manual systems to third generation computers at the Naval Supply Depot, Yokosuka, Japan, and has an MS from the Naval Post Graduate School, Monterey, Calif.

Mr. Lee is the deputy director of Charleston, S.C.'s Naval Supply Center dp dept. He recently received the Navy Meritorious Civilian Service Award for his participation in the MARK II conversions.



A very smart engineer introduces a very dumb terminal.

Why is he smiling?

Consul 580. The Dumb Terminal. No editing. No formatting. No graphics. No polled environment. No built-in modem. No multiple operating modes. And strictly Teletype® compatible. In short, a very dumb CRT terminal.

Yet only an engineer as smart as John Jacobs could have designed it.

Paradoxical?

Hardly.

It takes a smart cookie to bake a simple cake.

John's credentials?

His pre-580 innovations still stir the industry's imagination. The Consul 880 CRT terminal with its patented $200 graphics option, and dual intensity formatting. The 28 lb. portable Envoy CRT terminal. The revolutionary black-on-white screen. The polled series "A": 96 terminals can be daisy-chained together without a cluster controller. And the dumb terminal?

It's brilliant.

John made it simple so it would sell for $1795.* Here's what your bucks buy.

The most reliable TTY compatible terminal on the market. Cursor controls. Scrolling. Printer interface. XY addressing. Computer-controlled keyboard lock-out. Five switch-selectable speeds and 24 lines with 80 characters each.

Consul 580. Dumb?

Not necessarily. And that keeps John smiling.

ADDS Applied Digital Data Systems, 100 Marcus Blvd., Hauppauge, New York. 516-231-5400

What's behind our smile.
Applied Digital Data Systems Inc. ADDS

*$1295 in OEM quantities of 100.

CIRCLE 7 ON READER CARD

The Concentration of Knowledge The Crystallization of Technology

FACOM

As the concentration of the learning and culture of the world resulted in the encyclopedia, so the crystallization of modern technology has produced the computer—now indispensable to handle the enormous amount of information and data necessary in an enterprise in this modern world.

The wide range of FACOM computers, developed by Fujitsu's unique technology, includes easy-to-use models to meet the needs of any business enterprise, however large or small.

Such diversified fields as business processing, data communication and technical calculations can be handled by the most-popular FACOM 230 Series, which includes 8 models from the 230-10E to the ultra-large 230-75.

Scientific calculations and process control are best handled by the FACOM 270 Series, with 4 models from the 270-10 to the 270-30.

For educational purposes, there is the specially developed FACOM Mate. And, for mini computer users, the FACOM U-200 and FACOM R-E. There is also a wide range of peripheral equipment and full software for each member.

This completes the FACOM Family, fifteen members with unique characteristics—the crystallization of Fujitsu's technological and engineering capabilities.

FUJITSU LIMITED

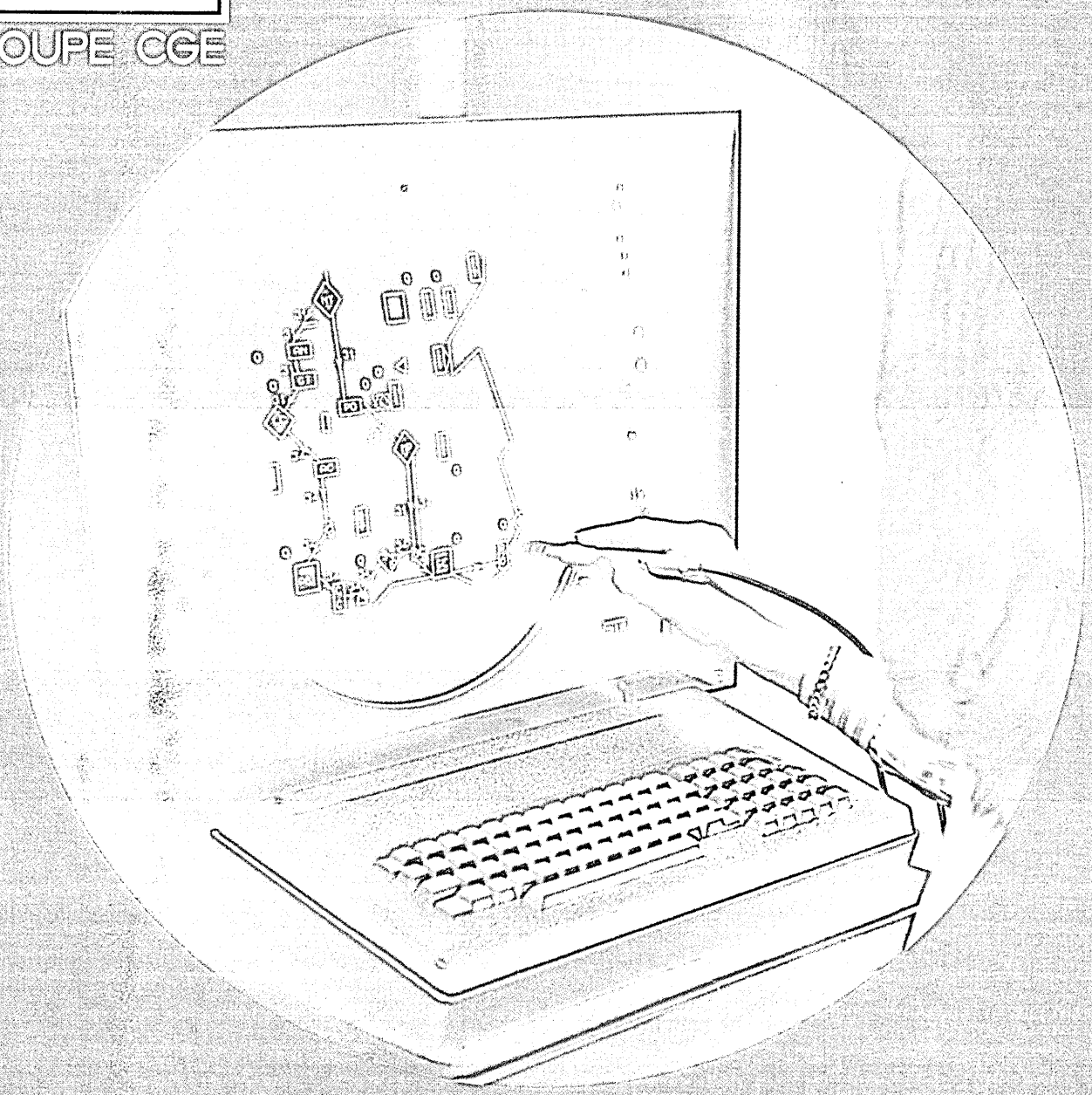
Communications and Electronics

Marunouchi, Tokyo, Japan

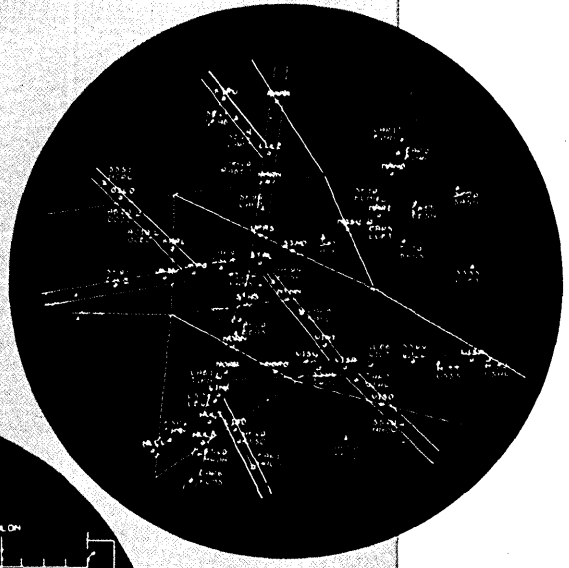
MAIN PRODUCTS □ Telephone Exchange Equipment □ Carrier Transmission Equipment □ Radio Communication Equipment □ Space Electronics Systems □ Electronic Computers & Peripheral Equipment (FACOM) □ Telegraph & Data Communication Equipment □ Remote Control & Telemetering Equipment □ Electronic Components

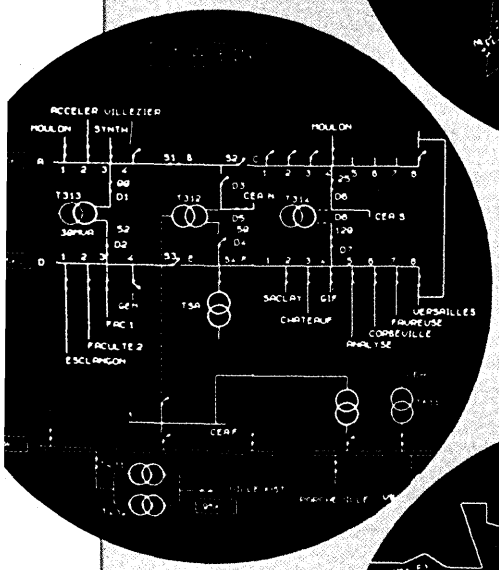
CIT
Alcatel
GROUPE CGE

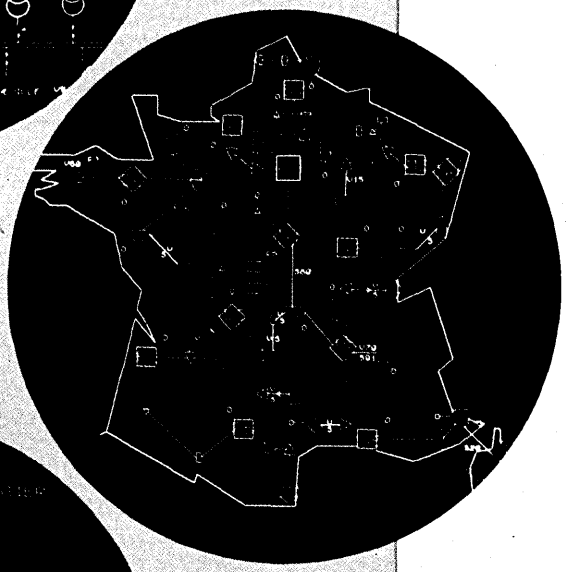
Leader...

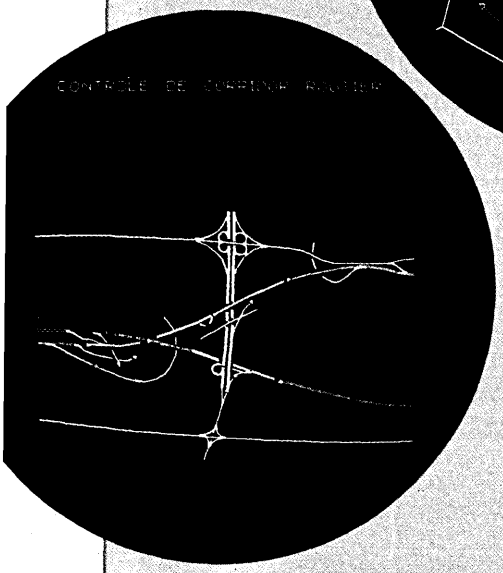


- de la visualisation graphique couleur
- of colour graphical display
- für die grafische farbvisualisierung
- de la visualización gráfica en colores
- della visualisazione grafica a colori
- В ОБЛАСТИ ЦВЕТНОЙ ГРАФИЧЕСКОЙ ВИЗУАЛИЗАЦИИ"
- 是彩色畫表顯示ㄧ前導者。









un software développé

une équipe expérimentée

un groupe puissant

garantissent le succès de vos applications

advanced software

experienced team

powerful industrial group

ensure successful applications

CIT Alcatel
GROUPE CGE

COMPAGNIE INDUSTRIELLE DES TÉLÉCOMMUNICATIONS CIT-ALCATEL

DIVISION DES APPLICATIONS ÉLECTRONIQUES

Centre de Villarceaux-Nozay
91310 Montlhéry (France)
Tél. (1) 920.88-90
Télex 26860

IBM is the defendant
in the courts and in the computer room.
How fair are the charges?

Monopoly Is Not a Game

by Richard A. McLaughlin, Associate Editor

In the continuing saga of IBM vs. The Rest of the World—or The Rest of the World vs. IBM, depending on where you sit—a good deal has been heard from competitors, from the Dept. of Justice, and from self-appointed industry spokesmen. Most of these protesters explicitly or implicitly base their arguments of how IBM should be dismembered or regulated on something related to "ultimate benefits for the user." But not much has been heard from that user, even though he is supposedly both the primary victim of any past monopolistic practices and the potential beneficiary of a new order of things.

DATAMATION recently went to the users to learn their side. For our study we used a questionnaire to gather confidential responses from dp managers on DATAMATION's 1,100-man Computer Executive User Panel. The panel consists of a board of managers from 1,100 sites that have been carefully selected to represent a cross-section of dp installations, a sample that is statistically accurate in terms of geography, size of company served, size and make of computer installed, and field of business.

We concede that questionnaires are a very subjective medium for soliciting information. We also concede that no one can determine whether an industry is being monopolized by conducting an opinion poll or taking a vote; that is a matter for the courts, not the press. On the other hand, there are some important things a poll can legitimately establish. For example, when there is only one source you can reasonably go to for a service or a commodity, like phone service or natural gas for your home, a simple monopoly exists. But when there is more than one seller, as with computer vendors, you must learn whether a buyer *feels* he has no choice before you can suggest that the industry may be illegally monopolized. That much you can learn with a poll. You can even learn what pressures are used to make the buyer feel that way.

In our poll we specifically tried to document any individual cases of ethically questionable practices used by IBM to protect its market share (especially any questionable practices that could not be as successfully employed by a firm which did not have the lion's share of the business). In the cases where we thought we could identify such practices, we wanted to learn what computer users thought about them.

We also wanted to learn if there was any likelihood that more equal proportions of market-share could ever be realized from the existing customer base; that is, is it possible that any significant proportion of IBM installations would ever be willing to switch vendors if given the proper stimulus? What would it take? This report summarizes what we learned.

Our study was divided into two parts. In the first part we attempted to test the validity of certain accusations made against IBM by asking specific questions about the users' present environments and past dealings with vendors. These were questions which they could answer from their own experience. The second part was very subjective, although it also relied on actual experience. We asked our panelists to rank the vendors with whom they had dealt by telling us who was the "best" in certain aspects and who seemed the "worst." The results of the first section of the study appear below. The results of the "tournament" ranking appear in Table 1.

The following statements are *not* those we posed to our panelists. Instead we asked questions that would yield more objective data from which we would try to derive a true or false response. To be as objective as we could, and to provide a framework for our results, we asked the same questions—to test the same accusations—about all vendors. As you might expect, there is more than one black sheep in the flock. **"No matter what the dp guy thinks, his**

management will probably make him go to IBM."

In many cases this is true. One steamed-up panelist even says, "It is frustrating that IBM has our corporate management so snowed that no matter how the numbers come out, the only answer is IBM." Of the 279 IBM installations, 56 (20%) say their company policy requires them to stay with IBM. On top of that, the implied resistance of "the dp guy" may not be there; 81 (29%) of the people running IBM shops indicate that they personally would not consider an independent supplier for their mainframe. This suggests that 9% of the dp managers who are not under corporate pressure would still stay with IBM. Although we don't know the number, many of those that cite corporate policy pressure wouldn't budge if it were suddenly released.

An important part of the corporate and dp management commitment stems from their resistance to change. Conversions and interruptions in service are dreaded at all levels. The commitment is being made, in many cases, to the incumbent, not to IBM in particular. This conclusion is partly backed up by the fact that 11% of the *non*-IBM installations say that corporate policy dictates that they stick with their present vendors, too, and 35% of them say they would not consider an independent mainframe vendor.

An example from a Toledo IBM site tells the story. "Recently IBM lined up a visit from a company with Honeywell equipment. However, the company refused to come when they determined we were not doing exactly the same thing as they were . . . which indicates IBM has just as hard a time breaking entrenched users away from competitive equipment. In other words, the 'in' mainframe company has a tremendous competitive edge."

"If the sales rep can't sell the dp manager, he'll go over his head to top management."

We've all seen instances of this. In fact, one man calls it "traditional" for IBM. Another in a California school system says, "It is long past due that IBM be admonished by the courts for their continual attempts to humiliate, degrade, and intimidate personnel who select competing manufacturers' products."

In all, 61 of the 400 people contacted complained about this lack of sales ethics on IBM's part. It is only fair to point out that 26 others complained about other vendors who had done the same thing, and Burroughs, Univac, ICL, DEC, Honeywell, CDC, RCA, NCR, Philips, Friden, and Memorex are mentioned. (An additional 56 managers claim this happened to them but would not name names.)

What is strangest about it all is that only three panelists admit that the salesman accomplished anything. The reports we got were replete with comments like "he got shot out of the saddle," or "he was fired." Going over the manager's head seems to be a last-ditch effort of which all vendors are guilty, but it nets them long-lasting resentment and few sales.

"Alternate version: The IBM sales rep gets cozy with upper management. The real selling is done on the golf course."

The previous version of this "accusation" dealt with IBM going over the dp manager's head in a time of stress, as a last-ditch effort. However, some sales reps regularly work over the dp manager's head; all of them would probably like to.

In our sample we found that 90 IBM salesmen regularly met with our respondent's boss. (One manager says, "and his boss and his boss.") Only 25 other salesmen managed that, but since the 90:25 ratio is pretty close to the ratio of IBM installations to others in our sample, nobody seems to be much ahead in that race. There is a loser though, and it is the dp shop. As one man in an insurance firm puts it, "It is very difficult to counteract the IBM sales force operating at the highest levels of your corporation and still have the time to attend to your daily responsibilities."

"IBM always has the advantage on bidding; other firms must prove they are better, not equal."

The answer is no surprise. Yes, IBM is almost always included on bidder lists. Of 128 replies saying one bidder had an advantage, 105 say IBM is that bidder. Again, the reasoning is often that IBM is the incumbent, and in over 17% of the cases where the incumbent is not IBM, the incumbent still has the advantage. Many of the users are willing to leave the bidding wide open—half of them, in fact—but a strong undertone, and the answers to other questions, make it clear that "allowing to bid" and "buying from" are two separate things, and only sometimes do they match up. It is also worth noting that IBM is the only company mentioned as being at a *dis*advantage in any of the bidding. (We think this happens in federal government installations, for instance, and the government is the biggest customer of all.)

"IBM often 'helps' potential customers define their computer requirements, then biases the Requests For Proposals so only IBM can meet the specs."

IBM seems to be a piker at this. While 95 installations say that IBM has helped in drawing up computer requirement plans for RFP's, 171 installations claim that other vendors (almost all others) have done so. Evidently such practices don't guarantee the sale; if there is a correlation between "helpers" and "sellers," it is not a clear one.

"IBM controls the release of new technologies. People are reluctant to buy something new until IBM gives its blessing."

Users say they are not afraid to buy a new technology before it appears in their own vendor's product line. Fully 83% of the respondents say they are so confident of their own staff's ability to

Whose answers are these?

The subject of monopoly is a volatile one, and not all our 1,100 panelists were willing to submit data on personal experiences even on a confidential basis. We received 389 usable responses. Of these, 279 represent IBM installations or mixed shops where it is obvious that most of the compute power is in IBM mainframes. The other 110 are from installations using other mainframes, including some from vendors like RCA and GE who have gone out of the general-purpose computer building business. Many of the panelists have had experience with many makes of computers, and can comment on some that go back as far as the ALWAC.

Of the 279 IBM installations: 22 are System/3 sites; 134 are large machine sites where the primary cpu is at least the size of a 360/50 or where there are multiple cpu's yielding equivalent power; and the remaining 123 are sites with small mainframes.

The non-IBM contingent is made up of 40 sites with 360/50 class machines or larger (or again, with multiple cpu's grossing that much power), and 70 smaller installations.

The System/3 site managers answer questions pretty much like managers of other small IBM shops do, it turns out, so we lump their responses together. In some particulars, however, large shops answer differently from small shops. Where this happens, we make a distinction in the text.

judge new technologies that they would be willing to switch over to something superior (if the product warranted the switch for other reasons). That's what they say, anyway.

"IBM frightens people out of buying independent peripherals or memory with the threat of withdrawing maintenance."

To test the validity of this lingering fear, we asked those of our panelists who had replaced IBM peripherals and memory just how their IBM maintenance had changed after the replacement. Of 199 transactions, the maintenance is thought to have remained the same in 161 cases. In seven of the remaining 38 cases, maintenance is thought to have *improved*. That leaves 31 cases, or 16% where IBM's service is thought to have degraded. (The percentages work out about the same for memory or peripherals.) One panelist even remarks that after he replaced IBM 2314's with Telex 5314's, "IBM's service degraded, they were quite petulant about it, pulled their CE out for a month."

Even discounting for the subjectiveness of the question, 16% is not a small number . . . it's not a big enough number to be statistically reliable, but it is big enough to suggest that something bad happens.

"Some whole industries are 'locked in' by IBM."

Of the 229 people that tell us their industry is in the hands of one vendor, only 17 say that vendor is not IBM. The most evident examples are state and local government, hospitals and health care organizations, and colleges. (The fact that IBM maintains a monopoly in colleges and universities is one of the points being made by the Dept. of Justice in its antitrust suit. Justice argues that entry-level dp people are so often trained on IBM equipment that it is difficult for other vendors to compete for sales to companies that hire them. There doesn't seem to be any way that IBM can sidestep that one.)

Obviously lots of industries are "locked in" by IBM. Those that are not are exceptions. What we hoped to learn from our questions on this topic was how much pressure could be brought on a dp manager by a boss who says, "All our big competitors use IBM equipment. What do they know that you don't?" We learned that this particular kind of pressure is not strongly evident. The vast majority of users in "monopolized" industries say that the monopolization does not make it tougher for them to propose or acquire another vendor's machine. The available software written for industry applications makes it difficult. So does the feeling that you can't be quite as wrong if you make a mistake when choosing IBM equipment. But the brand your competitor uses doesn't seem to count.

"IBM controls prices. That makes them a monopoly by definition."

We don't know how to use a poll to determine how well IBM controls prices. It is tough enough to figure out how important a factor price is. Few decisions are made on price alone. Performance, reliability, ease of maintenance, vendor stability and a dozen other factors come into play.

In general, in making a decision concerning acquisition, all categories of users rank the following five factors

MOST ETHICAL

Rank	"Most" Votes	"Least" Votes	Ratio
DEC[1]	11	3	3.67
IBM	122	54	2.25
Burroughs	17	10	1.7
Univac	14	9	1.5
HIS[2]	22	22	1
NCR	16	26	.61
CDC[3]	5	10	.5
RCA	5	17	.3

LIVE UP TO CLAIMS

Rank	"Best" Votes	"Least" Votes	Ratio
IBM	127	49	2.6
DEC	9	4	2.25
Burroughs	17	11	1.5
Univac	15	11	1.36
CDC	11	9	1.2
HIS	15	15	1
NCR	13	22	.6
RCA	5	16	.3

AFTER-SALES SERVICE

Rank	"Best" Votes	"Worst" Votes	Ratio
IBM	173	21	8.2
Univac	11	17	.64
NCR	10	16	.62
Burroughs	9	15	.6
CDC	7	22	.58
HIS	12	22	.54
DEC	5	10	.5
RCA	5	11	.45

1 – Digital Equipment Corp.

2 – Honeywell Information Systems

3 – Control Data Corp.

PRODUCT RELIABILITY

Rank	"Best" Votes	"Worst" Votes	Ratio
IBM	152	16	9.5
DEC	9	7	1.28
Univac	15	12	1.25
CDC	10	9	1.1
HIS	12	18	.66
RCA	5	9	.55
Burroughs	7	14	.5
NCR	8	19	.42

SUPPORT

Rank	"Most Complete" Votes	"Worst" Votes	Ratio
IBM	192	15	12.8
CDC	15	4	3.75
HIS	16	15	1.06
DEC	4	7	.57
Burroughs	6	13	.46
Univac	8	18	.44
NCR*	8	22	.363
RCA*	4	11	.363

*indicates a tie

PRODUCT PERFORMANCE PER DOLLAR

Rank	"Best" Votes	"Worst" Votes	Ratio
DEC	18	1	18
Burroughs	28	3	9.3
CDC	15	4	3.75
Univac	21	6	3.5
RCA	8	6	1.3
HIS	20	16	1.25
NCR	21	17	1.23
IBM	64	73	.87

Table 1: Mainframe Manufacturers Ranked by Specific Attributes

Panelists were asked to give their opinions about vendors with whom they had dealt by ranking which ones were "best" in some aspect and which seemed the "worst." We hoped that this distillation of their collective experience would function as a "round-robin" volleyball tournament and settle the matter of who is best by playing one off against another.

The "contestants" are ranked in the order of the ratio of good and bad votes they received. For instance, Digital Equipment Corp. (DEC) received 18 votes for best product performance per dollar and only one "worst product performance per dollar" vote. Its ratio is simply 18:1 and therefore it appears just before Burroughs, whose score is 28 to 3 or roughly 9.33:1.

Use caution in reading the Table, as this part of our investigation was highly subjective. The results may show a hazy outline of the real world, not necessarily a clear image.

MODCOMP IV.

MODCOMP IV is an entirely new kind of computer. If you think you've heard that before, consider these facts.

MODCOMP IV is nothing less than a 32-bit CPU with far-reaching capabilities, *at a price no more than you would expect to pay for a 16-bit CPU.*

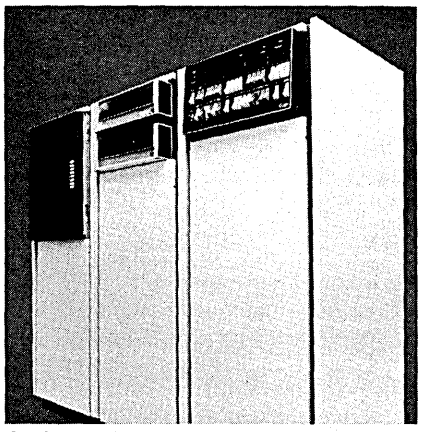
Over 1,000 registers, and a comparable amount of extra logic, have been included to optimize the efficiency of the operating system: in context switching, in resource allocation and in roll-in/roll-out operations — the bottlenecks in most systems.

With its 32-bit processing capability, low price tag and low-overhead operating system, MODCOMP IV is a new kind of computer without equal for real-time and time-sharing applications.

Try on these MODCOMP IV features for size.

240 general purpose registers in 16 sets of 15 registers each, permitting context switching in 2.4 microseconds.

1,024 address mapping registers enable up to 512K bytes of memory to be addressed in



256-word pages, and provide automatic hardware relocation for fast program loading and roll-in/roll-out operations.

32-bit parallel internal busses and adders, plus 64-bit floating point hardware for fast number crunching.

Push/pull hardware for efficient list processing operations.

Four memory ports for simultaneous input-output and CPU operations, and multi-processor configurations.

Compatibility. Input/output and upward program compatibility with all existing MODCOMP I, II and III computers.

Software includes our field-proven multiprogramming real-time executive, with a vast range of task-handling capabilities. FORTRAN IV, BASIC, RPG II and Macro-assembler. Plus a host of support software.

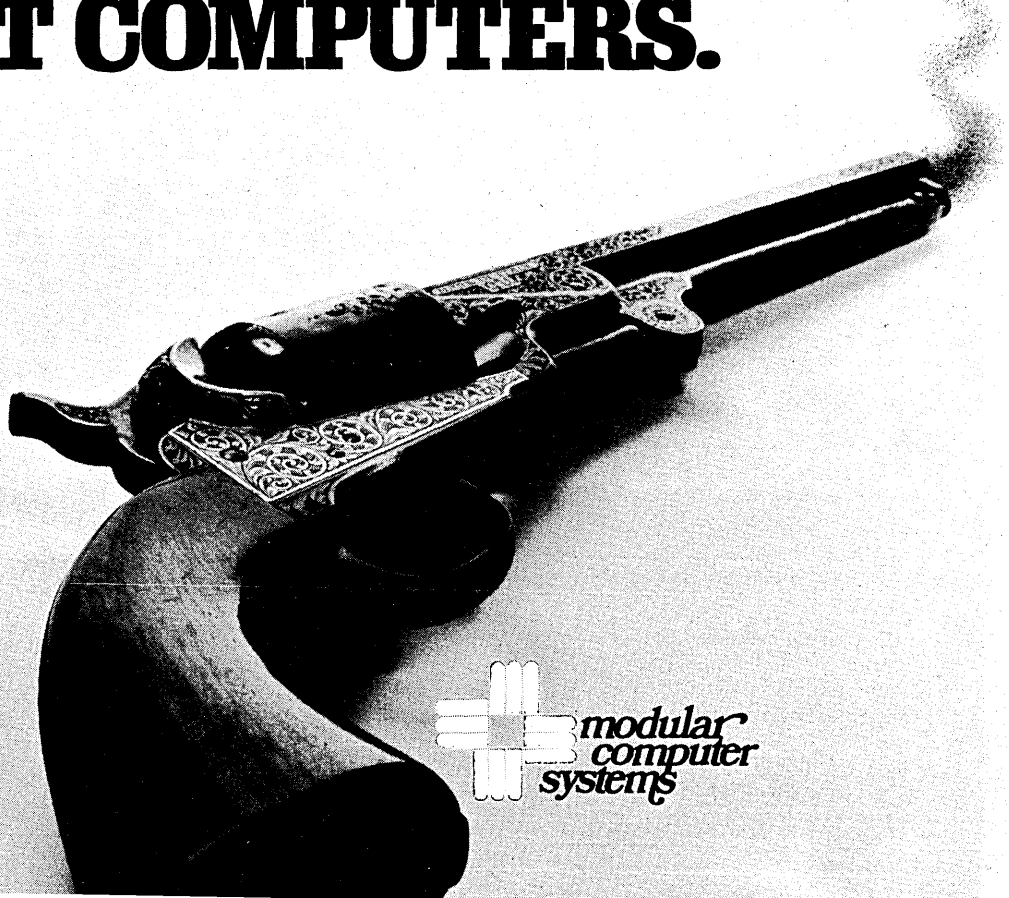
Price. A basic MODCOMP IV with 32K bytes of memory is priced at $18,500 list. With OEM volume discounts available.

Several MODCOMP IV's are now on order and set for delivery early in 1974, for applications that include electrical power generation control, multiple terminal time-sharing, host processor for factory automation, and control of traffic in a large Eastern U.S. city.

And that only scratches the applications surface. Contact us for full technical specifications and price information.

Modular Computer Systems
1650 West McNab Road,
Ft. Lauderdale, Florida 33309
Tel: (305) 974-1380
TWX 510-955-9820

THE 32-BIT COMPUTER THAT SHOOTS DOWN ALL YOUR OLD IDEAS ABOUT 32-BIT COMPUTERS.



modular computer systems

in this order:

1. product performance
2. vendor support
3. price
4. vendor stability
5. years to recover investment

(Price and vendor support are nearly equally weighted and sometimes switch positions.)

Most persons may think of price as "cost including conversion," otherwise they would weight the category "years to recover investment" more heavily. Also, although vendor stability is rated low in the chain of importance, we assume that an unknown vendor, or one that looked shaky, would have a very tough time selling anything to our audience.

The ranking of these decision factors is consistent over four major product categories ("mainframes," "peripherals or memory," "major systems software," and "applications software") with one exception. Sites where the primary mainframe is not from IBM show a bias for price over performance for mainframes; price is considered slightly more important than product performance. Again, we are trying to treat these items as if they could be separated although we know it cannot really be done.

Also, in all product categories except one, "major systems software," the difference between the items ranked second (vendor support) and third (price) is very slight. In the case of major systems software, all categories of respondents indicate that vendor support is far more important than price. That's not too surprising.

One thing we can establish about the importance of price considerations is that the rule of thumb for selling independent peripherals and memory has definitely changed. Not long ago, an independent supplier could hope to place his tape drives, disc drives, and even memory by showing a 10% lower price per year. Today a dp manager has to see a savings of 20% before he will even *consider* the product.

Still, price is the main leverage tool an independent has. It was cited as a reason for replacing one manufacturer's peripherals with another in 192 cases, compared to 90 times for the next highest scorer, performance.

Other than that, we have to cop out on proving price control through this mechanism.

"IBM's monopoly is so strong that they can get away with pushing second-rate hardware and third-rate software."

We had to find a different way to prove this one. Until the performance-measurement people have had time to develop some better tools, we will not be able to firmly state that one machine is superior to another one similarly priced, although we may have our own feelings about the comparison. Dp managers like those on our panel are often in a better position to make a judgment about performance per dollar. So we asked their opinions.

Most managers have not had hands-on experience with very many makes of computers, so we asked them to give us "best" and "worst" ratings for the machines they had used. We hoped that their collective experience would function like a round-robin volleyball tournament and settle the matter by playing one off against another. There are all kinds of mitigating factors in the performance per dollar question (like which generation of hardware was used by the individual attempting to make the comparison), but our panelists seem to have paid careful attention to our opinion poll questions and we are willing to put stock in their answers. Many times, where the distinction between two vendors is slight, the respondents indicate they lack sufficient experience to make a choice. The answers we tabulated are only those the panelists are comfortable in making.

The results of the opinion poll section of our questioning indicate that dp managers feel IBM offers a low level of product performance per dollar. Even panelists who staunchly support IBM on questions of ethics, of support, and of service, desert its ranks when it comes to saying whose equipment performs best. IBM clearly loses the round, but not the battle. As we have already established, vendor support is somewhat more important than price to a manager making a buy or no-buy decision. And in those questions that deal with support and service, IBM outranks everyone in the opinions of our panelists.

Similarly, we were looking for unethical practices IBM might employ to maintain its market position. The responses to our question on ethics ("Of all the mainframe vendors with which you have dealt, which one was the most ethical in its dealings with you? The least ethical?") are part of the answer to our probe. The high opinion that the dp managers seem to share also may partly explain why users have been among the least vociferous of the groups pressing for IBM's dismemberment.

The topics we covered in the opinion poll, and the "votes" we tabulated, are shown in Table 1. We have ranked the "contestants" in the order of the ratio of good and bad votes they received. (For instance, Digital Equipment Corp. received 18 votes for best product performance per dollar and only one bad vote. Its ratio is simply 18:1 and therefore it appears just before Burroughs whose score is 28 to 3 or roughly 9.33:1.) Use caution in reading the tables, as this part of our investigation was highly subjective. The results may show a hazy outline of the real world, not necessarily a clear image.

Conclusions

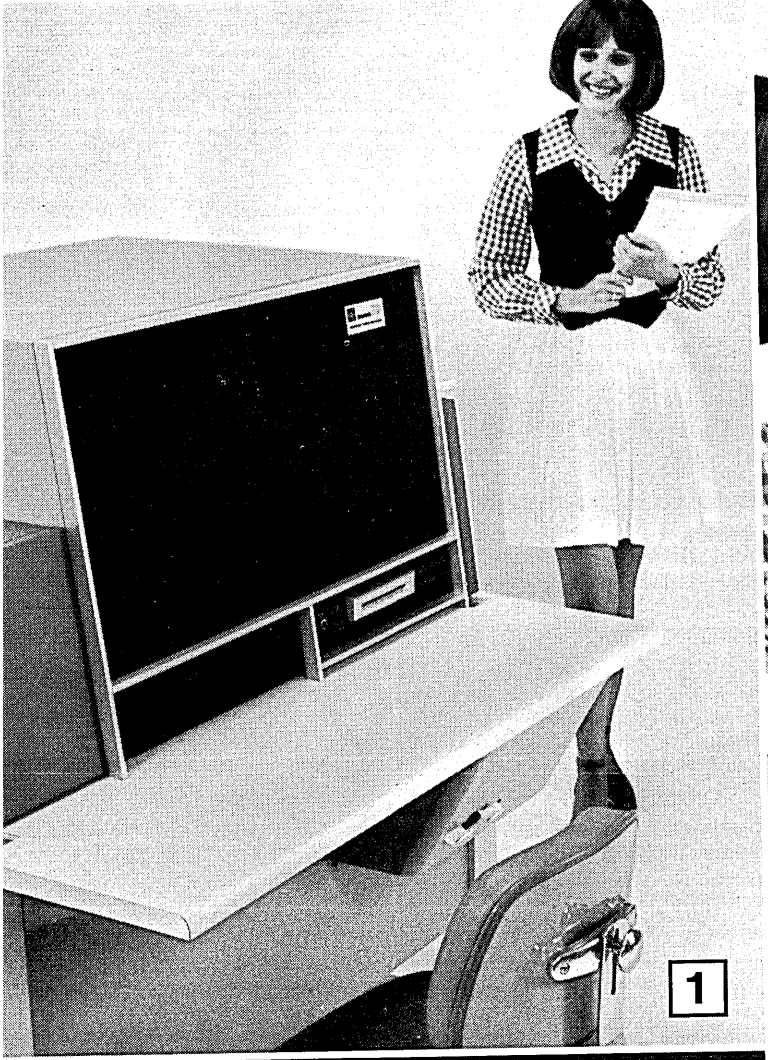
So what does it prove? By now we have spent many weeks going over hundreds of pages of input, far more information than we can hope to show here. We found some questionable tactics that IBM uses to maintain its position, but none that are any worse than those used by its competitors. (However, there is the possibility that *any* questionable practices, when undertaken by a company with most of the clout, are measurably more effective.)

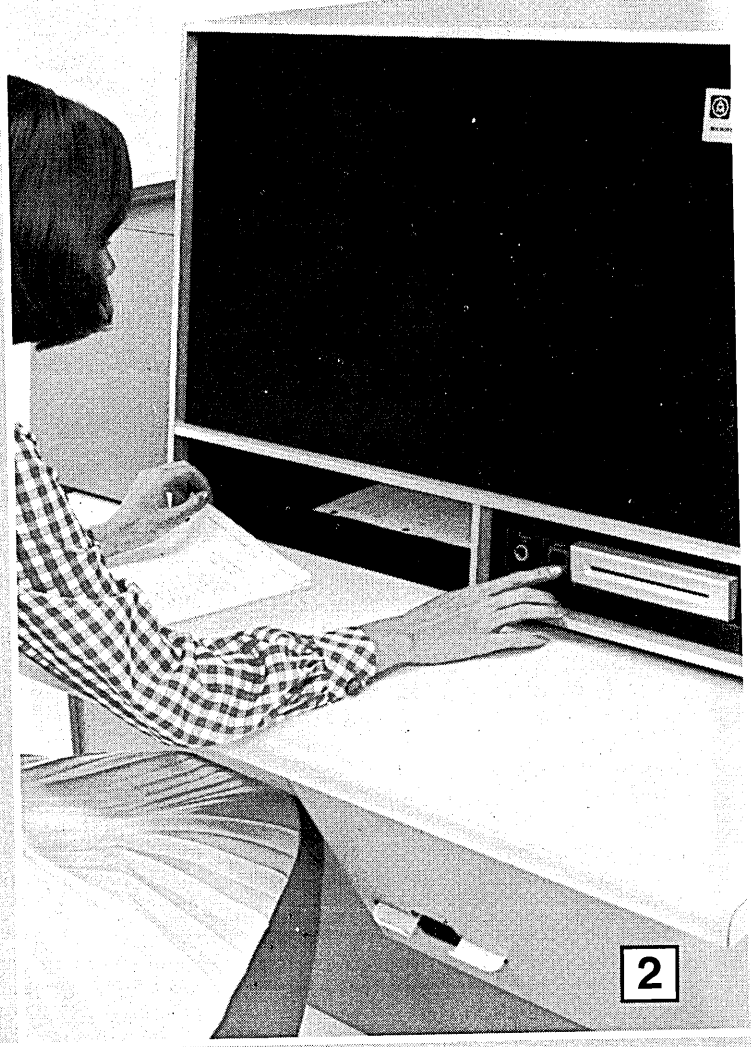
We think our results also suggest that some vendors' lack of success stems partly from things they don't do well, rather than just from unfair competition.

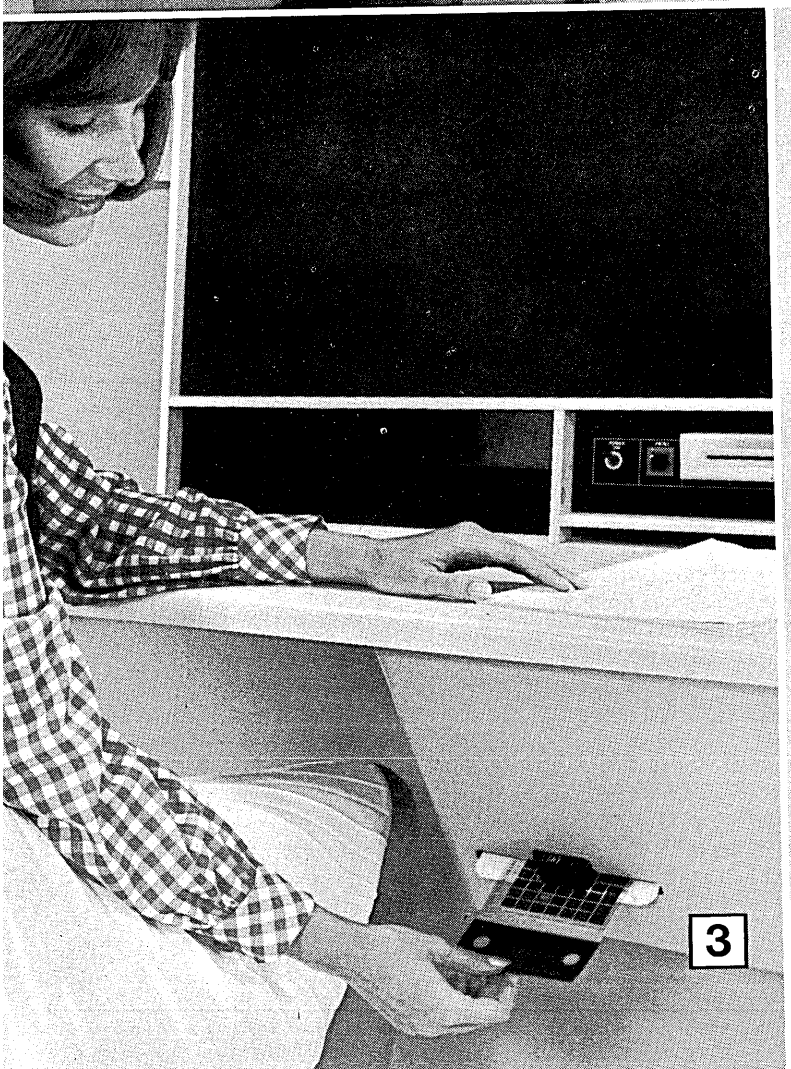
Further, we have been shown once more that IBM's position is largely self-sustaining by virtue of the training people receive, the software pools that accumulate, the hideous trauma of conversion, and the economics of providing service to a scattered customer base.

The message this all spells to IBM's competitors is clear: the only way to take away any part of IBM's existing customer base is by looking like IBM (both in service and support, and by being transparent to IBM programs in one way or another), and by offering more performance per dollar.

Our exercise also convinced us that the dp user will not very likely provide the impetus for an action to dismember IBM. Some 30 or 40 managers tell us that the only way the industry would become competitive would be through people in their own positions showing the guts to make unbiased choices and stick by them. But others, like the man in a Chattanooga 370 shop, say equally adamantly, "I don't favor making it more competitive at *any* expense to my company." Most managers fall somewhere in-between; they think competition should be increased somehow, but not if they have to do it themselves. These people may be the ultimate victims or potential beneficiaries just as the antitrust arguments claim, but the reason they haven't been much heard from is that they don't feel much like complaining. Even if they are not in love with IBM, they don't want to go through a divorce. □


1


2


3


4

Bruning's new system lets you make microfiche right in your office.

Here's big news for anyone using micrographics to store and retrieve information from catalogs, directories, reference works, accounting and purchasing records, and any type of name/number file.

Bruning has put together the first true systems capability for creation, duplication, storage/retrieval and print-back of unitized microforms made from documents. It includes both advanced hardware to get the job done efficiently, and the know-how to custom-tailor a system to your operations.

The key element in this system is the amazing new Bruning 750 microfiche camera with built-in processing. For the first time, you can make low-cost, high-quality fiche in your own office—copy up to 900 pages an hour, without specially trained people.

In terms of time savings alone, this is a major breakthrough. By working in-house, independent of suppliers, you can speed up your entire information-handling system. You assure the safety of your documents and the security of your information. And you'll realize significant cost savings.

Once original fiche are in hand, other elements of your Bruning system take over. For example:

- Our OP-40/80 duplicator/collator produces duplicate sets of fiche at high speed.
- Our new Micro-Triever II enlarger/printer turns out 50 hard copies a minute for a couple of cents a copy.
- Our revolutionary new Bruning 95 automated microfiche retrieval/display instantly retrieves information from large data banks.
- Our compact Bruning 550 reader/printer is ideal for locating and printing individual pages.

Bruning micrographics specialists are ready now to demonstrate this hardware and recommend a Bruning system that can increase your payoff from micrographics. Call your local Bruning office today. Or contact Bruning, 1834 Walden Office Square, Schaumburg, Ill. 60172.

The bold new force in micrographics.

BRUNING

DIVISION OF ADDRESSOGRAPH MULTIGRAPH CORPORATION

A comprehensive view of dp equipment and technology in iron curtain countries

Soviet Bloc's RIAD Computer System

by Bohdan O. Szuprowicz

Now that our friends from One Chase Manhattan Plaza are firing up their samovar at One Red Square in Moscow, the vast potential of the Soviet markets is catching the attention of American manufacturers. Computer manufacturers, in particular, have great expectations as tensions ease and Soviet-U.S. trade is exceeding the $1 billion level. However, despite the fact that Western computers and technology are high on the Soviet shopping list, computer sales to the Soviet Union have been only a trickle. Hard currency shortages in Russia and export controls in the U.S. are believed to be the reasons.

Concurrently, the Soviet Union and its COMECON partners are trying to fulfill their current Five Year Plans which call for the development of their own computer industries. The multinational RIAD program is the most ambitious of these projects.

On exhibition

The RIAD computer exhibition, which opened on May 3, was the first public showing of all the RIAD computers now claimed to be in production. The exhibition had all the earmarks of a trade show designed to impress the largest possible number of users; it also emphasized the cooperation of the Soviet Bloc countries in providing the necessary equipment for the complete RIAD system.

The exhibition, held at the Chemical Industry Pavilion in Moscow, coincided with the two-day May Day holidays. This moment in time presented an opportunity to show the RIAD systems not only to Soviet managers from all over the USSR, but also to those party leaders and delegates from other COMECON countries who were in town for the May Day celebrations. Prominent among the organizers of the exhibition were the Chamber of Commerce of the Soviet Union, Elektronorgtekhnika, and the Ministry of Radio Industry, which is the Soviet member body of the International Cooperation Committee for Electronic Techniques within COMECON.

Billed as the Unified System of Electronic Computing Machines of the Socialist Countries, the RIAD exhibit was limited strictly to third-generation computers, yet afforded a surprisingly comprehensive and detailed view of all dp equipment and technology in the Soviet Bloc. This was so primarily because only the central processors and disc drive units are truly new equipment (developed during the RIAD lifetime). Many of the peripherals such as tape drives, line printers, and card and paper tape readers have been in use, with existing computer equipment, for some time in their respective countries. In order to be included in the RIAD system, these peripherals only required reasonable speed compatibility and a universal interface.

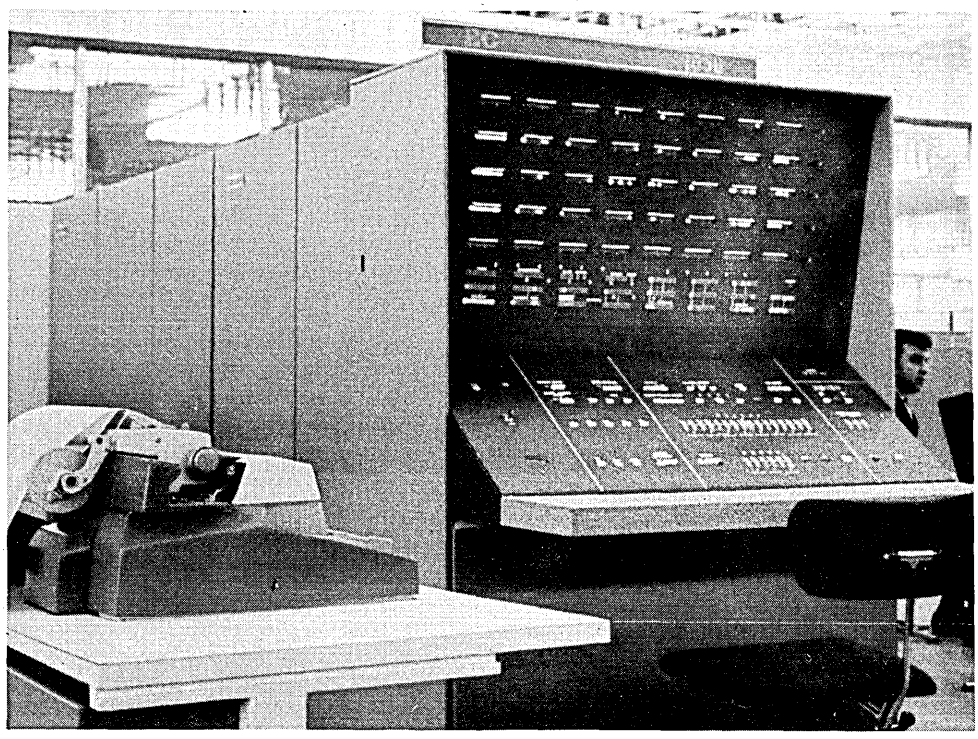


Fig. 1. Shown for the first time was this working model of the R-50, the largest RIAD system built.

Aside from the original development of the third-generation processors, the complete RIAD project can be looked upon as an international interfacing job not unlike some oem marketing deals in the U.S. Nevertheless, identification of suitable and compatible equipment across language, alphabet and culture barriers within the Soviet Bloc cannot be regarded as a trivial task.

In its concept, the RIAD program is patterned even more after IBM than the byte orientation of its computers. The successful multinational manufacturing of different IBM computers and peripherals in various countries, with a simultaneous production of all models in the U.S., is obviously the prototype the Russians wish to follow. And yet, the wholesale absorption of disparate oem products into the RIAD system, in preference to their internal development, make the RIAD program appear more like CDC in its acquisition heyday.

A museum appearance

A large central section in the pavilion displayed operating models of all the RIAD computers. The six central processors, each with a representative assortment of I/O devices, were arranged in a clockwise manner in order of increasing processing power. In one corner of the area, a scale model of all RIAD equipment was wedged between the smallest (R-10) and the largest (R-50, Fig. 1) computers on display. All processors and peripherals operating were placed on a two-foot high platform which served as a false floor and conveniently covered most of the cables.

In the middle of all the processors was a large glass-walled sealed room, under environmental control, labelled the "hermozone." All the tape and disc drives connected on-line to the operating processors were clustered in that area. An atmospheric control unit maintained the required pressure, temperature and particulate levels. This requirement is probably an indication that the Soviet Bloc manufacturers have not yet developed local sealing and dust control in their disc and tape units which would allow operations without the necessity for climatic control of the computer rooms.

This, and the obviously batch-processing orientation of the exhibits, was reminiscent of the large U.S. dp centers in the early '60s.

In addition to the demonstrations of computer power, there were also the familiar chess and tic-tac-toe games for the layman, and the crafty Czechs captured a lot of attention with a horoscope-prediction program.

In comparison with Western computer shows, there was very little literature available. All items displayed were provided with a label in Russian giving only the basic operating characteristics of the unit. This method of display, particularly when applied to equipment not operating or used in demonstrations, created a museum atmosphere.

Visitors were provided with a Russian guidebook describing all the exhibits, their organization at the show, and basic operating characteristics of each unit on display. Potential buyers could obtain a set of uniform specification sheets with detailed technical parameters and illustrations of the RIAD equipment. Somewhat annoying to a Western observer was the complete lack of addresses or names where you could write for additional information.

Production quantities and prices for the RIAD equipment were the two questions most seldom asked or answered, but we learned that the R-20 computers are now in production and are available on a three-month delivery schedule. The R-20s are manufactured at the Minsk plant, where the Russians claim that the second-generation MINSK 32s are still in production at the rate of 600 units a year.

The R-50 is also claimed to have been put into production, and the Russians indicated that they already have a "foreign" customer for a system. They expect to export about five R-50s during the first year, and feel that this figure may reach 20-30 units in two to three years' time. No total production figures of the R-50 were given, and only one unit was seen at the show.

The Germans have also put their R-

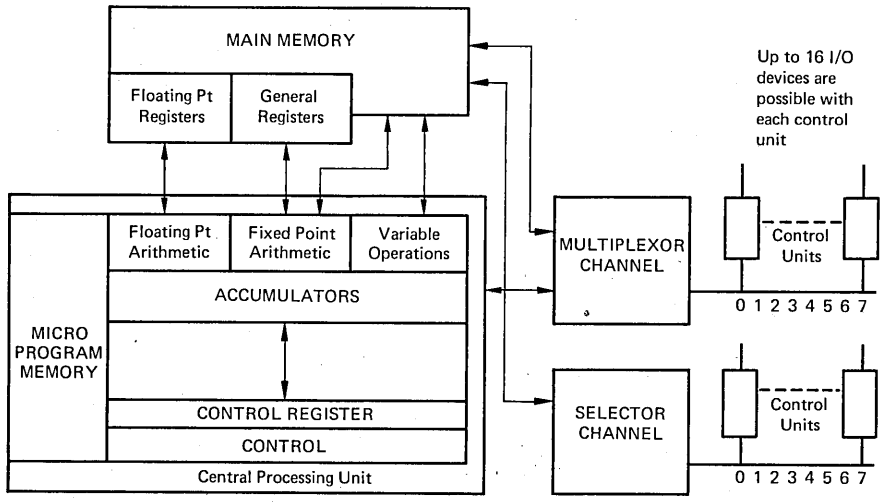


Fig. 2. Architecture of a microprogrammed RIAD processor.

Fig. 3. A Soviet crt unit with light pen and joystick operates beneath a photograph of party secretary Leonid Brezhnev.

40 into production, and earlier this year displayed this system at the Leipzig Trade Fair. Of all the RIAD processors, the R-40 appears to be the best finished model, with a certain IBM-ish look about it. Least certain as to production in any significant numbers is the R-30. The Poles, who experienced some development problems with the systems earlier this year, did not bring their RIAD processor to the Moscow show.

The hardware

The Unified System of Electronic Computing Machines (RIAD) presently includes seven different models with processors ranging in speeds from 10K to 1.5 million operations/second (see Table 1). These include the largest Soviet-designed processor EC-1060 (or R-60) which was not shown at the Moscow exhibition. Soviet academician V.S. Semenihin, a member of the exhibition's organizing committee, indicated in an interview with *Pravda* at the opening of the show that the R-60 was still in the developmental stage.

Another indication of developmental difficulties with the R-60 lies in the fact that it was earlier announced that the largest RIAD computer will be capable of three million operations/second. Other reports indicated a two million operations/second capability, while the official specifications now place it in the 1.5 million operations/second category. This would still make the R-60 the most powerful machine built in the Soviet Union; the BESM-6 is estimated to be capable of about one million additions/second and that is thought to be the largest Soviet-built computer to date.

Also puzzling was the absence of the ROBOTRON R-21 computer already in production in the German Democratic Republic, and the Czech ZPA 6000/30. Both of these machines are third-generation computers and were mentioned by M. Slezak in the Czech technical press as early as 1971 as being a part of the RIAD series.

All RIAD processors use an 8-bit byte as the smallest addressable unit (see Fig. 2). Two bytes form a "halfword;" four, the basic RIAD "word;" and eight bytes, the "double word." Variable-length data fields can go up to 256 bytes each.

The systems are claimed to be fully compatible, although the Hungarian R-10 uses its own set of 55 instructions and the Czech R-20A has special control instructions which differ from the rest of the series. All the other models use a standard 144-instruction set.

All RIAD processors can have at least one selector and one multiplexor channel, and all peripheral devices are equipped with a standard I/O interface and can be used with any processor. There is a total of about 150 peripheral devices suitable for use with the RIAD computers; about 120 of these were shown at the exhibit.

Although there is little evidence of the existence of extensive time-sharing software, the RIAD systems are capable of operating in a conversational time-sharing mode. There are provisions for teleprocessing and remote data stations are available for use on a local hard-wired basis. The RIAD system also includes several models of modems and multiplexors manufactured in both the USSR and Hungary.

RIAD computers use monolithic IC elements and printed circuit connectors, but component specs were not readily available. Russian engineers indicated that multilayered IC's with a maximum of 12 layers have been made in Russia. They also said that some Soviet-made chips contain up to 300-500 active electronic circuits, but it was not clear whether these components are used in the RIAD series.

The peripherals

Many of the 120 peripherals shown

RIAD System	R-10	R-20A	R-20	R-30	R-40	R-50	R-60
Countries of manufacture	Hungary	Czecho-slovakia	Bulgaria U.S.S.R.	Poland U.S.S.R.	East Germany	U.S.S.R.	U.S.S.R.
System Number	EC-1010	EC-1020A	EC-1020	EC-1030	EC-1040	EC-1050	EC-1060
IC Logic Type	..... TTL					++++++ ECL ++++++++	
Avg. Ops/Sec	10,000	40,000	20,000	100,000	300,000	500,000	1,500,000
PROCESSOR	EC-2010	EC-2021	EC-2020	EC-2030	EC-2040	EC-2050	EC-2060
Instruction set	55	66	144	144	144	144	144
Compatibility of systems	Special inst set	Special cntl inst	..... Full Program Compatibility				
Execution times (μsec)							
Simple Operations		15	20-30	5-11	1.4-2.0	0.65-2.0	0.5
Add/Sub Fixed Point	1.0-3.0	20-30	20-30	9-11	1.4-2.0	0.65-2.0	0.5
Add/Sub Float Point	2.6-3.6	n/a	50-70	10-16	2.5-3.6	1.4-2.4	0.5
Multiply Fixed Point	4.0-38	80-120	220-350	32-38	7.2-8.2	2.0-2.4	1.0
Multiply Float Point	n/a	n/a	490	27-33	6.5-13.1	2.0	n/a
Multiply Double Word			1200	60	12	12	1.5
Divide Fixed Point		150	390	100-106	16.2-17.3	8.3	
Divide Float Point			400	46-52	10.4-20.3	7.2	
CONTROL LOGIC	..... Microprogramming					++++ System +++++++++	
MAIN STORAGE	EC-2010	EC-3221	EC-3220	EC-3203	EC-3204	EC-3205	n/a
Capacity(Kbytes)	8-64	16-64	64-256	128-512	256-1024	128-1024	256-2048
Memory cycle(μsec)	1.0	2.0	2.0	1.25	0.90	1.25	0.60
Access Time(μsec)		1.0	1.0	0.75	0.45	0.4-0.6	
CHANNELS					EC-4034	EC-4012	
Selector channels	1	2	2	3	6	6	6
Data Transfer speed (Kbytes/second)	240	120	to 300	600-800	1200	1300	1300
Multiplexor channel							
Max. subchannels			48-128	128	256	256	
Max. mode data speed (Kbytes/second)		35	10-16	60	20-25	30-110	100
Selector mode (Kbytes/second)		220	100	180	180-720	100-180	450

Source: Compiled from data supplied by Elektronorgtekhnika, Moscow, U.S.S.R. in May 1973 and from *Informatyka* of Warsaw, Poland, October 1972 and May 1973 issues.

Table 1. Characteristics of RIAD computer systems.

were working with the cpu's displayed in the main section (see Table 2). Additional units of disc and tape drives were available for closer inspection at the national stands, because those online to the processors were enclosed in the environmentally-controlled room and could not be accessed by the visiting public.

Most of the various devices were displayed without being connected to any operating system. Approximately 25% of all the peripherals displayed were manufactured in the Soviet Union. If numbers are anything to go by, the USSR was indeed the largest exhibitor, although it had only half of all its RIAD peripherals on display. Following the Soviet Union, Bulgaria, Czechoslovakia, and Hungary each displayed about 20 devices. The German Democratic Republic concentrated on peripherals attached to its R-40 processor, and only showed a few modems and a remote data station.

Discs. Perhaps the most interesting peripherals to a Western observer were the five different models of disc drives (see Table 3), all using the standard 7.25 megabyte disc packs, and manufactured in Bulgaria.

All of the disc drives use 203 concentric data paths on each surface (six discs with 10 working surfaces in each pack) and revolve at 2400 rpm. Throughout the exhibit there were a total of about 20 units of the various drives, suggesting that all are in production in their respective countries.

Tape drives. There are seven tape drives (see Table 4) manufactured by the participating countries in the RIAD system, and six of those could be seen at the exhibit. All models were available for inspection at the national stands of their country of manufacture. All of the tape drives above use standard half-inch magnetic tape, 750 meters long, on a single reel. Most can record with either an 8- or 32-bit density.

Printers. Eight line-printers were displayed (see Table 5). It was interesting to note that most of the printer control mechanisms were based on the ATsPU 128 line-printer, the most popular printer in the Soviet Union. This printer operates on a set of character wheels and hammers, while the German and Czech printers use a revolving cylinder.

The maximum printing speeds shown above apply in all cases to single paper printing; in some printers, maximum printing rates are only possible with the numerical character set. Quality of output appeared to be average in most cases, certainly adequate for an environment where very little printing is taking place on preprinted forms and precision alignment is not as critical a characteristic as it is in the West.

Crt's. There was a definite scarcity of crt units, data terminals and minicomputers—the only true minicomputers were displayed by Hungary, and these were not a part of the RIAD system. Hungary was also the only exhibitor with a magnetic tape cassette terminal, and besides the USSR, was the only country to show crt displays. The two units manufactured by Hungary can display up to 1024 characters on a 15mm x 20mm screen, and use a 96-character alphanumeric set.

The Soviets' crt unit has a larger screen of 32mm x 18mm, but displays a maximum of only 960 characters. Another Soviet model is a graphic display (Fig. 3) with a 25mm x 25mm screen. It is equipped with a joystick and light pen, and uses a 96-character alphanumeric set.

Nowhere to be seen at the Moscow show were such common Western devices as tape-to-disc systems, ocr units, or micr devices. It is understood, however, that optical readers exist in Eastern Europe, but probably such devices cannot yet be interfaced to the RIAD hardware. Surprisingly, because of the large information storage and retrieval concepts generated in the Soviet Union, there were no microfilmers or

COUNTRY OF MANUFACTURE →	Bulgaria	Czecho-slovakia	East Germany	Hungary	Poland	Soviet Union
Processor	×	×	×	×	×	××××
Tape Drives	×	×	×		×	×××××
Magnetic Drums					×	×
Disc Drives	×	×	×			××
Fixed Discs				×		×
Tape cassette Drive						
Card Readers		×		×		×××
Paper Tape Readers		×		×××	××	×
Card Punches		×				××
Line Printers		××	××	×	×	××
Plotters		×				×××
Crt Terminals				××××		××
Typewriters	××	××	××			×
Key To Tape	×					×
Key To Paper Tape		××		××		×

Source: Compiled from data supplied by Elektronorgtekhnika, Moscow, May 1973

Table 2. Major RIAD System peripherals and countries of their manufacture.

"CFI has a move-ahead spirit, a brand new plant, and the best disk packs going. I know. I sell them."

"Sure, I'm enthusiastic about CFI Memories," says Jim Patti of James P. Patti & Associates. "Last year, I sold over a thousand packs. And in this product area, I carry CFI exclusively."

"They've increased their production capacity with a new plant that turns out both IBM-compatibles and non-standards. And they're responsive. If a customer needs ten disk packs or cartridges in the afternoon, he gets them. If he needs a straight answer to a technical problem, he gets that in minutes because CFI's technical people are always available for immediate consultation."

"I react personally to all my customers, giving first-class service to large and small alike. When I make a commitment, I keep it. And CFI has backed me all the way."

Personal profile
Jim Patti of James P. Patti & Associates, Los Angeles, California. Thirteen years experience, heavily on the operations side. DPMA member. An avid golfer and jazz musician in his leisure hours.

Jim Patti, an enthusiastic pro with in-depth experience in this business, is typical of the 186 representatives serving CFI customers here and overseas. Together, they've supplied users and OEM's with thousands of disk packs and cartridges. And they're all men who work hard to earn your business by providing the kind of personal attention you require.

A nearby CFI representative is waiting to serve you now. For his name, call us toll-free at 800/854-3290. Or write: CFI Memories, Inc., 305 Crescent Way, Anaheim, California 92801.

We take your business personally.

CFImemories, inc.
A LENCOR COMPANY

EUROPE: CFI Memories, Inc., Carolyn House, Sixth Floor, Dingwall Road, Croydon CR9 1NT, England. Tel. 01-681-3811 CANADA: Barshaw Office Systems Corporation, 9559 Cote de Liesse Road, Dorval (Montreal), Quebec, Canada. Tel. 541-631-8591

any other COM devices either shown or mentioned. This seems to be an area which may present a very large market potential to some of the Western manufacturers of such devices; the Soviet Bloc certainly has the applications.

The software

The Russians define their RIAD software as consisting of operating systems, system maintenance packages for startup, testing, diagnostic and troubleshooting work and application programs. The RIAD operating systems include a Disc Operating System (DOS), and three Operating Systems (OS); two of which are special for the R-10 and R-20A computers only. We learned that the RIAD DOS and OS were similar to those of the IBM 360 series, but it was not possible to ascertain to what degree. One indication may be a remark by a Soviet RIAD expert that many Western application programs "will run" on RIAD systems with very little, if any, modification.

The RIAD DOS is available for the R-20, -30, -40, and -50 models with main storage requirements of 64-128K. It includes supervisory and control programs and five compilers: Assembler, COBOL, FORTRAN, RPG and PL/I.

The RIAD OS is for models R-30, -40, -50, and -60; the minimum memory required is 128K. This operating system includes multiprogramming control programs and its language compilers consist of ALGOL, COBOL, FORTRAN, RPG, PL/I and the Assembler.

Of the remaining two operating systems, one of the smallest, MOS (Malaya Operathionnaya Sistema), is designed specifically for the Czech-made R-20A computer which has only 66 instructions (compared to a 144-instruction set in the larger systems). The smallest operating system is known as OS/10, developed only for use with the Hungarian R-10, a system with a special set of 55 instructions which are not fully program-compatible with the rest of the series.

Relatively little information was available about RIAD application programs, although three groups of such packages were outlined in a general fashion. These include programs which enhance the functions of the various operating systems; packages for scientific, engineering, and economic applications; and programs designed for use in industrial plants. There were also suggestions made of the existence of translators which would allow the use of application programs developed for the MINSK computers (the workhorses of the Soviet Union) to be used on the RIAD systems.

During our discussions with Russian designers, they showed a keen interest in Western methods of evaluating the development cost of an application program. They also indicated a desire to thoroughly familiarize themselves with the large selection of IBM 360 application software programs which could presumably be used on the RIAD system. This came as a surprise to us, as we were originally under the impression that the RIAD series was conceived and developed *after* studying the wide availability of IBM 360 software, and was designed to take advantage of that situation.

Along this line, the Russians also indicated their willingness to consider the purchase of Western IBM 360 applications software, if it were made available to them on a one-time purchase plan; allowing unlimited use in multiple installations through the USSR, without any additional royalties or copyright payments.

Despite the fact that this was the first public showing of the RIAD series, the exhibit building was never crowded, and most of the visitors appeared to be well-dressed white collar workers of the engineering and clerical-managerial type. We did not see the normal attendance at the exhibition during a day when it was open to the public. Judging by the adjoining permanent electronic pavilion (which also had computers on display), the interest of the Russian man-in-the-street is infinitely higher in watching a working television set than a computer. □

Disc Drive	Country	Search time (Milliseconds) Min	Max	Avg	Avg. Access Time
EC-5050	U.S.S.R.	25	150	75	90
EC-5052	Bulgaria				95
EC-5055	GDR	30	130		
EC-5056	U.S.S.R.	30	150	90	87
EC-5058	Czechoslovakia	30	150		90

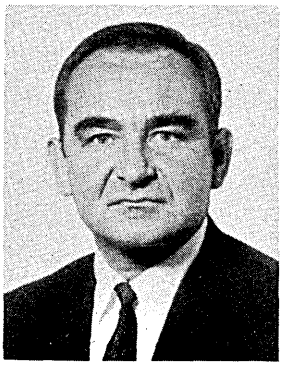
Table 3.

Tape Drive	Country	Max Data Rate Bytes/sec	Tape Speeds Meters/Sec
EC-5010	U.S.S.R.	64,000	
EC-5012	Bulgaria	64,000	2
EC-5014	U.S.S.R.	126,000	2
EC-5016	GDR	48,000	1.524
EC-5017	U.S.S.R.	64,000	2
EC-5019	Poland	120,000	3
EC-5022	Czechoslovakia	126,000	4

Table 4.

Line Printer	Country	Speed range lpm	Maximum characters per line
EC-7030	U.S.S.R.	700-800	123
EC-7031	GDR	900-1200	120
EC-7032	U.S.S.R.	900	128
EC-7033	Poland	600-1100	160
EC-7034	Czechoslovakia	600-900	132
EC-7035	GDR	600-1200	120
EC-7038	Czechoslovakia	750-1000	160
EC-7039	Hungary	245-1110	132

Table 5.



Mr. Szuprowicz is president and founder of 21st Century Research, an investment and marketing research firm specializing in technology markets on an international basis. He was previously research director and vp of a Los Angeles research organization High Technology West. He has a BS from the Univ. of London and has done graduate work at Columbia Univ. and UCLA.

If you have a voice in company training, you have a responsibility to ask yourself these questions:

1) *Is the cost effectiveness of your present training efforts acceptable?*

2) *Is it possible to put your internal and customer programs in multi-media format, thus decreasing training costs and insuring standardization?*

3) *Are you now conducting training programs but lack certain methods, materials or instructor talent?*

4) *Is there a gap between company goals and technical capabilities, i.e., need for updating skills in Data Base Management, Data Communications, Business Systems Analysis and Design, Virtual Storage, Project Management, etc.?*

5) *Is your in-house training capability providing the quality and productivity levels you require?*

Here you are. Faced with training challenges that can help shape your company's future. Your co-workers' future. Your own future.

And here we are, Control Data Institute, ready to help.

We have more home office and field training specialists offering a clearer choice of contemporary in-house and off-site training tools, techniques and programs than just about any company in data processing . . . from stand-up seminars and classroom sessions to portable multi-media packages and complete customized systems tailored to your needs.

We've prepared new systems that can bring your training opportunities into sharp focus. If you're the result-oriented director of information systems, operations manager, or DP manager we think you are, you won't hesitate to send for information about them.

CONTROL DATA INSTITUTE

The Educational Service of CONTROL DATA CORPORATION

8100 — 34th Avenue, South Minneapolis, Minnesota 55440

Offices in Major Cities Throughout the World.

GE TermiNet* Printers

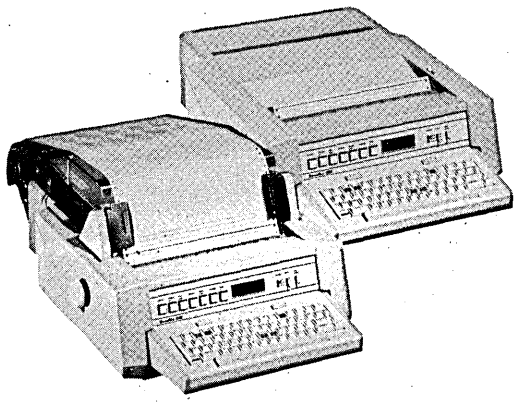
4 Forward speeds to shift your business into high gear

More and more businesses are handling tremendous amounts of data. Data that has to move fast . . . accurately and dependably. To stay up with competition. To beat competition. To survive.

You can shift your business into high gear at speeds of 10, 15 and 30 characters per second with the quiet GE TermiNet 300 printer. That's 3 times faster than conventional printers. Or for high volumes of data shift up to the quiet, high speed TermiNet 1200 printer at speeds up to 120 characters per second. You'll be surprised at the small differential in price. 4 forward speeds ready to give you the required amount of accurate business data you need at your command.

Thousands of companies have already shifted into high gear with TermiNet printers. Isn't it time you considered what TermiNet printers can do for your business?

Write for detailed information on the reliable GE TermiNet Printer: General Electric Company, Data Communication Products Department, Section 794-07, P. O. Box 4197, Lynchburg, Va. 24502

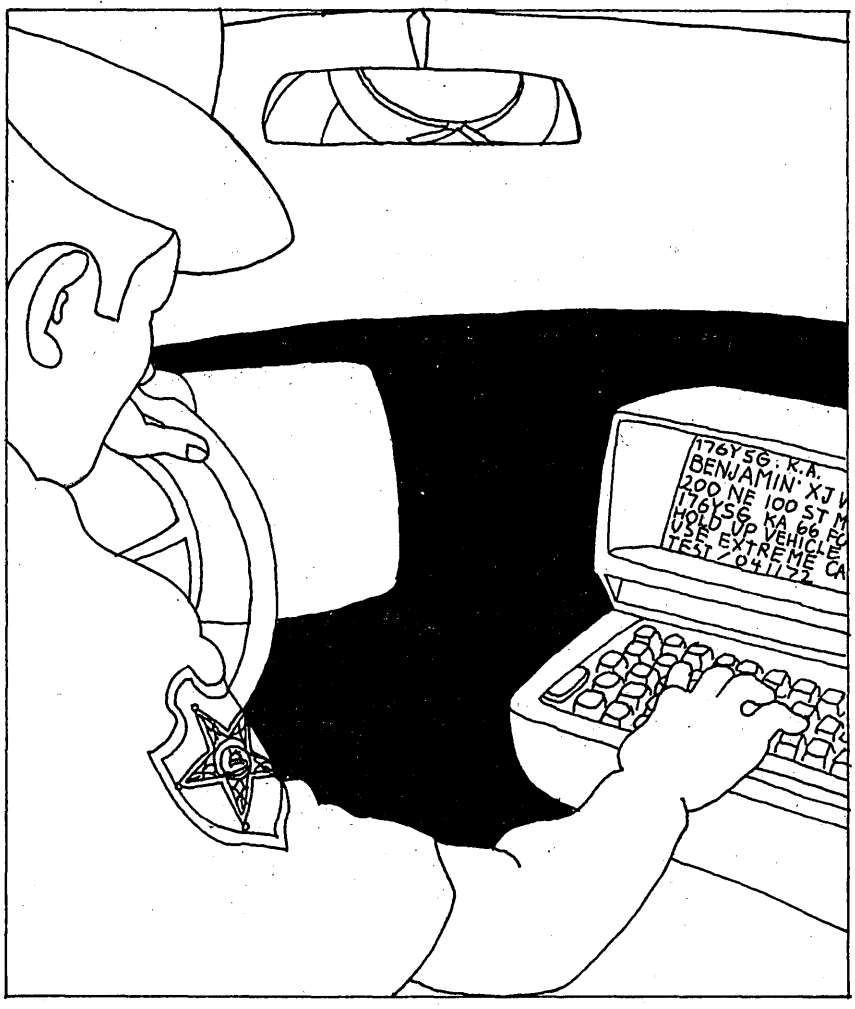


GENERAL ELECTRIC

Your name, address
and arrest record
before the stoplight changes

Law Enforcement Communications Conference

By Wendy Reid



THE SPEAKER was a southern sheriff: a big man with wavy, silvering hair and a gentle drawl. "We started looking into teleprinters back in '70 and waited for the LEAA (Law Enforcement Assistance Act) grant. But while they were processing the grant, another animal appeared out there called the two-way digital terminal and already the teleprinter was obsolete. So I made an appointment with a little company called Kustom, and down came a couple of hippy-looking characters with a digital terminal under their arms, and they said that it would work two ways and I said prove it, and they did."

And then the speaker, Chief Deputy William J. Bennett, Palm Beach, Fla., Sheriff's Office, went on to prove the effectiveness of the system he helped develop—probably one of the most sophisticated law enforcement communications systems in the country. His presentation drew an awed and appreciative response from the 125 dark-suited law enforcement officers who were attending the one-day seminar on Law Enforcement Communication Systems at the Saddleback Inn, Santa Ana, Calif. The seminar, held May 31, was sponsored by the Data Communications Div. of Kustom Electronics, Chanute, Kan., and was attended by state police, highway patrol officials, police communications experts, sheriffs, police and fire chiefs, and criminal justice personnel from Nevada, California, Arizona and Washington.

Bennett's system, which incorporates an inquiry/response mode with dispatch communications, uses MCT-10s, solid-state plasma display and keyboard terminals, that are located in each patrol car and hooked up to a 28K, 1.2 million bit PDP-11 controller in the main communications center.

"We were more or less forced into seeking another way of communications," Bennett said. "We had problems getting into the patrol car and trying to tell a dispatcher for 10 minutes that we were in service and ready for a call. On the other hand, when we had an emergency, we were 10 or 15 minutes trying to tell them, 'Hey, send some help, I'm bleeding out here.' "

The inquiry/response mode is activated by the patrolman requesting the information he needs by pressing function keys (coded to keep actual message typing in the patrol car to a minimum). The inquiry is processed through the PDP-11 and translated into the appropriate format for input to the computers at the National Crime Information Center (NCIC), the Florida Crime Information Center (FCIC), and the Palm Beach County Automated Law Enforcement and Management Information System (PALMS).

Requested information on for example, whether a car is "hot" or not, who is the registered owner, is the person wanted (locally or nationally), is received back on the display in six to eight seconds. This response time compares with voice transmission ("Harry, could you query the computer regarding a John Jackson?") turnaround time of 90 seconds.

Aside from the obvious advantage in rapid apprehension of persons suspected of crimes, this cut in time delays is also saving officers' lives. When the information comes back a "hit"

(car or persons wanted), the controller in the communications center, monitoring the digital dialogue, rings an alarm. The dispatcher then reports the location of that patrolman on the displays of all cars in the field; the investigating officer also knows to use caution in the apprehension.

Another device for safety is the emergency key. When an officer stops a car, he first enters the time and location on the terminal. If, at the end of three minutes, he has not reported back to the control center via the terminal, an emergency signal sounds in the center, and the location of the officer, who presumably needs help, is flashed onto all other terminals in the field.

Depending on the circumstances, the officer in the field is able to receive a great deal of information concerning a vehicle or a person under suspicion. Bennett said "We had one interesting deal when we first started. We had someone standing outside a closed gas station at 2 a.m. who looked suspicious to the road patrolman. So he stops and queries him and says, 'What are you doing here?' and the guy says, 'Just waiting for my buddy, just going to go fishing.' So the patrolman gets his identification and enters it in the terminal in the car, and it comes back that the guy's not wanted. So the patrolman queries the terminal if the guy has an arrest record. And it comes back that the guy's a specialist in breaking into gas stations. So the patrolman goes back to the guy and says, 'Have you ever been arrested?' And the guy says, 'No, I have never been in no trouble, I'm just going fishing.' Then the patrolman brings the guy over to the car and says, 'Do you see that screen?' And the guy says, 'Oh, s---.' Needless to say, he was already in the gas station and was on his way out when he got caught. He just copped out right there, so that was the end of the ball game."

Dispatching

The second major portion of the system is computer-aided dispatching. This uses status keys, which the officer pushes to indicate whether he is enroute to a call, waiting for an assignment, has arrived at the scene of a complaint, etc. All commands from the dispatcher or the shift officer are displayed on the terminal and acknowledged by the patrolman. The information from all terminals in the field is logged at the communications center, and is available to the command officer, so that he may see at once what the status is of all cars in the field: where they are, what they are doing and what units are available.

Dispatches also include directions on the terminal for the patrolman. ("They would look it up on the map book, where the heck is Walbasso Street, and they'd go to page 21 and C3 and find out what routes, and when they got all that information, if they weren't too excited and dropped the book a couple of times, they were on their way. Well, we eliminated all that.")

While the major amount of information transmitted over the system is digital, the system does use regular two-way radio channels, and so also allows for voice communications. The Palm Beach County Sheriff's Office and law enforcement agencies for adjacent Monroe, Dade and Broward Counties are going out for bids later this year for a $7 million communications system that will throw all the radio frequencies in southern Florida "into the barrel," and will dole out the frequencies according to an individual agency's priorities. The system will also incorporate a three-digit private phone hookup to all 86 departments in the four-county area, and a flip-flop capability that will allow a patrolman on a chase three counties away to get back to his own dispatcher to access the local data base.

"It's been a year now since we pioneered it," Bennett concluded, "and we've built software, changed software . . . and we're still changing software to get everything that needs to be done. And every week we find something better that we can do. We're blowing their minds a little about what actually can be accomplished with the mobile digital in the field."

The conferees also heard from Charles Hill, director of communications, Seattle Police Dept., who described that city's Nine-One-One (911) emergency telephone system. The system, for all police and fire emergencies, was adopted because the 911 number is faster to dial and easier to remember than the former seven-digit number.

Incoming calls on the 911 system are handled by Automatic Call Distribution (ACD), which switches calls among answerers and, by adding the Force Administration System (FADS), enables constant monitoring of individual phone position status and transaction totals, and provides management data on talk time, positions manned and calls waiting.

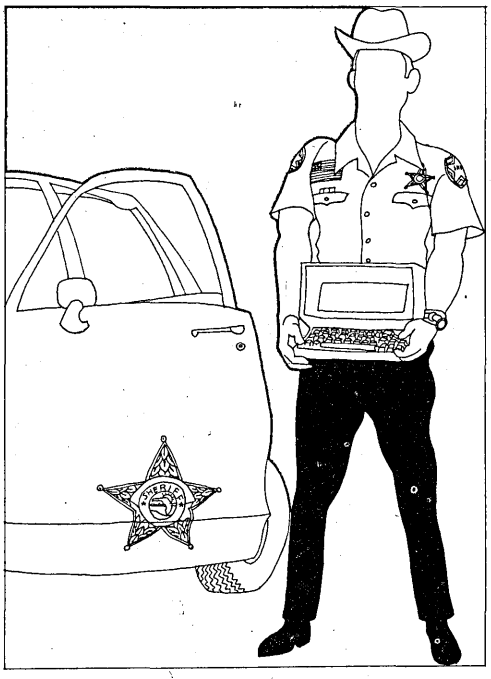
> "The dispatcher is just hangin' around nowadays just waitin' for someone to say something on a no-voice channel."

The Seattle 911 system has all incoming calls answered by primary operators. If the word "fire" is mentioned, the primary operator transfers the call, via touch-tone phones. to one of six dedicated lines to fire dispatch. If fire is not involved, the operator asks two questions: where is the problem? (jurisdiction) and what is the problem? (action needed?).

Up to ten dedicated lines can be accessed depending on the jurisdiction of the problem. If the answer to the second question indicates the call is not an emergency, the call is switched to a secondary operator. According to Hill, the entire time for the transaction of emergency calls by the primary operator is currently averaging under 50 seconds.

Following the presentation, Hill fielded questions concerning cost of the system (there is no direct cost for 911, which uses standard AT&T phone equipment, except for dedicated transfer trunks; however, the implementation of this system often forces upgrading of an existing phone system, and herein is the cost factor); and planned technological advances, such as computerized answering equipment and automatic dispatching.

At this point, Hill stressed that the philosophy of the system was to save



lives and therefore the constant objective was to eliminate time delays. When cost feasible, he added, further technology "will undoubtedly be employed. Most communications systems," he added, "are designed by technicians who attempt to absorb and understand operational conditions and goals. Ours was designed by operations people who attempted to understand the limitations imposed by available technology . . . We gave great attention to human engineering in attempting to alleviate the inevitable stresses involved in such work," Hill concluded.

A third speaker, Police Chief Duane

Law Enforcement

Baker, Glendale, Calif., announced that city's new police management information system, which will be operational by the end of the summer. The system is linked to a 370/135 in Glendale City Hall, and is based on an 11K in-house PDP-11 which runs five types of programs developed by consultant TRW Systems. The programs use information captured as an "incident" (all police activities including non-crimes, such as accidents) progresses, and generate reports, run a cumulative file management system, a real-time subsystem, and a systems analysis package. Reports relate to such matters as: effective deployment of police personnel, management of patrol units in the field, and reports to the neighborhoods on police activity in their area.

Because the system was funded by an LEAA grant, it can be replicated at low cost by other law enforcement agencies: all software for the system can be interfaced with most large-scale systems and is available at no cost.

Chief Baker added that the next step would be to go to digital transmission of data, transmitting directly to the patrol car, bypassing the communications center.

Those dreams were being shared by nearly everyone else . . . the breaks and lunch times were filled with mumblings about funding, LEAA, tight-fisted city halls ("All they want to do is build libraries . . . I've yet to see one book that solved a crime," grumbled one police administrator in a statement that invited contention), and a reordering of state and federal funding priorities.

Fittingly, the conference closed with a discussion by Dennis Kroger, a representative of Kustom Electronics to Washington, D.C., where his job is to sniff out current legislation regarding funding for law enforcement systems. His talk highlighted some recent developments concerning monies allotted to LEAA, and general information concerning the availability of revenue-sharing monies distributed on the local government level. Although Kroger admitted that most news out of Washington was discouraging, particularly that regarding funding, he did mention that if and when the money came down the pike, police telecommunications systems were a high priority for grants.

The one offkey note was sounded by this reporter who, forgetting everyone else in the audience was a policeman, left for a coffee break and asked the man sitting next to her to watch her purse. □

Our new time-sharing terminals operate at 120 cps in interactive or batch mode. Either way you save.

And you save in two ways: You reduce communications line costs and cut computer connect time.

With these 1200 baud terminals you make full use of telephone line capacity. So even with moderate terminal usage, your savings can really mount up.

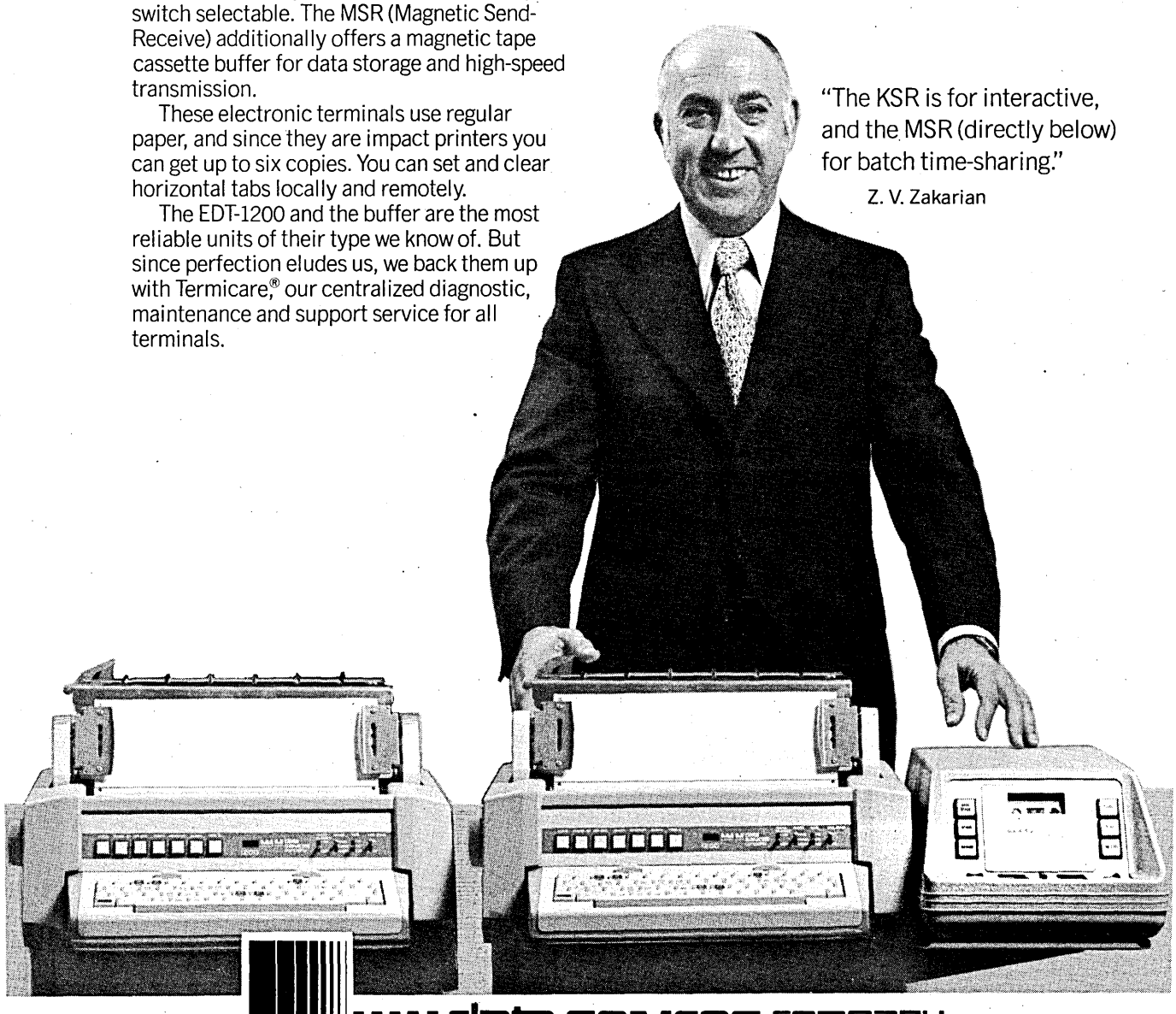
We offer two models of our EDT-1200 series: The KSR, which operates at 10, 30 or 120 cps, switch selectable. The MSR (Magnetic Send-Receive) additionally offers a magnetic tape cassette buffer for data storage and high-speed transmission.

These electronic terminals use regular paper, and since they are impact printers you can get up to six copies. You can set and clear horizontal tabs locally and remotely.

The EDT-1200 and the buffer are the most reliable units of their type we know of. But since perfection eludes us, we back them up with Termicare,® our centralized diagnostic, maintenance and support service for all terminals.

With these new terminals our product line is now up to 78 models with 228 options, with speeds of 10, 15, 30 and 120 cps.

For details about the EDT-1200, or about any of the 306 ways we can help you with terminals, please contact me. Z. V. Zakarian, Western Union Data Service Company, 16 McKee Drive, Mahwah, N.J. 07430. 800-631-7050 (N.J. 201-529-1170).

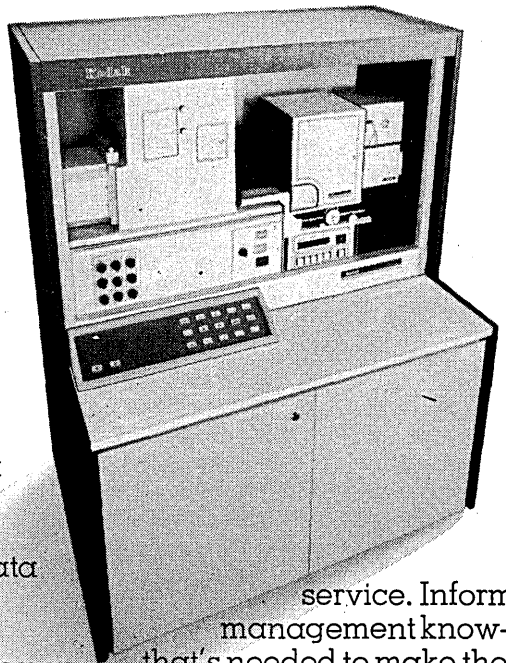


"The KSR is for interactive, and the MSR (directly below) for batch time-sharing."

Z. V. Zakarian

western union data services company

Can't afford computer output microfilm? Sure you can.



You don't have to buy a computer output microfilmer or even rent one. Just call on a service bureau equipped with a Kodak Kom microfilmer.

Using a service bureau is similar to time-sharing. You get all the savings of computer output microfilming. Without a big investment.

The service bureau can handle all the details for you. It will convert your tape data to microfilm, process the film, and get it back to you fast.

Take your pick of microforms. Depending on your application requirements, you can instruct the service bureau to microfilm in roll or fiche formats. You can even have your business forms superimposed on the microfilm images.

When you select a service bureau equipped with a Kodak Kom microfilmer, you can do so with confidence. Kodak backup makes the difference. Full software support. Kodak service. Information management know-how. Everything that's needed to make the most of COM.

Get all the facts.

For more information on computer output microfilming, please write us. Eastman Kodak Company, Business Systems Markets Division, Dept. DP605, Rochester, N.Y. 14650.

For better information management. Kodak

Preparation should include updates of documentation and cooperative staff attitudes

What To Do 'Til the DP Auditor Comes

by Stephen P. Keider

As data processing becomes less and less mystical, audits of computer installations are becoming more commonplace. At one time the dp audit was confined to such things as prompt and accurate payment of bills for equipment and supplies, and evaluation of adherence by data processing management to personnel policies. With the role of data processing increasing in value, however, audits of operations, programming and systems are gaining in frequency.

The most basic dp audit concerns the operation of the center and essentially addresses "how effectively and/or efficiently does our data processing department perform." This may be prompted by any of several conditions.

- Data processing user department or corporate management is generally dissatisfied with the data processing department.
- General corporate problems (declining sales/earnings recession, tight money) manifesting themselves in a general directive to "cut costs", particularly in cost centers.
- Data processing has not been "sold" within the company, resulting in general apathy toward the use or value of its product.
- Pending reorganization of the company (centralization, merger, division dissolution etc.) requiring an evaluation of its effect on data processing.
- A general feeling among management that problems exist in data processing and uncertainty as to what the problems are, least of all what the cure might be.
- Finally, and most prevalent, recognition by data processing management itself that an objective, periodic review of operations is the surest way to prevent minor problems from becoming disasters.

The most significant aspect of an audit is that in almost every instance the auditor is able to recommend changes to operations/equipment/personnel resulting in considerable dollar savings. While all of the recommendations will not be practical, they will represent viable targets toward which management can aim.

Measurement categories

Basically, the auditor will concentrate on several management measurement categories. Specifically, they include:

- cost of operations/maintenance
- accuracy of input/output
- security/back-up
- efficiency
- configuration adequacy
- volumes
- morale/attitudes/pay levels/turnover
- service level
- cost accounting
- capacity
- timeliness
- data entry
- documentation
- management requirements and priorities
- facilities adequacy
- organization
- management techniques

The audit will last anywhere from one to eight weeks depending upon the size of the installation and the scope of the review. The basic techniques for conducting the audit include:

- Extensive interviews with management and personnel within the data processing department.
- Extensive interviews with user department management.
- Conducting of a user satisfaction survey.
- Observation of the machine run operation and finally,
- A review of a mountain of data.

One way to shorten the duration is availability of the following information prior to the first day of the audit.

Charter of dp organization. Indicates the services dp should provide and how well goals/objectives are being met.

Table of organization. Represents what staffing should be compared to actual and is a key indicator in recognizing major bottlenecks.

Job descriptions. Tied in to pay levels and table of organization. It is a good measure of whether personnel really understand their jobs and scope of responsibility/authority.

Long-range plan. Although the presence of one does not merit an "A" for the installation, its absence indicates an "F" in the most basic managerial area . . . planning.

Operating statement. A detailed chart of accounts for data processing enables the auditor at a glance to pinpoint areas for further investigation. Further, it is a good yardstick for comparing the specific operation to national norms.

List of users and applications. Used as a basis for preparing and administrating a user satisfaction survey. This list is also an excellent indicator of how

We build reliability

When you decide to expand, enhance, or replace the memory in your System 360/370, cost is only one consideration. Almost any supplier of compatible memory systems can claim to offer you substantial savings. But can they deliver systems that will give you reliable, trouble-free performance? And are they willing to back up that performance anywhere, anytime? For that matter, will they be around to stand behind it? When you choose EMM, all the answers are "yes".

Why EMM? Let's start with *experience*. EMM is one of the world's largest independent memory manufacturers. Most of the mainframe computer companies use our memory systems or components.

Our *technology* goes right down to basics. We manufacture our own stacks and system modules. Add the electronics for the total memory. And give them all the same degree of manufacturing control that put us on the Apollo and Skylab programs. EMM was the first independent memory company to receive IBM approval for 360/65 CPU maintenance when add-on memory over 1 megabyte is installed.

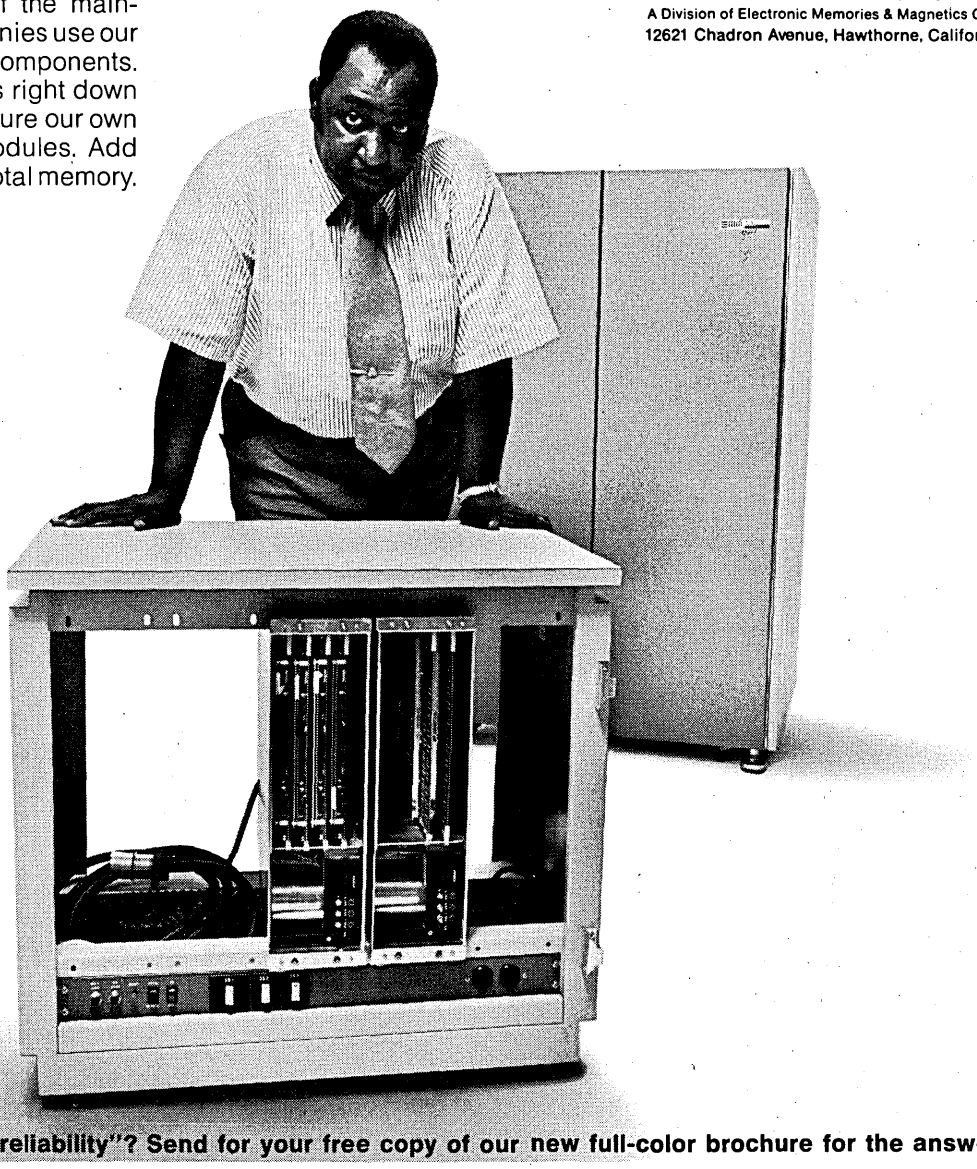
We have the *stability* of a major company committed to the memory market. We'll be around tomorrow and a lot more tomorrows to come.

But one of the main reasons for our many *satisfied customers* is the reliability that's built into each system under the watchful eye of Bob Allison. It's part of his job to make sure no system that isn't functionally perfect ever gets as far as the shipping dock.

So if you're interested in 360 or 370 compatible memory, call one of our Computer Products division marketing specialists at (213) 644-9881, or contact our nearest office.

But don't ask for Bob. He's too busy trying to make sure you'll never have to worry about memory-related downtime again.

EMM COMPUTER PRODUCTS
A Division of Electronic Memories & Magnetics Corporation
12621 Chadron Avenue, Hawthorne, California 90250



How do we "build reliability"? Send for your free copy of our new full-color brochure for the answer.

effectively dp is being used. For example, in a manufacturing concern if 90% of usage is administrative applications, then manufacturing is being shortchanged . . . and that's where dollar savings really exist.

Personnel resumes. Provides information such as average experience level, promotables, cross-training, etc. Also, when reviewed in conjunction with pay scales, can highlight reasons for morale, turnover, general attitudes.

Personnel education schedule. Its absence indicates that little planning for personnel development is done. If it is non-existent, the auditor will spend more time in attitudes/morale area.

Billing algorithm. Must be fair, accepted and repeatable. Otherwise it will be a major source of user discontent.

Equipment configuration. When coupled with the application list, and volumes, will be a relative indicator of plant efficiency.

SYSGEN listing. In one document, lists all of the options, languages, libraries, etc. in use at the installation. If the audit involves primarily operating efficiency, a good deal of time will be spent in reviewing space allocations, libraries, resident routines, etc. Also, a review of the PROCLIB listing in an OS shop should be in order to evaluate effectiveness of procedures.

Job run schedules. Almost nonexistent in most installations, indicating that dp is a day-to-day, react type operation.

Rerun log. An ideal way to pinpoint gross inefficiencies. It is helpful in evaluating equipment operators and programmers. It also will be reviewed in terms of general business management practices of the center.

Console log. A good measure of operator and/or system programmer efficiency (over a five-day period).

Equipment meter log (last 12 months). Provides the most reliable source of actual equipment utilization. Although it is totally non-indicative of actual cpu use, it does provide an objective measure of manned-time.

Tape/disc logs. Indicates whether adequate procedures are used to lengthen duration of tape file and minimize promulgation of useless files.

Standards manual. Its currency provides a good yardstick for the general evaluation of the installation.

Run book (for a frequently run application). It is typically out of date. Yet it is the key to successful operations in the event of a minor catastrophe (operator turnover) or major catastrophe (fire/flood/etc.).

Data entry records. Although data entry accounts for a significant percentage of the data processing budget, little attention is paid to monitoring this part of the operation.

Past reports/audits/reviews. Identifies some initial areas for the auditor, and measures manager's efficiency in planning and control.

Minutes from current staff meetings. Identifies current problems existing within the installation, and how well management handles them.

Managers' correspondence file. Provides insight into corporate and user evaluation of data processing.

Copy of all dp management reports. Provides insight into management techniques utilized in the installation. For example, is the operations manager more concerned with number of jobs run or with average user turnaround?

In summary, the collecting of all the above data is quite pertinent to the success of the audit for two rather significant reasons:

1. The prospect of a forthcoming audit tends to act as a stimulus to management team to update all of the above.

2. An audit consolidates all those items into one, enabling management to recognize duplicate methods, worthless documents or gaping holes in control book.

Remember, the key to the successful implementation of one audit is the attitude in which it is presented to the data processing department personnel. The auditor must be regarded as an individual who is attempting to improve the overall level of operation of the department, thereby increasing the individual worth of each person on the staff. The auditor is not a spy, nor an efficiency expert. He is simply attempting to isolate problems, by taking a fresh viewpoint of day-to-day operations. □

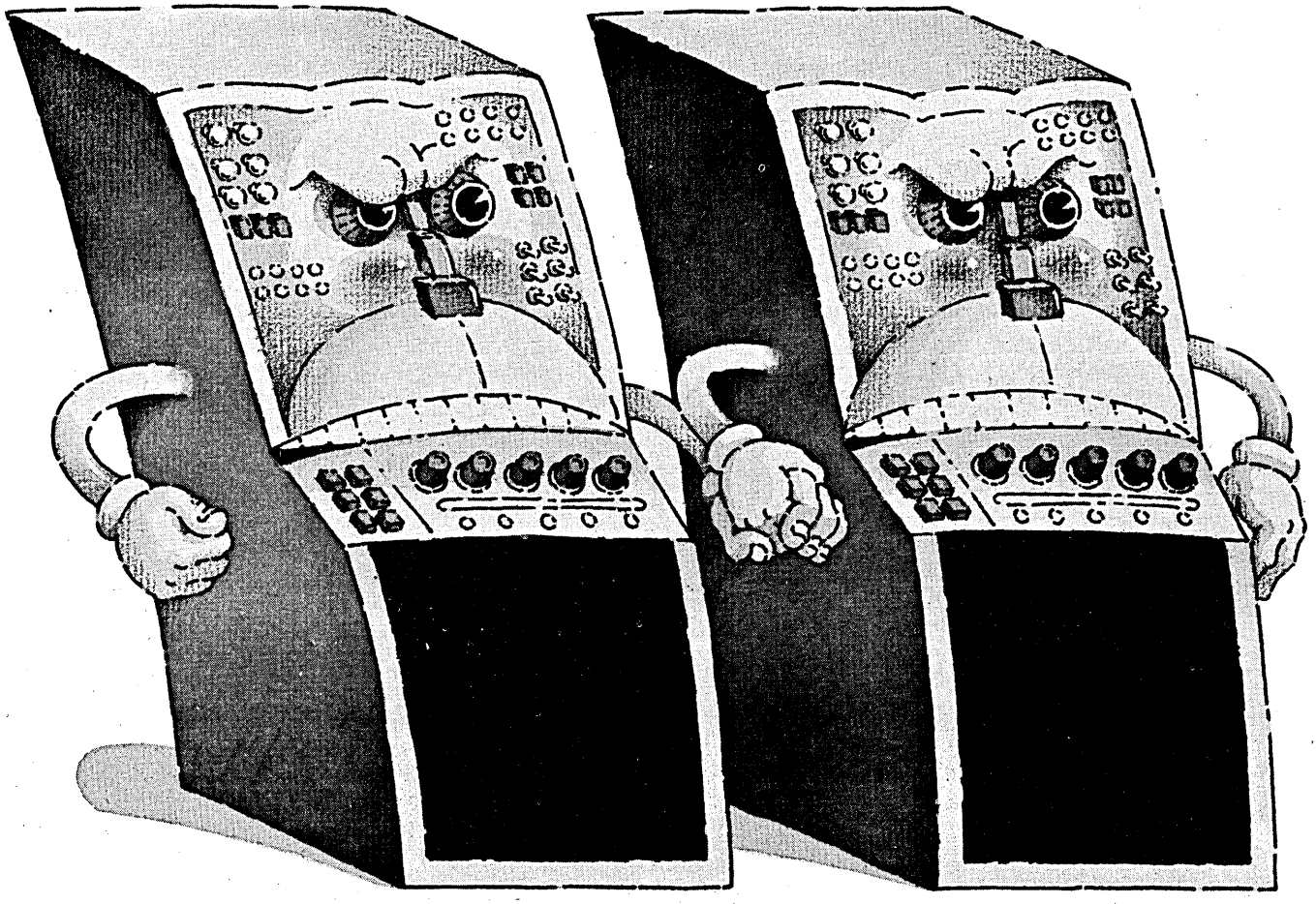
Mr. Keider is a consultant at Neoterics, an Ohio-based computer service firm. Prior to his position there, he spent twelve years with IBM as a system engineering manager and an education manager. A past president of the Cleveland/Akron ACM Chapter, he has a BS from John Carroll Univ.

Introducing "Scrooge-2"

A new money-saving arrangement for remote computing.

Perhaps the biggest challenge in computer operations management today is obtaining a time-sharing-like response with batch-like costs.

Grumman Data Systems has just risen to the challenge. We have constructed an intra-active system consisting of a 360/67 for time-sharing that is hard-wired (and soft-linked) to a fast-response 360/75



batch processing machine. We have formally designated this service as TS/RJE. Informally, we call it "Scrooge-2," for the way it carefully squeezes every dime you give it.

In Scrooge, the most comprehensive operating system, OS, can be automatically used for execution of batch programs that were developed under the language-compatible CP/CMS time-sharing system.

Its prime benefit is running work in the batch environment which you would normally run in the time-sharing environment. In the past, it has been too much trouble to remove it from the time-sharing machine. By using Scrooge, you'll release your time-sharing equipment for more appropriate time-sharing work, yet get appropriately fast turnaround times on the batch work.

Not only does our new system pinch dollars but it lets you pinch them in four different ways as the chart indicates.

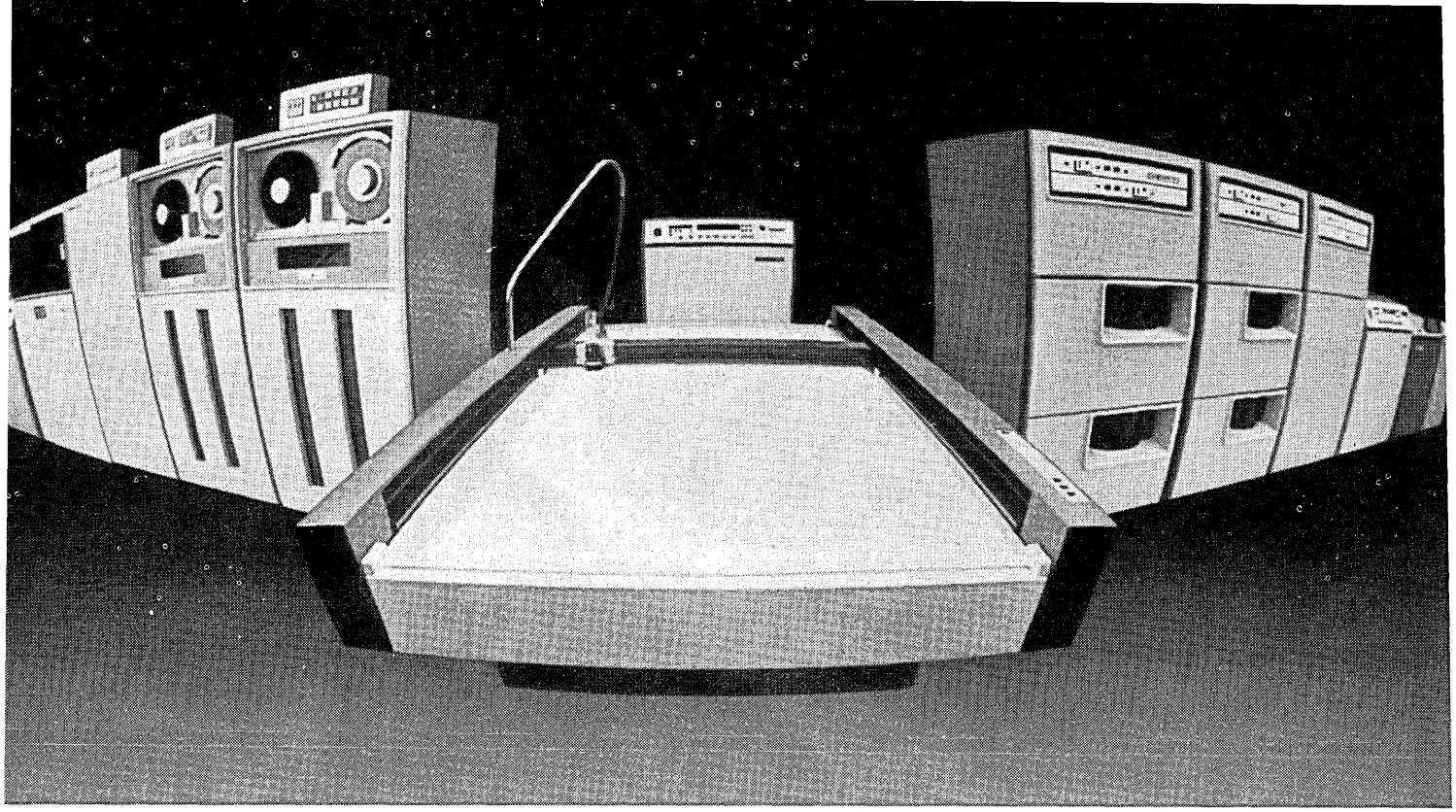
Different ways to save with Scrooge-2.
(1) You can use our complete TS/RJE system from a remote terminal... entering both time-sharing and batch work. Because of the high cost-effectiveness of the system, your data processing costs should show a substantial saving.
(2) You can hook up your own time-sharing 360 to our batch 360/75. Your data processing costs should drop sharply, as you now enter each job into the most appropriate environment.
(3) You can hook up your own batch-processing 360 to our time-sharing 360/67. You'll get time-sharing response on these priority development jobs, while maintaining a cost-effective operational level.
(4) You can use Scrooge for program development, getting as much as a four-to-one reduction in program development cost.

In addition, there is provision for information flow back and forth between machines, to and from batch terminals as well as interactive types. You can query status and/or cancel batch work. A powerful skeleton processor minimizes the OS job deck that must be stored in an on-line file.

We can plug you into Scrooge right away, but you may want some details first. Call or write Curt DeForest, Manager-Computer Services, Grumman Data Systems, Dept. 260, Bethpage, N.Y. 11714. 212-575-2607.

Grumman Data Systems

Computer services and equipment that lower the cost of computing.



Peripheral vision.

From the beginning, we have preferred concentration to diversification. We don't supply everything that attaches to your computer. But the things we do supply are the best.

What do we supply?

Drum plotters. We're the world's leading supplier of both hardware and software.

Flatbed plotters. Several years ago, we saw a need and an opportunity to expand the plotter's uses. The flatbed plotter allows a variety of materials to be substituted for paper, and it has expanded the market for computer graphics, as well.

Microfilm plotters. Here, we got bigger by getting smaller. With microfilm. Our 1675 COM plotter/printer and our 2100 COM printer deliver the best price/performance in the industry.

Disk memory equipment. This was our second area of concentration. In a remarkably short time, we have become the leading independent supplier.

Tape systems. We've recently begun to concentrate on tape. The result is that our new 1040 Tape Drive combines the features of others with our own experience. We intend to be a leader in this field.

The point is we have not grown by accident. Thirteen years after our beginning, we have become a leader in computer peripherals.

For information on peripheral products, call your local CalComp office, or contact California Computer Products, Inc., DM-M9-73, 2411 West La Palma Avenue, Anaheim, California 92801 (714) 821-2011

CALCOMP

Got to get it there fast?

United flies more planes to more cities more often than any other airline. And every single plane carries freight.

Akron, Ohio
Allentown, Pa.
Asheville, N.C.
Atlanta, Ga.
Bakersfield, Calif.
Baltimore, Md.
Bay City, Mich.
Bethlehem, Pa.
Birmingham, Ala.
Boise, Idaho
Boston, Mass.
Bristol, Tenn.
Buffalo, N.Y.
Canton, Ohio
Cedar Rapids, Iowa
Charleston, W. Va.
Charlotte, N.C.
Chattanooga, Tenn.
Chicago, Ill.
Clearwater, Fla.
Cleveland, Ohio
Columbus, Ohio
Davenport, Iowa
Dayton, Ohio
Denver, Colo.
Des Moines, Iowa
Detroit, Mich.
Durham, N.C.
Easton, Pa.
Elko, Nev.
Ely, Nev.
Eugene, Ore.
Flint, Mich.
Fort Lauderdale, Fla.
Fort Wayne, Ind.
Fresno, Calif.
Grand Junction, Colo.
Grand Rapids, Mich.
Greensboro, N.C.
Hampton, Va.
Hartford, Conn.
High Point, N.C.
Hilo, Hawaii
Honolulu, Hawaii
Huntsville, Ala.
Jacksonville, Fla.
Johnson City, Tenn.
Kansas City, Mo.
Kingsport, Tenn.
Knoxville, Tenn.
Lansing, Mich.
Las Vegas, Nev.
Lincoln, Nebr.
Los Angeles, Calif.
Medford, Ore.
Memphis, Tenn.
Merced, Calif.
Miami, Fla.
Midland, Mich.
Milwaukee, Wis.
Minneapolis, Minn.
Modesto, Calif.
Moline, Ill.
Monterey, Calif.
Muskegon, Mich.
Newark, N.J.
New Orleans, La.
Newport News, Va.
New York, N.Y.
Norfolk, Va.
Oakland, Calif.
Omaha, Nebr.
Ontario, Calif.
Pendleton, Ore.
Philadelphia, Pa.
Pittsburgh, Pa.
Portland, Ore.
Portsmouth, Va.
Providence, R.I.
Raleigh, N.C.
Reno, Nev.
Richmond, Va.
Rochester, N.Y.
Rock Island, Ill.
Sacramento, Calif.
Saginaw, Mich.
St. Paul, Minn.
St. Petersburg, Fla.
Salem, Ore.
Salinas, Calif.
Salt Lake City, Utah
San Diego, Calif.
San Francisco, Calif.
San Jose, Calif.
Santa Barbara, Calif.
Seattle, Wash.
Sharon, Pa.
South Bend, Ind.
Spokane, Wash.
Springfield, Mass.
Stockton, Calif.
Tacoma, Wash.
Tampa, Fla.
Toledo, Ohio
Toronto, Ont.
Vancouver, B.C.
Visalia, Calif.
Warren, Ohio
Washington, D.C.
West Palm Beach, Fla.
Williamsburg, Va.
Winston-Salem, N.C.
Youngstown, Ohio

Your shipment is in friendly hands. Our people have an outstanding record for safe, damage-free handling. Our Customer Service specialists understand your needs. They reserve space, arrange pickup and delivery, answer your questions about rates, schedules, containers. So call a friend. United.

United Air Lines

Jet Freight *No. 1 in the U.S. sky*

There's a criteria for decomposing programs into modules

Characteristics of Composite Design

by Glenford J. Myers

Perhaps the biggest problem facing programming today is the extreme difficulty and cost encountered in creating and maintaining large programming systems. An over-used term "modularity" is often given as the answer to this problem.

To a large extent, modularity, when properly interpreted, can be the answer. Modularity is not, however, simply the arbitrary division of a large program into smaller parts or modules. The primary goal in designing a modular program should be to decompose the program in such a way so that the modules are highly independent from one another.

Before proceeding, one key definition is necessary—the function of a module. The function of a module is a description of the transformation (input to output) that occurs when the module is called. In other words, a module's function is "what happens when that module is called". Note that the function is related not only to the operations performed in that module, but also to the functions of any modules called by that module. This is illustrated in Fig. 1. The function of module OVT is to obtain a valid transaction. OVT doesn't return to its caller until it has a valid transaction. To perform this function, OVT calls on three other modules. However, this is transparent to the caller of OVT.

As mentioned, the primary design goal is to produce a design of the modular structure of a program so that the modules are highly independent. There are two ways of doing this—minimizing the relationships among modules (called *module coupling*) and maximizing the relationships among parts of each module (called *module strength*). Since these two attributes are complementary, in practice both are used.

Maximizing module strength

Module strength is a measure of the relationships among the "parts" of a module. "Part" means any form of a subset of the module, such as a subfunction or a group of program statements. Note that if a module calls another module, the function of the called module can be considered a part of the calling module. Hence, in Fig. 1, module OVT has at least three parts—reading a transaction, validity-checking it, and writing an error message.

To maximize module strength, we wish to maximize the relationships among the parts of the module. Module strength is maximized if the parts of the module join forces to perform a single specific well-defined function. Hence, any module that performs one well-defined function is a strong module. To illustrate this, the following list shows examples of strong modules and weak modules:

Strong Modules
- Write record to output file
- Find next patient to monitor
- Produce inventory summary for the last week

Weak Modules
- General input module (performs more than one function)
- Initialization routine (not a specific function)
- Update record and read next transaction (performs two functions)
- Main control routine (not a well-defined function)

Minimizing module coupling

Module coupling is a measure of the relationships among modules (Fig. 2). In most cases, a relationship exists between two modules if they reference the same data. To investigate coupling, we need to look at its two aspects—the way in which modules reference data and the attributes of the data.

The three most common techniques used for referencing data among modules are externally-declared data (for example, data with the EXTERNAL attribute in a PL/I program), global data areas (for example, "control blocks" or data in a FORTRAN COMMON area), and parameters or arguments.

To investigate externally-declared data, refer to Fig. 3. Module GETCOMM (get next command) calls module READT (read line from terminal) to obtain a line from the terminal address (which is used by READT) which is in an externally-declared area in GETCOMM. Now suppose that the program is modified and an additional module called GETDATA (get next line of data) is added. We want to use READT from GETDATA but we are faced with a problem since READT obtains its input (the terminal address) from an area in GETCOMM. One obvious solution is for GETDATA to set the terminal address in GETCOMM before GETDATA calls READT, but most experienced programmers will recognize that this is dangerous since it may create bugs within the program.

The use of global data areas also creates high coupling. A modification of only a few modules may affect every module in the program. For instance, changing the length of one data item in a FORTRAN COMMON area requires that every module using this area be changed. Also, a desirable goal is limiting the references in each module to only those data items that the module is supposed to reference. Global data defeats this goal, since any module can

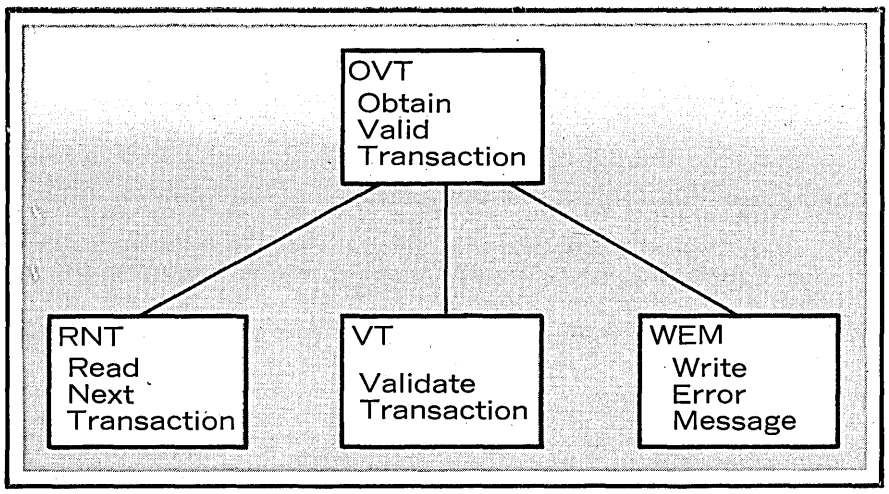


Fig. 1. Illustrating the definition of a module's function.

potentially reference any global data. Lastly, if a module references global data, it's difficult to use that module elsewhere in the program or in another program (for instance, the other program may have a different global data area or none at all). This defeats the "off-the-shelf" goal of modularity.

To minimize coupling, data should be explicitly passed as parameters or arguments. All input to a module should be passed to the module in the form of input parameters and all output from a module should be returned as parameters.

The second aspect of coupling is the nature of the data referenced by the modules. The two basic types of data are control information (data that tells a module what to do) and pure data (data that is processed by a module). The first type, control information, should be avoided because it increases coupling. If one module tells a second module what to do (for instance, via function codes, switches or flags), then the second module is not a true "black box" because the first module has some knowledge of the "insides" of the second module. Also this tends to reduce the strength of the modules (for instance, the second module probably performs more than one function).

Sometimes, it is difficult to distinguish between control information and pure data. The classification is dependent on how the *sending* module perceives the data, not how the receiving module perceives it. If A passes x to B and A perceives x as pure data, then x is pure data, even if B executes differently based on the value of x. If A perceives x as control information (that is, A is telling B what to do), then x is control information. As a second clue, control information is usually artificially created, that is, information over and above the information being processed by the program.

Other characteristics

The primary goal of modularity is module independence and this is dependent upon the characteristics of module strength and coupling. However, a few additional characteristics are worth investigating — decision structure, module size, and predictable modules.

Whenever possible, it is desirable to arrange modules and decisions in those modules in such a way that modules that are directly affected by a decision are located *beneath* the module containing the decision. In other words, we are attempting to hide the results of a decision in a module from the calling module.

In Fig. 4, module B contains a decision x which tests a record to see if it is unused. If x is true, module D is directly affected (that is, module D is eventually called), but module D is not beneath B in the structure. What are the consequences of this? First, B has to pass the results of decision x back to A, probably in the form of a flag. If B is telling A to call D, then this flag is control information and the coupling is increased. Secondly, A has to test this flag to determine if D should be called. Hence, module A is, in a sense, repeating decision x. We see that poor decision structures can lead to high coupling and redundant decisions.

Probably a better structure of Fig. 4 would be for D to be directly called by B and not by A.

It's unlikely that a program's decision structure could be made ideal, since doing so might weaken the modules in the program. Decision structure improvements should be made *only* if they don't cause any module's strength to decrease.

Although no specific criteria can be made for module sizes, some general statements can be made. Most modules should range from 10-100 executable source language statements in size. Although there are many valid exceptions to this, very small modules may not actually be performing a whole function and the overhead (intermodule linkages) may be excessive. On the other hand, very large modules may be performing more than one function and are usually difficult to understand. In my experience, the "typical" module contains between 10-40 executable statements.

A predictable module is one that, when given the identical inputs, operates identically each time it is called. A predictable module also operates independently of its environment.

The most common violation of the first statement occurs when a module keeps track of its own state or history. A good example of this is a module containing a statement like "IS THIS THE FIRST TIME I'VE BEEN ENTERED? IF YES, THEN . . . ". Modules of this sort are usually unusable in more than one context in a program, because their behavior cannot always be predicted.

The second case of an unpredictable module is a module that makes assumptions about its environment. For instance, if module A calls module B and module B makes use of this information (the fact that its caller is A), then module B may be unusable in other contexts (that is, other modules may not be able to call it). Another

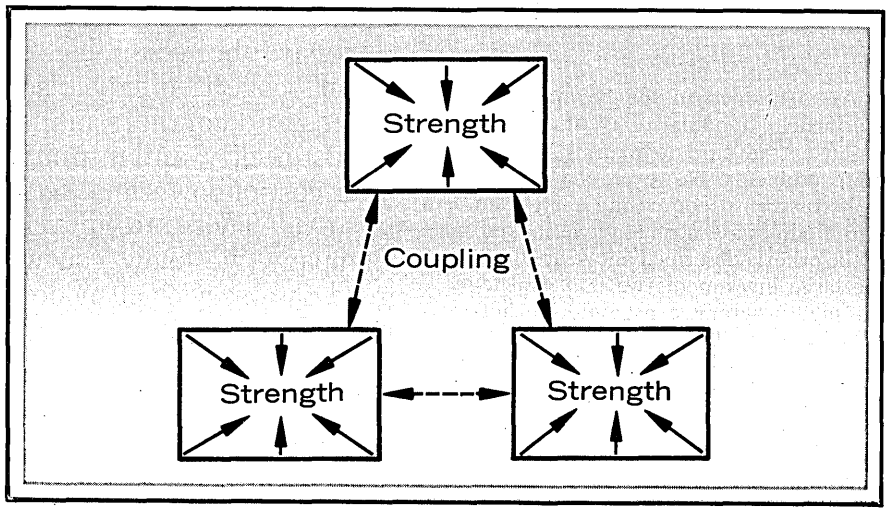


Fig. 2. The goal is to maximize strength and minimize coupling.

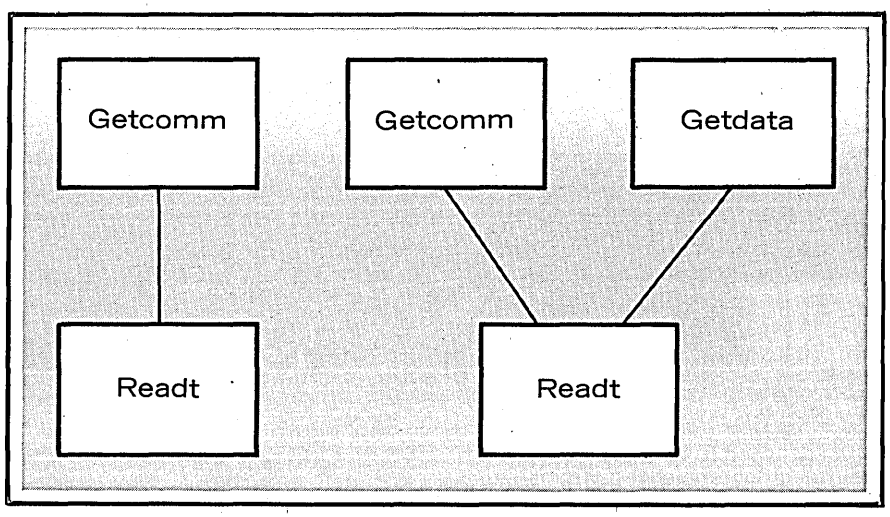


Fig. 3. Coupling with externally-declared data.

example is a module that assumes it is part of a particular program. For instance, if module "MERGE TWO SEQUENTIAL FILES" is written for a magazine subscription program and the module assumes it is part of this program (for example, it issues error messages stating "MERGE ERROR IN XYZ MAGAZINE SUBSCRIBER LISTS"), then this module is unusable in any other program.

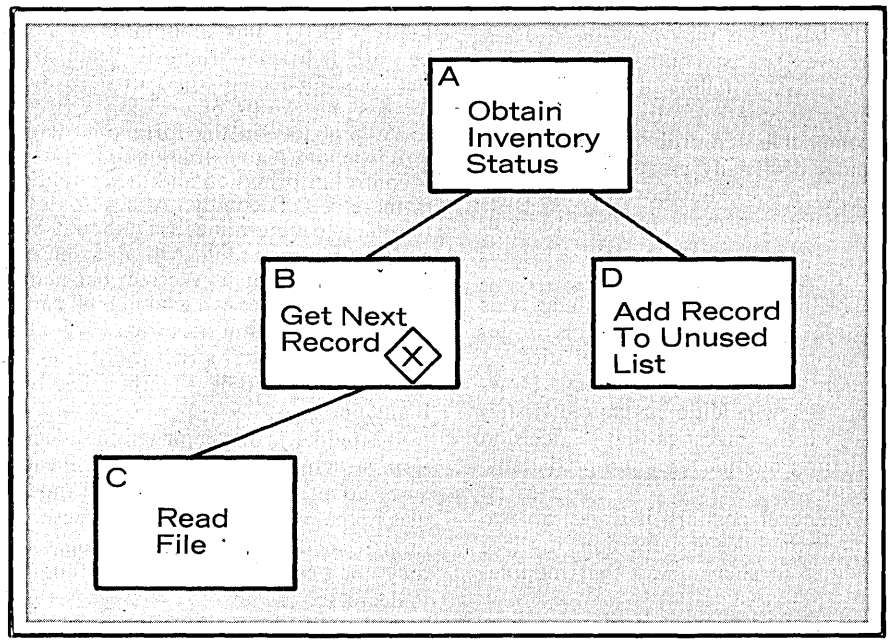


Fig. 4. A decision structure problem.

When a modular program is correctly designed, we can see that many advantages accrue.

Increased reliability. Modular programs are less complex and testing is easier and more straightforward. Hence, the number of programming errors or "bugs" is reduced.

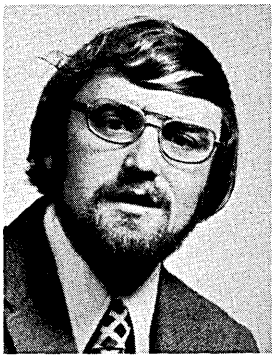
Decreased development costs. Programmer productivity is higher because the program is less complex. Because of the high independence within the program, interactions and dependencies among programmers are reduced. Also, design changes are cheaper because they normally affect only one part of the program.

Increased extensibility. Modifying the program in the future is easier and less costly because modifications will normally affect only isolated parts of the program.

Increased project control. If the program is decomposed into many small independent modules, tracking of the implementation process is easier because progress can be measured based on a large number of small activities. Also, because the modules are highly independent, programmer assignments can be easily shifted to smooth out the peaks and valleys in resource requirements.

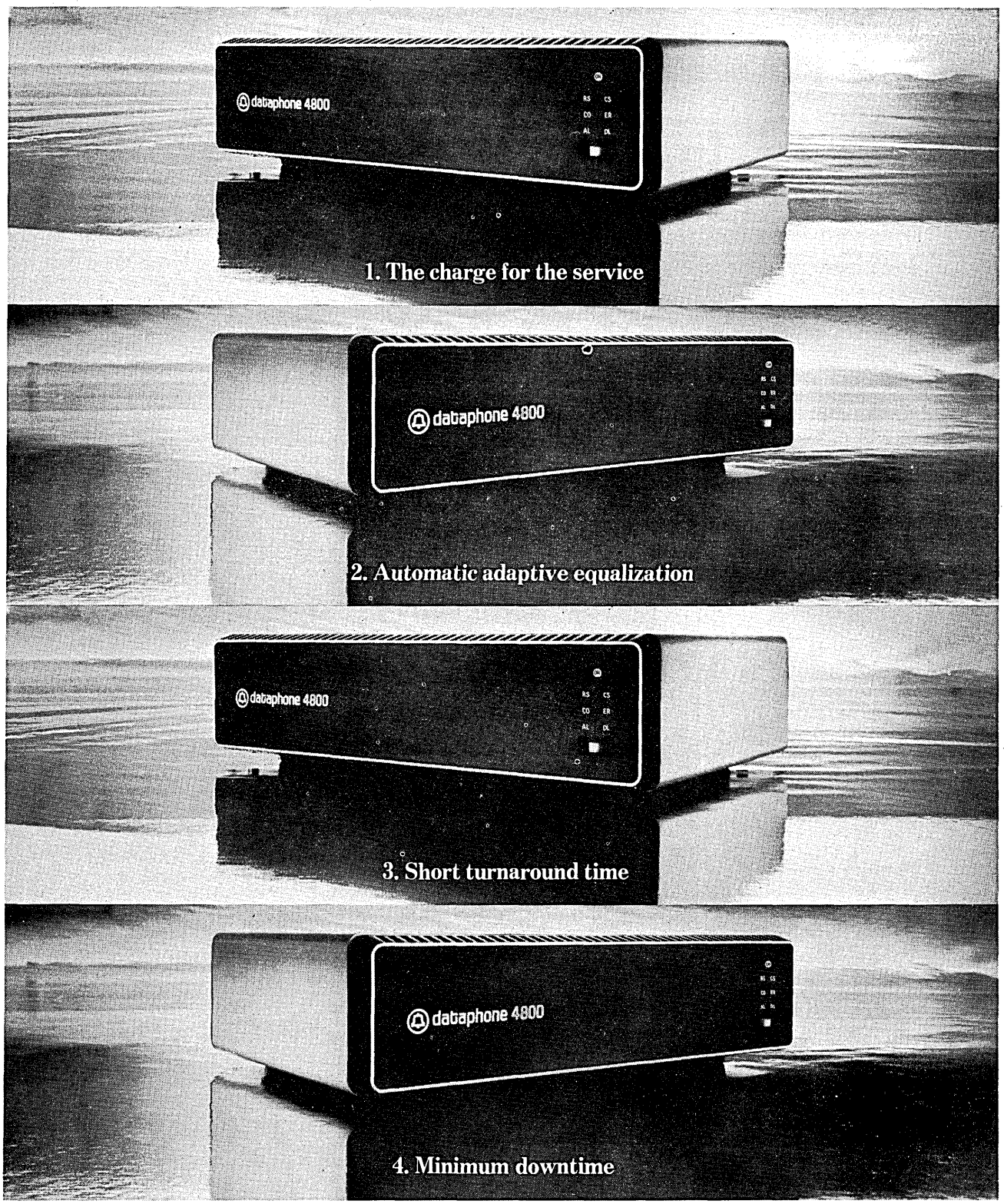
Off-the-shelf parts. As more and more modular programs are implemented, libraries of reusable modules can be accumulated. These modules can be used in various places in the same program or as building blocks in future programs. If the modular programs are designed correctly, *every* module has the potential to be reused.

As mentioned in the beginning of this article, modularity is often proposed as the cure to many programming problems. However, the criteria to be used in decomposing a program into modules are normally overlooked. If the criteria described above are used, the large investments we make in developing programs can be more profitable because of better reliability and extensibility and lower development costs. Also, if the modules we write become the "off-the-shelf" components of future programs, then today's investments will pay off on tomorrow's programs. □

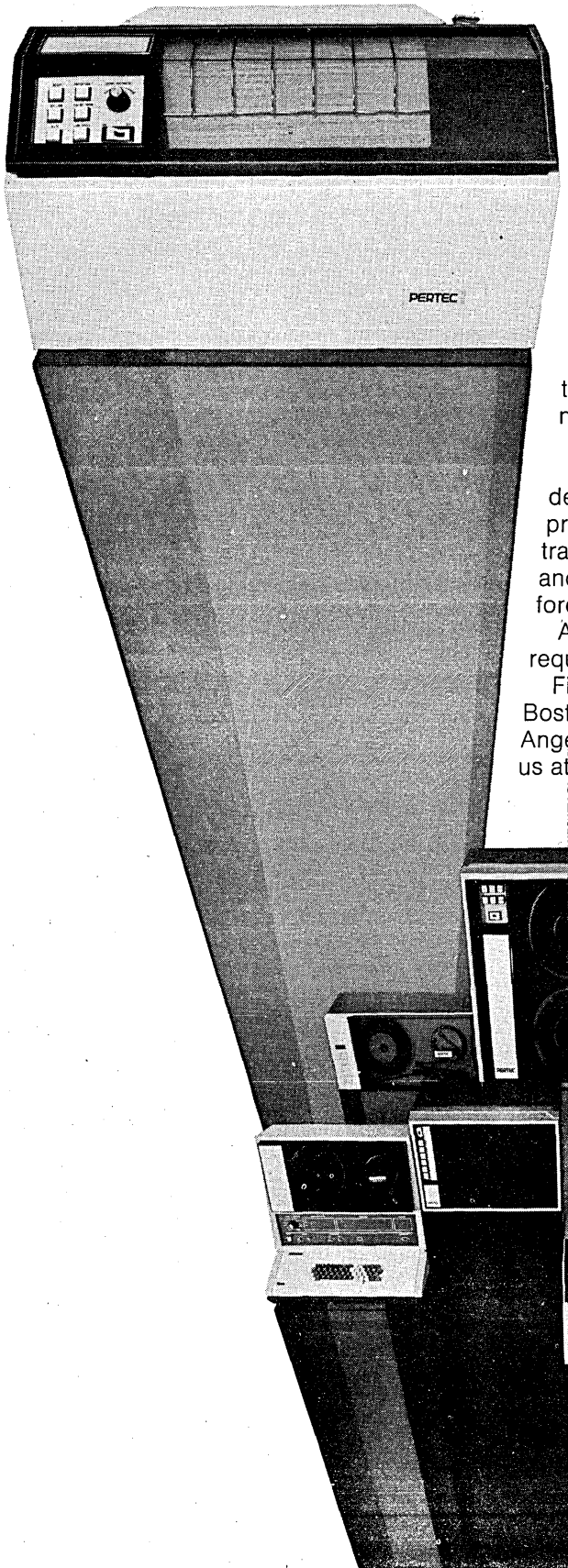


Mr. Myers is a design manager of an advanced systems project at IBM's Poughkeepsie Development Laboratory. He joined IBM in 1968. He has a BS in electrical engineering from Clarkson College of Technology and an MS in systems and information science from Syracuse Univ.

Bell System Dataphone® 4800 Service cuts your costs 4 ways.



Introducing the Pertec printer. High speed features on a medium speed printer at a surprisingly low cost.



It's a 132 column, 300 lpm printer. And a 160 lpm printer. A printer with Pertec dependability at a lower cost than most comparable single speed models.

It offers a variety of pre-engineered, plug-in options to complement your system as if it were designed for it.

With full fault protection to instantly signal anything amiss, electronic top-of-form and skip-over perforation features.

It prints 6 or 8 lines per inch and accommodates up to 6-part forms without the need for mechanical thickness adjustments.

And it's simple to operate and unobtrusively quiet.

Of course you get the same assistance in design, development and maintenance of your system with our printer as you do with our tape and disk drives. Factory training for your service people. Back-up by a service and support network spanning 30 U.S. cities and 20 foreign countries.

All because Pertec is serious about satisfying your system requirements. Contact us and we'll prove it.

Find out more. Call us collect in the area nearest you: Boston (617) 890-6230; Chicago (312) 696-2460; Los Angeles (213) 996-1333; London (Reading) 582-115. Or write us at 9600 Irondale Avenue, Chatsworth, California 91311.

The best values in computer peripherals come from

PERTEC

Already the world's largest independent manufacturer of tape transports.

CIRCLE 83 ON READER CARD

Data coding structures must be rigidly disciplined before shared data bases can fully achieve their objectives

The Need for Data Code Control

by Merle G. Rocke

The application of mechanized data processing systems to business management functions usually points out the need for new or revised methods of classifying and coding the data involved. Manual systems benefit when data is well-defined, organized and consistent; computer systems, however, *require* rigidly disciplined data to fully utilize logical decision rules.

The "stand-alone" computer system is rapidly becoming a thing of the past. Large shared data bases and common application systems are now technically feasible. It is becoming increasingly critical that data codes be rigidly disciplined if we are to realize the full impact of the many potential benefits afforded by current technology.

Data coding is fundamental to all types of mechanized information processing systems. Data codes serve as "keys" which identify information stored on mechanized media (e.g., magnetic tape, disc, etc.). Codes are the fundamental units of which information structures are built and are necessary to facilitate the logical recording, accumulation and presentation of facts for management. Accordingly, this writing directs attention to a new information systems function—that of controlling the development and usage of data coding structures.

Definition. A data code may be defined as a brief label, composed generally of one or more letters and/or numbers, which identifies an item of data and has the capability of expressing the relationship of that data item to other items of the same or similar nature. The complexity of the relationship governs the complexity of the coding structure.

The problems

Because of previous limitations in both hardware and software, each system designer designed his own system of data representations to fit the problem at hand. Inevitably, many found unique solutions useful for specific applications in limited areas. Collectively, however, these unique solutions set the stage for a computer age Tower of Babel. The various functional areas of a business organization (e.g., the accounting, manufacturing, engineering and sales departments) frequently develop unique, incompatible data codes for representing a common entity set. Each segment of the company, for example, often has its own code structure for classifying and identifying the various products produced by the firm. Today these circumstances result in tremendous duplication of stored data within an organization, extensive cross-reference lists, and extreme difficulty in sharing data among the individual units of that organization—primarily because a multiplicity of code structures exists where a single structure would suffice.

To further elaborate, many or all of the following undesirable circumstances could be avoided if data code structures were better disciplined.

1. Redundant code structures—multiple structures exist where one would suffice; they may differ in format, size, or meanings.
2. Incompatible code sets—code values of one set cannot be converted to equivalent values of a "synonymous" code set because of incompatible definitions.
3. Inadequate flexibility—the structure, due to its design, has limited application.
4. Insufficient expansion capacity—little capability exists for coding additional entities.
5. Cumbersome code structures—because of inadequate design, the code structures are unwieldy.
6. Complex computer programs—programs are more complex as a result of 1, 2, 3, and 5 (above).
7. Instability of individual code values—frequent updates or "replacements" are necessary.
8. Confusion among code users—this results when several code structures are similar and have the same name but still have essential dissimilarities.
9. Unnecessarily high response time—desired changes take longer to implement because of inadequate code design.
10. Duplication of effort—this occurs when many similar but slightly different code sets must be maintained.
11. Undetected errors; invalid data—these result when the format or definition of a data code is changed without properly notifying affected areas.
12. Erroneous decisions—these result from invalid data, use of improper code structures, etc.
13. Operating costs higher than desired—as a result of the above circumstances.

A solution

These undesirable circumstances may be avoided by the establishment of an effective, central data code control function, usually within the information processing organization. The two basic reasons for this function are to ensure (1) the development and use of standard data codes (i.e., standard formats, definitions and code values), and (2) that new data codes conform to established principles.

The responsibilities of this central data code control function should include:

1. Publication of standards and procedures necessary to support data code standardization and discipline.
2. Publication and maintenance of a directory of "standard" data code structures for use by application systems. This publication should document the size, format, definition, source of specific values, controlling user, etc. for each code.
3. Provision of necessary education for systems analysts in the areas of data codification principles and methods (discussed in greater detail later in this paper).
4. Provision of assistance and guidance to operating areas which have ultimate responsibility for the design of new coding systems or modification of existing ones.
5. Review and approval of proposals for new or changed data coding structures to ensure conformance to established data codification principles.
6. Liaison between the organization's physical locations, functional units,

We've been manufacturing 4800 bps modems since 1967.

We know how to deliver them promptly. And we do.

Once you decide to step up to 4800 bps, you expect big improvements in your data communication. You look for higher throughput, lower CPU costs, increased efficiency. Great! But, you won't get any benefits until the new modems are installed. And some suppliers still expect you to wait months because they're new at building 4800 bps modems.

ICC keeps 4800 bps modems on hand, for installation whenever you're ready. We've been helping customers upgrade to 4800 bps for more than 6 years. We respect your need for prompt delivery.

ICC

International Communications Corporation
7620 N.W. 36th Avenue, Miami, Florida 33147
Telephone 305 + 691-1220 305 + 836-4550
In Europe: RACAL-MILGO LIMITED Reading, Berks, England

a milgo company

CIRCLE 38 ON READER CARD

member of IDCMA

and data processing application systems groups to review the impact of proposed changes, establish effective dates for code changes, etc.

An in-depth understanding of the principles and various methods of data coding is essential to support effective reviews of proposed data coding structures. This information must also be given to initial designers of data codes.

The following are 10 characteristics of a sound data coding system. These traits must be considered if the information processing systems supported by the coding system are to be viable, effective and stable.

Uniqueness. The code structure must ensure that only one value of the code, with a single meaning, may be correctly applied to a given entity.

Expandability. The code structure must provide reasonably sufficient space for entries of new items within each classification.

Conciseness. The code should require the least possible number of positions to adequately describe each item. Brevity is advantageous for human recording, communication line transmission, and computer storage efficiencies.

Uniform Size and Format. Uniform size and format is highly desirable in mechanized data processing systems.

Simplicity. The code must be simple to apply and easily understood by each user, particularly workers with the least experience.

Versatility. The code should be easily modified to reflect changing conditions, characteristics, and relationships of the coded entities.

Sortability. Obtaining reports in a predetermined format or order is desirable. Reports are most valuable when sorted for optimal human efficiency.

Stability. Code users need a code which does not require frequent updating. Individual code assignments for a given entity should be made with a minimal likelihood of change. Uncontrolled and unlimited changes are laborious, costly, and likely to breed error and reduced confidence.

Meaningfulness. For greater meaning, code values should indicate some of the characteristics of coded entities, such as mnemonic features, unless this causes the code to become inconsistent, inflexible or unwieldy.

Operability. The code should be adequate for present and anticipated data processing mechanization as well as human reference. Care must be exercised to insure that clerical effort or computer update and maintenance time necessary to preserve required relationships does not grow to unmanageable proportions.

In addition to these general characteristics, a number of more specific principles have evolved. Among the more important of these are:

Character content. Characters other than letters or numbers (such as the hyphen, period, space, asterisk, etc.) are to be avoided in code structures (except for separating code segments, where a hyphen may be used). Upper case letters only, i.e., ABC . . . Z (not abc . . . z) are to be used in data codes.

Visual similarities. When it is necessary to use an alphanumeric random code structure, characters that are easily perceived as, or confused with, other characters should be avoided. Some examples are: letter I vs. number 1; letter O vs. number zero; letter Z vs. number 2; slash, or virgule, / vs. number 1; and letters O and Q.

Acoustical similarities. Nonsignificant codes should avoid characters that can be confused when pronounced (acoustically homogeneous); for example, the letters B, C, D, G, P, and T or the letters M and N.

Vowels. Avoid the use of vowels (A, E, I, O, and U) in alpha codes or portions of codes having three or more consecutive alpha characters to preclude inadvertent formation of recognizable English words.

Multiple code set compatibility. More than one code or representation is necessary in some instances to meet most systems requirements. A single code is the ideal objective, but is not always the most practicable solution. Multiple codes, if needed, should be translatable from one code to another, i.e., the data items remain unchanged, only the codes are variable.

Mnemonic codes. Mnemonic codes may be used to aid association and memorization, thus increasing human processing efficiency, provided they are not used for identification of long, growing lists of items. Mnemonic structures must be carefully chosen, however, to insure that flexibility is not sacrificed. Mnemonics should generally not be used if the potential code set exceeds 50 entries, because the effectiveness of the mnemonic feature decreases as the number of items to be coded increases.

Code naming. All independent data code segments must be individually named with standard, unique, consistently applied labels.

Calculation of code capacity. When calculating the capacity of a given code for covering all possible situations while maintaining code uniqueness, the following formula applies (assuming 24 alpha characters and 10 numeric digits are used because the letters I and O should be avoided whenever possible):

$C = (24^A) \cdot (10^N)$

where

C = total available code combinations possible

A = number of alpha positions in the code

N = number of numeric positions in the code (A + N, when combined, equal the total positions of the code).

Note: This formula assumes a given position is *either* alpha *or* numeric—never both. If *both* alpha *and* numeric characters can appear in all code positions, the formula becomes $C = (34)^{A+N}$.

Segmentation. Codes longer than four alphabetic or five numeric characters should be divided into smaller segments by a hyphen for purposes of display and reliable recording, e.g., xxx-xx-xxxx is more reliable than xxxxxxxxx.

Alphabetic versus numeric. The recording of numeric codes is more reliable than that of alphabetic (all letters) or alphanumeric codes (letters and numbers). Controlled alphanumeric codes (i.e., where certain positions are always alphabetic or numeric) are more reliable than random alphanumeric codes. For example AA001 (where the first two characters are always letters and the last three are numbers) is a more reliable code than when letters or numbers can appear in any position.

Character grouping. In cases where the code is structured with both alpha and numeric characters, similar character types should be grouped and not dispersed throughout the code. For example, fewer errors occur in a three-character code where the structure is alpha-alpha-numeric (i.e., HW5) than in the sequence alpha-numeric-alpha (i.e., H5W).

Code position sequence. If a code divides an entire entity set into smaller groupings, the high-order positions should be broad, general categories; and low-order positions should be the most selective and discriminating (including any prefixes and suffixes). An example is the date (YYMMDD).

Check characters. When the number of characters of a proposed code exceeds four characters and when this code will be for purposes of identification of major subjects (e.g., organizations, projects, materials, individuals, etc.) consideration should be given to the addition of a self-checking character to avoid errors in recording.

Codes for numeric categories. Quantities or numbers should not be coded since this introduces additional translation and a loss of preciseness. For example, the numbers 1 to 99 could be coded A, 100-199 coded B, etc. This may be desirable for purposes of categorization, but statistical value is lost since the actual numbers cannot be derived once they are coded. Categorizations can be performed during later phases of data processing rather than in precoding of the input data.

Use of "natural" data. A code structure should not be developed if the specific data in its natural form (such as specific percentage amounts) is appropriate and adequate.

The variety of data coding methods available is fairly extensive. Knowledge of the primary uses, the advantages and potential disadvantages of each of these methods is essential to enable

selection of the best method for a given application. Codes may be significant (provide meaning in addition to simple identification of an entity) or nonsignificant. They may be assigned sequentially, randomly, or mnemonically. Codes which collate entities (place them in a predetermined sequence) may be alphabetic, hierarchical, chronological or classificatory. In short, the selection of codification structures and structural combinations is quite broad. Matching the coding method to its particular use is necessary for optimal effectiveness of the data code and the information processing systems it supports.

The developments resulting in expanding emphasis on and importance of data codification have been rather recent. Accordingly, not much literature is available on the emerging data code control function. Detailed information on data coding techniques such as those listed above is currently difficult to find. Additional information may be obtained from a technical report entitled *Guide for the Development, Implementation and Maintenance of Standards for the Representation of Data Elements* being developed by Committee X3L8 of the American National Standards Institute (ANSI), 1430 Broadway, New York, N.Y. 10018. This handbook should be available from ANSI sometime this year.

Principles in practice

As stated previously, the two primary objectives of central data code control are to ensure (1) the development and use of standard (commonly used) data codes and (2) that new data codes conform to established coding principles. Several examples of actual experiences may provide insight concerning practical application of coding principles. The following are examples of coding difficulties which could have been avoided had the code control function at my company been implemented sooner.

The first of the two code control objectives concerns standard data codes. When we developed our directory of standard data codes, we discovered about 20 different company facility identification coding structures being used in mechanized systems. Since much information is keyed by facility code, this information is quite difficult to compare or share—especially since code value "B" in one system may be the equivalent of both "23" and "47" in another system or "D30" and "M30" in still another system. By requiring that all new systems now use the corporate standard facility code, the others are now being phased out through attrition.

The importance of sound data codification principles cannot be overemphasized. We have experienced extensive problems because our dealer and customer identification codes are tied to geographic regions. The first code position designates the geographic region of the dealer or customer. This region identifier is necessary for code value uniqueness. (Without it, there are duplicate codes.) Hence, when the marketing department redefines the geographic regions, many of the codes must be changed to avoid duplicates. Dealer and customer codes on all historical records and files must also be updated to reflect the changes. Problems 7, 9, 11, 12 and 13 as previously described all result because these codes were designed improperly. These codes were also initially designed with insufficient expansion capability, so field sizes must now be expanded in many computer programs and on forms—a costly process.

We have found that through deliberate efforts to correct existing data code deficiencies and by avoiding known pitfalls as new structures are developed, we have been quite successful in reducing the 13 undesirable circumstances previously described. And reduced costs are the ultimate result.

Conclusion

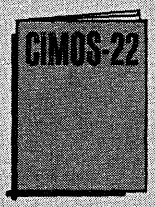
Data code discipline is becoming increasingly necessary. Without it, integrated information processing systems will flounder. One should not, however, expect immediate results on a profit and loss statement after implementing a data element control function. Be patient. Desirable results *will* be forthcoming. □

Mr. Rocke is a member of the data bank staff at the general offices of Caterpillar Tractor Co., Peoria, Ill. He holds a BS in industrial administration from the Univ. of Illinois, and is a principal member of the American National Standards Institute Committee X3L8 on Computer and Information Processing—Representations of Data Elements.

Minicomputer SOFTWARE

Here's an exciting new operating system with RPG that dramatically simplifies and speeds data processing applications

CiMOS-22 is a disk-based operating system for the CIP/2200 minicomputers which consists of language processors, programming and debugging aids and services that simplify data processing applications. The capabilities of CiMOS-22 are packaged in a flexible system design so that each user can tailor the operating system to his individual needs. From either RPG or assembly language programs, the user can take advantage of the high-level data management facilities of CiMOS-22. These facilities include the ability to organize, catalog, store, retrieve and update data files. From a system console or assembler language program the user can create and delete disk-based files. On-line editing capability permits the user to build and maintain data files as well as source and object program libraries. There is much more to CiMOS-22 that you should know about. It's all detailed in our new brochure shown here . . . and it's yours free. Cincinnati Milacron, Process Controls Division, Lebanon, Ohio 45036.



FREE

minicomputers

CINCINNATI MILACRON

Machine Tools
Process Controls
Chemicals
Plastics
Plastics Processing Machinery
Abrasives

Cincinnati area (513) 494-5444 • Chicago area (312) 439-5726 • Los Angeles area (714) 847-2576 • Detroit area (313) 557-2700
New York area (201) 687-4500 • Houston area (713) 622-4620 • San Francisco area (408) 735-0701 • Atlanta area (404) 634-6312

CIRCLE 22 ON READER CARD

THE REASONS TO KEEP YOUR IBM 1130:

THE REASONS NOT TO:

Throughput. You already know there's a limit to the throughput your 1130 can handle. If you haven't reached that limit yet, you probably will. Then come the problems. You don't want to move up to a more expensive system. You don't want to rewrite your software. You don't want a lot of grief. We think you should check into our "Super" 18/30 DMS. It's a direct 1130 replacement that gives you three to ten times the throughput at about the same cost. And it still uses all your existing programs.

Real Time. Your 1130 doesn't have real time capability. Our 18/30 does. It's a fourth generation computer with real time, multi-programming (on-line CRT, etc.) capability. And we're prepared to help you make the conversion to real time, now or any time you are ready.

Money. The 18/30 does much more work for almost exactly the same number of dollars. And lets you avoid having to move up to a bigger, more expensive computer with all new software to write. The result: enormous savings in dollars, downtime and anguish.

None of the above. Even if you aren't throughput-bound and couldn't care less about real time at the moment, we can still help you cut costs. Our "Mini" DMS also works with your 1130 software and gives you at least the same throughput (much more in disk work). All for as much as 40% less per month than you're paying now.

Us. Anybody who says they can do all this is worth talking to. Call Ron Doiron at (714) 778-4800. Or write him in care of General Automation, Inc., 1055 S. East St., Anaheim, Calif. 92805.

GENERAL AUTOMATION 18/30 DMS

Citizens should be able to control personal information kept on them in government files

Records, Computers, and The Rights of Citizens

by Willis H. Ware

Willis H. Ware, chairman of the H.E.W. Advisory Committee on Automated Personal Data Systems gives the reasons for the decisions made in this important report.

In early 1972, then Secretary of Health, Education and Welfare Elliot Richardson, created a special advisory committee charged with analyzing harmful consequences that might result from automated personal data systems, and which was to make recommendations about safeguards that might protect individuals against potentially harmful consequences and afford them redress for any harm. Since the social security number has been widely used as a personal identifier, the committee was also asked to examine the policy and practice relating to the issuance and use of such numbers. On July 31, 1973, the committee submitted its final report to current H.E.W. Secretary Caspar Weinberger, with Attorney General Elliot Richardson in attendance.[1]

As a document intended for busy government officials, this report included a summary of its findings in the early pages. In addition, the press conference at which it was released briefly summarized its findings and recommendations; and as one might expect, the initial press coverage highlighted the committee recommendations instead of giving a careful exposition of the rationale by which the position had been reached. To put the findings of this committee in perspective and proper context, the following discussion draws on selected segments of the report.

The central issue of concern is the record-keeping practices of the government and private agencies that deal with personal information about people. While not all such records are maintained by computer, those that are become of special concern because the concentration of information within computer files at one location, and the access to such files through remote access terminals tend to magnify the opportunities for misuse of personal information. Relative to the totality of the record-keeping systems that surround each of us today, any one individual finds himself at a significant disadvantage to affect the content of the records or to limit their usage. Most of us have suffered at least the annoyance of having to cope with a computer-based system that, outwardly at least, appears not to care how it has mistreated us, or worse, has given a false impression or subjected us to harassment. It is, of course, true that the computer itself is not the culprit; rather the system designers have, for whatever reasons, seen fit not to create humane systems that are considerate of the data subjects about whom information is held. Thus, in the struggle to protect the personal privacy of the citizen, the preferred solution would adjust the balance of power between citizen and record system in such fashion that the individual has the opportunity and the mechanism to contest, correct, and control personal information held about himself.

It is helpful to review suggestions that have been made to deal with the matter of protecting data subjects against harm. One proposal has been to license and certify computer programmers and systems designers, with the hope that such a procedure would improve the care with which record-keeping systems are designed and operated. While assuredly useful, it cannot of itself adequately protect data subjects against potential harm. The best designed system in the world cannot prevent authorized users of the system from maliciously using the information. More to the point, however, a certification approach would put the responsibility for a properly designed and controlled record system in the wrong place. The responsibility should be upon the organization that assembles the system, initiates its design and operates it, not upon the technical professionals who implement it.

A second suggestion is the ombudsman approach that has been used for many years in Scandinavian countries.

---

1 *"Records, Computers and the Rights of Citizens," Report of the Secretary's Advisory Committee on Automated Personal Data Systems, DHEW Publication Number (OS)73-94, Government Printing Office Stock No. 1700-00116, for sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.*

Basically, the ombudsman is a spokesman for an individual who has been harmed; he serves essentially as a communication channel between the person and a bureaucracy in matters of dispute. While the concept is a useful third-party mechanism to facilitate resolution of an argument, it is not well-established in this country, nor is it a sufficiently broad and powerful force to bring about essential changes in how record-keeping systems are designed and deterred from inappropriate behavior.

There have been many definitions of privacy, all of which contain the common element that personal data is bound to be disclosed and that the data subject should have some hand in deciding the nature and extent of such disclosure. As the committee phrased it, "personal privacy as it relates to personal-data record keeping must be understood in terms of a concept of mutuality." The organization that holds personal data must not have complete control over it and, conversely, neither may the data subject—each has a stake in seeing that the information is used properly. As part of the committee's definition of privacy, it was suggested that, "a record containing information about an individual in identifiable form must . . . be governed by procedures that afford the individual a right to participate in deciding what the content of the record will be and what disclosure and use will be made of the identifiable information in it. Any recording, disclosure and use of identifiable personal information not governed by such procedures must be proscribed as an unfair information practice unless such recording, disclosure or use is specifically authorized by law."

Thus, the committee concluded that safeguards for personal privacy based on such a concept of mutuality in record-keeping, requires adherence by record-keeping organizations to certain fundamental principles which collectively define *fair information practice.* We propose that:

- There must be no personal-data record-keeping systems whose very existence is secret.
- There must be a way for an individual to find out what information about him is in the record and how it is used.
- There must be a way for an individual to prevent information about him obtained for one purpose from being used or made available for other purposes without his consent.
- There must be a way for an individual to correct or amend a record of identifiable information about him.
- Any organization creating, maintaining, using, or disseminating records of identifiable personal data must assure the reliability of the data for their intended use and must take reasonable precautions to prevent misuse of the data.

The principles just given are considered by the committee to be the minimum set of rights that should be available to the individual. The question becomes how to extend these rights to the citizen. An obvious mechanism, and one that has been suggested many times, is the creation of a centralized federal agency to regulate all automated personal data systems. Such an agency would be expected to register or license the operation of such systems, could establish specific safeguards as a condition of registration or licensure, and would generally be the watchdog over all public and private data banks. Because systems used by the enormous number and variety of institutions dealing with personal data vary greatly in purpose, complexity, scope and administrative context, an agency to regulate, license, and control such a breadth of activity would have to be both large-scale and pervasive. The procedures for regulation or licensing would become extremely complicated, costly, and might unnecessarily interfere with desirable application of computers to record-keeping. Moreover, such a regulatory body would be another instance of federal government intrusion into the affairs of industry, the citizen, and other levels of government.

Thus, the committee has proposed a solution that was felt to provide the citizen with equally strong rights, while at the same time avoiding the necessity for a regulatory body. It has recommended that there be created by legislation a code of fair information practice applicable to all automated personal data systems. This code would define "fair information practice" as adherence to specified safeguard requirements, would prohibit violation of any requirement as an unfair information practice, would provide both civil and criminal penalties for unfair information practice, would provide for injunctions to prevent violation of any safeguard requirements and, finally, would permit both individual and class action suits for actual liquidated and punitive damages. This approach, the committee is convinced, would not impose constraints on the application of edp technology beyond those necessary to assure the maintenance of reasonable standards of personal privacy in record-keeping. It would imply no new federal bureaucracy and enforcement should be inexpensive at the government level. Importantly, this approach exploits the established legal and judicial institutions and practices of the country, and through court decisions and judgments can provide an adaptable solution that reflects shifts in the attitudes of society. From the standpoint of industry, the monitoring of fair information practice would become a matter for the General Counsel's office, as he is already concerned with fair labor practice and other requirements levied by law.

We were led to this concept by noting that organizations operating personal automated data systems should be *deterred* from inappropriate practices rather than being forced by regulation to adopt specific practices. The most universal deterrent seems to be financial, and thus we structured our code and its safeguards in terms of financial penalties; this is already the case in many other damage-recovery procedures under law.

To implement such a fair information practices code we suggest certain safeguard requirements. One set stipulates that:

- any organization maintaining an administrative automated personal data system shall identify one person immediately responsible for the system,
- shall take affirmative action to inform each of its employees about the safeguard requirements and rules and procedures governing the conduct of the system,
- shall specify penalties to be applied to any employees who violate the safeguard,
- shall take reasonable precautions to protect data in the system from anticipated threats or hazards to the security of the system,
- shall make no transfer of identifiable personal data to another system unless such other system also fulfills the safeguard requirements, etc.

A second set deals with the public notice requirement and stipulates that any organization maintaining an administrative automated personal data system must give public notice of the existence and character of the system once each year. Furthermore, any organization "proposing to establish a new system or to enlarge an existing system shall give public notice long enough in advance . . . to assure individuals who may be affected by its operation a reasonable opportunity to comment."

Finally, a third set stipulates the rights of individual data subjects and includes such things as any organization maintaining an administrative automated personal data system:

- Shall inform an individual when asked to supply personal data whether he is legally required or

may refuse to supply the data requested.
- Shall inform an individual upon request whether he is the subject of data in the system and, if so, make such data fully available to him.
- Shall assure that no use of individually identifiable data is made that is not within the stated purposes of the system.
- Shall inform an individual, upon request, about the uses made of data about him, including the identity of all persons and organizations involved and their relations with the system.
- Shall assure that no data about an individual are made available in response to a demand for data by means of compulsory legal process unless the individual to whom the data pertains has been notified of the demand.
- Shall maintain procedures that allow an individual who is the subject of data in the system to contest their accuracy, completeness, pertinence, and the necessity for retaining them; that permit data to be corrected or amended when the individual so requests, and assure when there is disagreement that the individual's claim is noted and included in any subsequent disclosure or dissemination of the disputed data.

We regard the safeguards just outlined as a minimum set. Whether they are exactly the proper set of course can be debated. The important point is that a code of fair information practice defined in terms of certain safeguards is a viable and, so far as can now be seen, adequate solution to the problem of protecting personal privacy.

Systems that maintain personal data in identifiable form are also used for statistical reporting and research. In such applications, the identification is usually stripped from the data and aggregated, or statistical assessments are made. There are other systems, usually called statistical-reporting and research systems, that never deal with identifiable data. For each of these, the appropriate set of safeguards is slightly different but, in general, act to the same end.

The second major issue to be considered by the committee was that of the social security number and its growing status as a standard universal identifier. The initial press coverage of our report stated simply that we were against the use of the social security number as a personal identifier but excluded the supporting arguments.

The committee included both dp experts and a number of individuals each responsible for the operation of large record-keeping systems. It was certainly understood by all that a standard universal identifier that could be assigned to an individual for his lifetime has positive value. Our argument against the use of the social security number rests partly on the fact that this number is not a good candidate for a standard universal identifier. For example, the Social Security Administration estimates that more than 4.2 million people have two or more social security numbers; thus, the SSN is not adequately unique. Furthermore, the SSN has no check feature and most randomly chosen nine-digit numbers cannot be distinguished from a valid SSN. For these and other reasons, the SSN is not adequately reliable as a standard universal identifier.

There is a much more important aspect than the shortcomings of the social security number as a potential de facto standard universal identifier. There has not yet been a public debate on the issue of a personal identifier nor has there been an assessment of the social consequences. Moreover, there are inadequate legal and social safeguards against abuse of personal information contained in automated personal data systems. In view of these facts, we take the position that "a standard universal identifier should not be established in the U.S. now or in the foreseeable future." However, we acknowledge that a standard universal identifier does have positive social value in some circumstances and we would urge that the question surely be reexamined when adequate legal and social safeguards have been established and shown effective in protecting the personal privacy of the individual citizen.

Meanwhile, in order to constrain the spread of the SSN as a de facto standard identifier, we recommend that
- uses of the number be limited to those necessary for carrying out requirements imposed by the federal government, and
- that federal agencies and departments should not require nor promote use of the SSN except to the extent that they have specific legislation mandated from the Congress to do so.

To further restrict the spread of the SSN in its identifier role, we recommend that legislation be passed that:
- Gives the individual a legal right to refuse to disclose his social security number to any person or organization that does not have specific federal authority to request it.
- Provides that an individual have the right to redress if his lawful refusal to disclose his social security number results in the denial of a benefit or the threat of denial of a benefit.
- Requires that any oral or written request made to an individual for his social security number be accompanied by a clear statement indicating whether or not compliance with the request is required by federal statute and, if so, citing the specific legal requirement.

We have also made a number of other recommendations with regard to the SSN, the net effect of which is to restrict its use to those purposes mandated by federal law, to urge the Social Security Administration not to assign numbers to children below ninth grade level, and to give the SSN the status of a confidential item of information.

In the struggle to assure and protect the privacy of the individual and to afford him redress against any harm that might befall him through the operation of an automated personal data system, we are convinced that adequate deterrents against abuse of personal information can be provided through the mechanism of a code for fair information practice. We believe that a regulatory approach is neither necessary nor desirable. With regard to the role that the social security number plays in the dissemination of personal information and the linking of items of personal information coming from different sources, we are convinced that the American public has not yet adequately considered the implication of a standard universal lifetime identifier and we, therefore, take the position that until such conscious debate has occurred, and until adequate social and legal safeguards against abuse of personal information exist and have been shown to be effective, the SSN should be tightly constrained as to its use. □

Dr. Ware is senior computer scientist on the corporate research staff of the Rand Corp. and has made numerous contributions to both computer security and its relation to personal privacy. He recently chaired a special advisory committee for the secretary of HEW.

Can a DIVA Disc System really maximize my mini and save me a cool million?

It sure can. Say you own or use one or more of the mini-computers George is sitting on. You can select, according to your particular needs, any one of eight standard mini-maximizer disc systems. George happens to be contemplating a mass memory system with a capacity of approximately 1 gigabyte.

That's a lot of data storage capacity.

But you might be thinking smaller: 7.5 million bytes, or somewhere in between. We can make you both happy. DIVA makes a disc system that will let you or George segment and store your number-crunching, time-consuming calculations and make short shrift of them. These systems are high-performance units: 624K bytes/sec transfer, 32-msec avg access, 11 sec stop that cut running costs to a few bucks/hr.

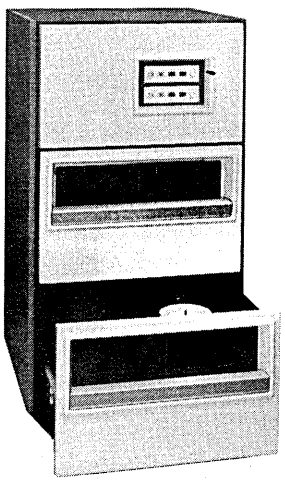
That's maximizing your mini.

Now, about the cool million. You don't need a mini for this calculation. DIVA's top-of-the-line disc system, with 8 spindles tags out at $111,900. Add the cost of your mini. Subtract the total from $1 to $4 million: the cost of a comparable maxi.

That's saving a cool million, or more.

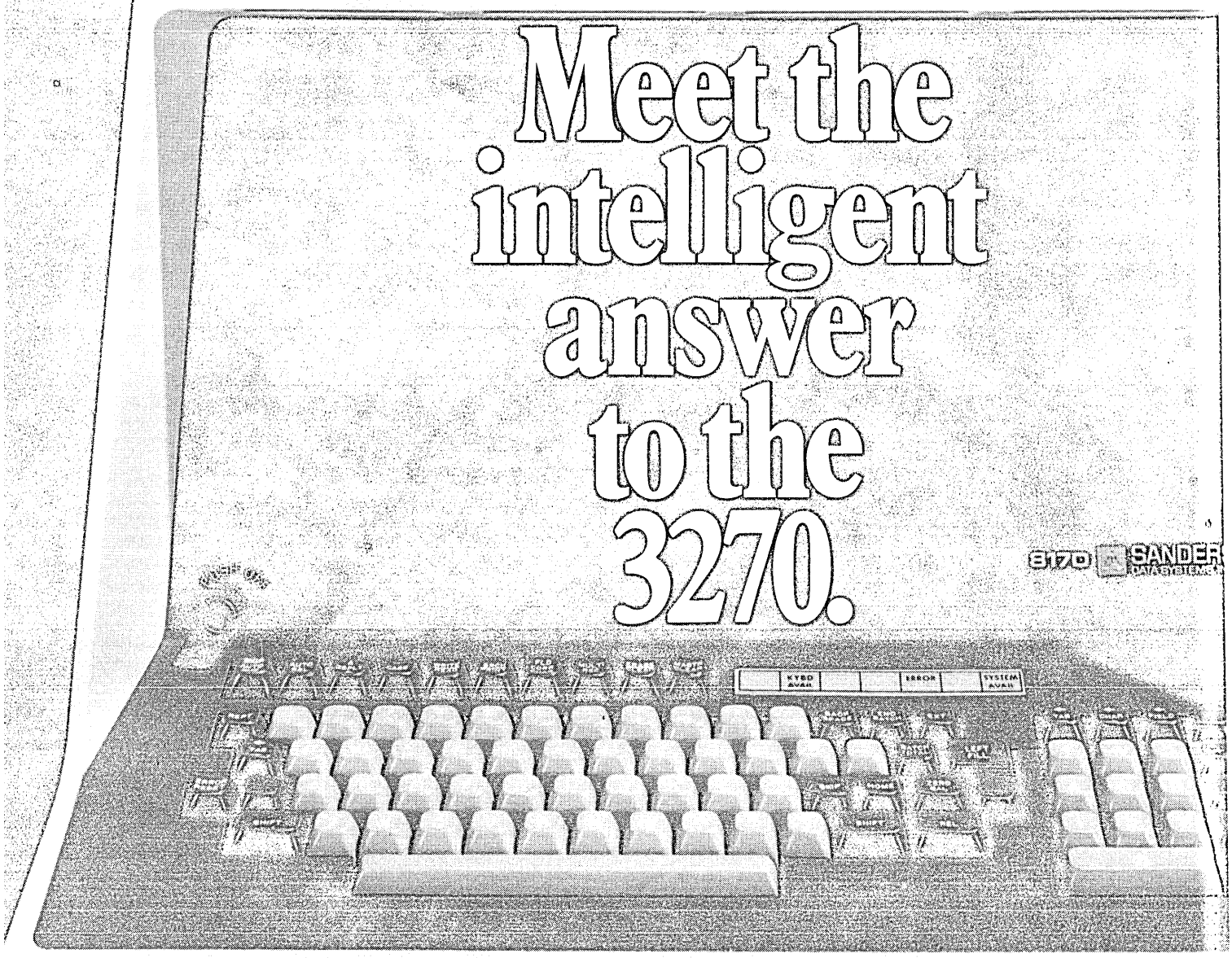
Obviously, there's more to mini-maximizing than is written here. Options like IBM compatible formatting, an exclusive DIVA feature, and psuedo-sectoring for efficient disc use. Features like overlap seek and removable packs. The rest is in our free brochure. Send for your copy. Read the specs on all the systems. Talk with George Roessler about costs or any unanswered questions on software, training, application, etc. Then maximize your mini. She's got a lot of potential.

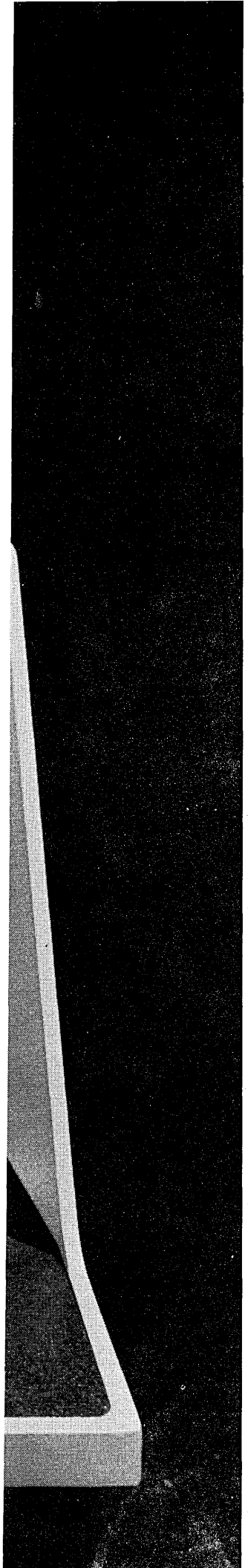
DIVA, Inc./607 Industrial Way West/Eatontown, N. J. 07724/ Phone: 201-544-9000/TWX 710-722-6645.



DIVA **Mini maximizer systems**

Meet the intelligent answer to the 3270.



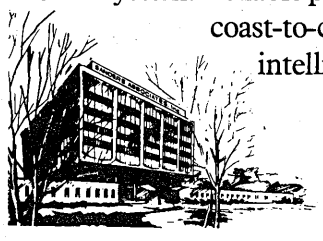


Sanders' 8170 Intelligent Terminal System.

Its intelligence supports all the standard, remote IBM-3270 terminal controls and provides all the remote 3270 functional capabilities with the extra bonus of local printer control and local, programmable data validation features. And Sanders' 8170 system will cost you less money than the 3270.

Sanders has unequalled terminal industry experience. The 8170 system is another addition to a long-established intelligent terminal line and other terminal systems products that go back to the beginnings of business terminal systems. Sanders intelligent terminals are production proven and user proven.

If you're thinking 3270, look into the lower-priced, more-versatile 8170 system. Reliable products, experience, software support and a coast-to-coast maintenance network make Sanders the intelligent answer. Sanders Data Systems, Inc., Daniel Webster Highway-South, Nashua, New Hampshire 03060. Telephone: (603) 885-3727.



Sanders...the intelligent answer

CIRCLE 68 ON READER CARD

News in Perspective

Congress turns its attention to stronger laws to protect the privacy of individuals, beginning with how criminal arrest records are disseminated, page 119. Massachusetts flatly turned down a request by the F.B.I. to plug the state's criminal arrest system into the bureau's National Crime Information Computer until congress and the Justice Dept. come up with sufficient safeguards against abuses...

Britain, meanwhile, may license operators of data banks containing sensitive information about individuals, and require the operators to appoint an individual to hold personal responsibility for keeping the information secure, page 121...

Amdahl Corp., the small California company that is building a 360/370 compatible computer using LSI technology exclusively, now plans to have a virtual memory system, page 121...

Conservative Orange County in California is trying something new—its data processing will be run under a facilities management contract, page 122...

Dp departments are turning to a new kind of movable wall to save money when they have to expand, page 123. The manager of Crocker Bank's data center says a moving job which once cost $3,000 recently was done at a cost of $25...

Rush recruiting by dp managers is being made easy in some midwestern installations through a new service called "contract staffing," page 128. Now there is talk of "facilities resources"...

Checking account customers can pay bills with the aid of their pushbutton telephones, and local retail establishments are joining the pushbutton bandwagon, page 128. It's happening in Seattle.

Retailing

IBM in Point-of-Sale: Late but Big

IBM is entering the booming but fiercely competitive retail store point-of-sale market with a system that is high-priced by competitive standards but low by IBM's.

Its 3650 retail store system, announced Aug. 10 and presented to retailers in demonstrations across the nation four days later, appeared to be aimed at the very big retailing organizations with large information processing requirements. It is a market where IBM dominates in computer usage, but where 60% of the prospects already have made a decision on point-of-sale equipment. Although it said it will be able to deliver equipment in seven to eight months, it was without a single customer at the time of the announcement.

This led manufacturers of competing systems, who commented in the week following the announcement, to predict it will be three to four years before the giant computer company gains a respectable foothold in that market. A spokesman for Litton's Sweda North American operations said retailers with whom he's talked are saying of the IBM announcement: "There's nothing revolutionary. The price is higher. And they're late."

IBM has been experimenting in the point-of-sale market since the late 1950s, says a source who was close to the project, and intensified its research in the late 1960s. In 1969 it installed an experimental electronic data collection system in a Safeway store in Fremont, Calif., but removed it six weeks later. Its 3650 system is the product of a 90-man systems research effort at IBM's communications equipment center at Research Triangle Park, some 18 miles outside of Raleigh, N.C.

The system, which would be on-line to a 370 virtual memory machine, is made up of the following:

- A point-of-sale terminal (the 3653), with built-in logic and memory, priced at $3,575; and an optional magnetic wand reader that reads magnetically encoded price tags, employee ID badges and store credit cards, priced at $350. Both are available for purchase only.
- A store controller (the 3651), a programmable logic unit with a standard 40K of storage, expandable to 56K. The controller has a disc storage unit which can store 5 megabytes. The controller, which links the store system to the 370, rents for $824-$1,024/month ($700-$820 under the company's extended term plan) and is priced from $31,500 to $39,160.
- An on-line ticketing device (the 3657) that prints, encodes and reads information on price tags. The monthly rental is $647 ($550 under ETP) and sells for $22,500.
- A display station (the 3275) and an optional printer (the 3284) that are attached to the store controller for preparation of receiving documents and purchase orders and for credit, administrative and management uses. The display station rents for $165/month and sells for $6,700. Rental on the printer is $130/month. It sells for $5,590.
- A remote communications unit (the 3659) for connecting components of the system to the controller. It is priced at $4,050 and rents for $106/month ($90 under ETP).

IBM said first shipments of the 3650 system will begin in the second quarter of 1974. They will be attached to 370

FOR SALE ONLY: IBM offers terminal and magnetic wand reader for sale. Other components of 3650 system are rental items.

vs systems ranging from the model 125 to 168 via 3704 or 3705 controllers in 2701 or 2703 emulation mode. The systems will use binary synchronous line control (BSC) operating under BTAM and DOS/VS or OS/VS1. In the first quarter of 1975, the company said, it will begin shipping systems with its new synchronous data link control (SDLC), virtual telecommunications access method (VTAM), and 3704/3705

NCP/VS under DOS/VS and OS/VS2. In the second quarter it will begin shipping this configuration under OS/VS1.

Low price—almost

IBM's pricing scheme for the 3650 is considered by analysts to be considerably below its traditional profit goal of a 30% return on revenue. Some estimate it at about 15%. And competitors think this isn't low enough. One guesses that the cost per terminal may run $500-$1,000 more than that of other systems, taking into account required expansion of the rental base at the mainframe. But a retailer, Jim Gray, director of information systems at Bullock's in Los Angeles, which uses American Regitel POS systems in 14 of its stores, considers the system a "very viable alternative," but adds that most of the IBM 3650 features are also in the American Regitel system.

Gray adds, however, that since IBM does not supply applications software, users wanting to take full advantage of the system will have to be "far along" in their development of automated credit authorization, sales auditing, purchase order management, and management systems.

IBM's use of a magnetic reader and printer to read and print price tags is considered a "safe technology" by analysts. But they foresee problems if magnetics becomes a standard, noting that many department stores also sell groceries and that the grocery industry last spring settled on a universal product code that is read optically (See May, p. 136). "It could really create havoc in supermarkets that also sell general merchandise and use a common checkout stand," according to one source. (IBM had been expected in the retail trade to introduce a grocery store POS system before the retail store product. It is understood to have encountered problems in developing the logic to decode and translate the grocery industry symbol, even though the symbol selected closely resembled that submitted by IBM.)

With its 3650 system, IBM challenges front-runners Singer Business Machines and the National Cash Register Co. in the $100 million general merchandising POS market that is expected to multiply five times in the next seven years. Singer, a major supplier to Sears, holds 51% of the POS market. It issued a statement that it "intends to maintain our lead." NCR said it is in a "broad position" to meet the IBM challenge. Other major suppliers are American Regitel, a subsidiary of Motorola; Pitney Bowes-Alpex; Litton's Sweda, and the Unitote division of General Instrument.

Privacy

Action May Start With Arrest Files

Capitol Hill is rumbling with plans to protect criminal arrest records, probably because of public interest in the Watergate caper and related matters. Liberals and conservatives are uniting; governors are doing their parts; the Attorney General now seems more receptive; and a recent H.E.W. report stressing the necessity of stronger privacy laws (see page 112) seems likely to produce action from Congress this year.

Last year, Massachusetts passed a tough new law limiting access to criminal arrest records to law enforcement agencies and those organizations explicitly required by law to use the files. The legislation also allows individuals to see their records and petition to have distortions and inaccuracies expunged, and sets up a criminal history systems board, made up of representatives of state criminal justice agencies, to decide who will—and who will not—use the criminal arrest records. It also establishes a privacy and security council, composed of civil libertarians directed by Dr. Arthur Miller, Harvard Law professor and long-time privacy advocate, to monitor the criminal history board.

The board recently ruled that the Small Business Administration (SBA), the Defense Investigation Service (an arm of the Defense Dept. which makes security checks on personnel working on government contracts), and military recruiters had no business seeing arrest records.

SBA and the U.S. attorney then filed suit threatening to hold up $30 million in loans unless SBA could access the records. So far, SBA loans continue to flow into the state. The agency and the U.S. attorney tried to get a temporary restraining order against Massachusetts so SBA could use the files, but they were denied. Just as the U.S. attorney was appealing the decision, Atty. Gen. Elliot Richardson got wind of the project and personally requested a 60-day delay while his assistants in Washington reviewed the case. The next hearing is scheduled for Oct. 15 in the federal district court in Boston.

In the meantime, the Defense Investigative Service has refused to recommend people to fill 2,400 jobs in Massachusetts until it gets access to the state files.

On a related front, Governor Francis Sargent of Massachusetts has refused to plug the state's criminal arrest system into the F.B.I.'s national criminal information computer (NCIC) system "until such time as the Dept. of Justice or the Congress provides sufficient guarantees to safeguard individual rights and the system's integrity against abuse." According to Andrew Klein, an aide to Governor Sargent, the Massachusetts system is advanced enough to connect with the national network, but it just won't happen until "we are satisfied with federal safeguards."

Unsafe elsewhere

In a letter to the Attorney General, Governor Sargent said, "The Massachusetts criminal information system has been designed to provide internal and external safeguards against potential abuse. Unfortunately, I have seen no similar action on the part of the Dept. of Justice, the Attorney General, or the Federal Bureau of Investigation to construct equivalent safeguards for the national criminal information system."

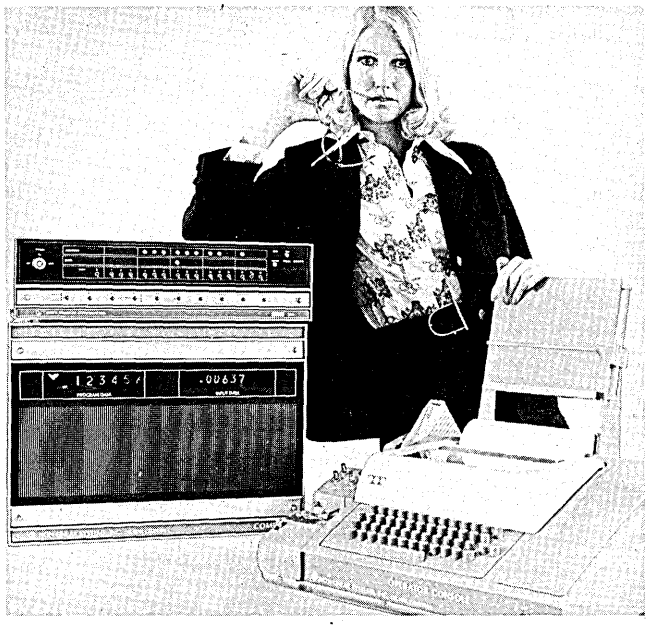
But the movement for more privacy for such records is not limited to the state of Massachusetts; Iowa just passed legislation which creates a citizen's council to monitor the state system and make recommendations to the Iowa Crime Commission on individual rights as they concern arrest records. The council will also make recommendations on what type of arrest records should be transmitted to NCIC from Iowa. Citizens will be allowed to look at their records.

Iowa Governor Robert Ray recently wrote to the Attorney General about the lack of national guidelines. In replying to the letter, Richardson said he shared the governor's concern "for achieving an appropriate balance between the information needs of government and the constitutional rights of persons affected by the collection and dissemination of criminal justice information."

Action on dispositions

Meanwhile, Congress is on the move. Buried in the LEAA enabling act is an amendment requiring that "all criminal history information collected, stored, or disseminated . . . shall contain, to the maximum extent feasible, dispositions as well as arrest data." The amendment, a stop gap provision, requires the LEAA to come up with some new rules and regulations governing reporting of dispositions. The Attorney General is currently drafting new regulations to implement the amendment. Prompt action is expected. The Dept. of Justice is also working on a legislative package which would require improved reporting of arrest and disposition information by the states and would include privacy

A computerized data acquisition/control system that talks your language.



And that you can afford: $16,500.

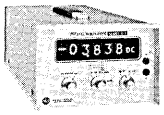
If you can read this, you can carry on two-way communications with the NLS S-9 Computerized Data Acquisition/Control System. Using everyday English, you can communicate with hundreds of remote sensors, monitoring inputs, acquiring data, controlling processes. And the S-9 is easily programmed by your own technician (with the help of simple software supplied by NLS), eliminating any need to employ a specialized software consultant.

A real-time system in a desktop package.
A totally engineered real-time system, the S-9 is neatly packaged in a single desktop unit... less expensive and more efficient than racked-and-stacked, do-it-yourself systems. Sitting right alongside the teletypewriter through which the operator "talks" to the computer, the system includes: minicomputer (simple program)... variable memory... multiple analog inputs... keyboard entry... fast digital input... digital output and control capability... wide-range precision A/D conversion.

And the price is right.
The entire S-9 Computerized Data Acquisition System — including teletypewriter and the NLS software package — is just $16,500 f.o.b. NLS. Options allow expansion of the S-9 to include: 1000 3-wire analog inputs... a 128-bit digital control... a 32K core memory.
The S-9 (and products pictured below) are sold factory-direct by NLS, originator of the digital voltmeter. Call today for more information on specs and applications. Use our toll-free WATS line: 800-854-2758 (Californians call 714-755-1134 collect).

Phone NLS direct (toll-free): 800-854-2758 for information on the S-9 and all these products.


X-1


X-2


X-5


S-4

The X-1 is a super high-performance DVM; five digits with sixth digit overrange. Standard model measures DC volts with automatic ranging; highly accurate and extremely fast, $2,785, f.o.b., NLS. The X-2 is a versatile four-digit DVM (with fifth digit for 20% over-ranging) for laboratory, system or field applications. Can be tailored from a complete selection of options to meet your specific needs, $1,115 for the standard DC model, f.o.b., NLS. The X-5 provides direct digital readout of pressure in any standard engineering unit. Choice of three ranges: from 0.001 to 33.000, to 60.000, or to 100.000 inches Hg differential pressure. Full price, $6,000, f.o.b., NLS. The S-4 is a low-cost, compact data acquisition system which converts analog signals to three or four digit measurements. Basic S-4, $3,535, f.o.b., NLS.

Originator of the Digital Voltmeter.

Non-Linear Systems, Inc.

Post Office Box N, Del Mar, California 92014
Phone 800-854-2758 or 714-755-1134. TWX 910-322-1132.

protection provisions. While the exact provisions are not known, the new legislation seems likely to affect state criminal history systems funded by LEAA as well as the related F.B.I. files in Washington. But Congressman Michael Harrington of Massachusetts has written to Governor Sargent and warned him not to expect too much. "I suspect that the new LEAA proposals also are being altered by the Office of Management and Budget and that the administration bill that comes before Congress will not provide effective safeguards. It is clear that any effective legislation must come from outside the Administration."

Just so there isn't any footdragging in the Dept. of Justice, a band of liberal and conservative congressmen have already taken action to force the Attorney General into making some sort of regulations. Signed by Rep. Barry Goldwater, Jr., of California, Sen. Edward Brooke of Massachusetts, Rep. Harrington, Governor Sargent, Sen. Harold Hughes of Iowa, the A.C.L.U., Robert F. Kennedy Memorial and others, an administrative petition drafted by the Lawyers' Committee for Civil Rights asks the Attorney General and the new F.B.I. director Clarence Kelley to suspend operation of "F.B.I.-administered offender files" until the Dept. of Justice issues formal regulations ensuring the rights of individual citizens.

The petition alleges that states participating in the F.B.I.'s NCIC system lack the means to insure the accuracy and completeness of their data on individuals; allow virtually uncontrolled access to "public and private employers and other agencies for the purposes of clearing employment, promotions, the granting of credit, and other basic rights;" do not allow individuals the right of access; and instead of focusing on serious crimes of national importance, the files contain a host of minor offenses, "many of which are misdemeanors involving no harm to others."

Congressman Goldwater contends that people in such files have been given "stricter sentences and have been treated more harshly by parole boards. These inequities, resulting from the inaccuracy of the files, result in the violation of a number of basic rights, including the right to privacy, the right to due process and equal protection under the law, and the right to be free from cruel and unusual punishment."

The Attorney General has 60 days to carry out the provisions of the petition. If he does not come up with some guidelines by then, some of the petitioners intend to sue.

Related developments

A special oversight committee to study the F.B.I. has been set up by the Senate Judiciary Committee. One of the major areas to be studied is the computerization of arrest records. Headed by Senator James Eastland, the new subcommittee will begin hearings this year on an independent F.B.I.

A new drug abuse program called CODAP is causing a flap in numerous states and has already caused the White House to back down in Massachusetts. The focus of the argument is a questionnaire that provides specific information on persons participating in the program. The questionnaire requests the birth date, sex, race, zip code and initials of the mother's maiden name, but does not ask for the actual name of the individual.

Designed by the White House's Special Action Office for Drug Abuse Programs, and administered by the National Institute of Mental Health (NIMH), the program requires all states receiving federal funds to fill out general statistical information and specific individual information. NIMH contends the information is needed for planning and research. Massachusetts is the only state to actually refuse to sign the contract, foregoing an estimated $9 million in federal aid; but Pennsylvania, New Hampshire and Hawaii have expressed concern. When word of Governor Sargent's unhappiness reached Washington, Peter Bourne, associate director of the White House Office, notified Massachusetts that it would not be required to provide the data.

Pennsylvania, in spite of signing the contract for federal aid, instructed state centers not to fill out the questionnaire on individual clients—without informing Washington. So ultimately it was left up to the individual centers to either fill out the questionnaire against the state's instructions or leave it blank, which was against the federal contract signed by the state.

—K. Endres

U.K. Would License Data Bank Operators

Security of personal information maintained in computer data banks in the U.K. may become the legal responsibility of a named individual in each organization.

Robert Carr, Secretary of State at the Home Office, said this will be among the recommendations he'll submit before the year's end in a white paper to parliament on invasion of privacy. Parliament will be asked to license government and commercial installations that maintain sensitive information on individuals. Before being granted the licenses, the operators would have to assign a specific individual to monitor security of personal information.

Data banks maintained by the central government, local authorities, the state medical service, commercial credit bureaus, and banks, would be involved, Carr indicated during a recent parliament debate on privacy.

This already is being done experimentally at the National Data Processing Service run by the British Post Office where Peter J. Smith, the service bureau's director of operations, was assigned to the function five months ago under the title "social auditor."

Mainframers

Amdahl and Fujitsu Working on VM Model

Two mainframe models, not just one, are planned by Amdahl Corp. Designated as models 470/6 and 470V/6, they will be functional equivalents of the IBM 370/165 and 168, but will have internal speeds four and three times faster, respectively, according to the company.

Amdahl's 470V/6 will be the virtual memory model, which is being developed jointly by the Sunnyvale, Calif., company with Japan's Fujitsu Ltd. Initial deliveries, including the V model, are scheduled for early '74. Price? Somewhere between $3.25 and $4.25 million (or $65-85K/month), depending on model and configuration. But the company contemplates no production of peripheral equipment.

Instead, its charter calls for the design and manufacture of large-scale 360/370-compatible computers, using LSI technology exclusively—thus the world's first fourth generation computers. The company, founded in October 1970, is headed by Dr. Gene M. Amdahl, former IBMer who directed the architectural planning of the System/360s. Already, employment exceeds 400.

Among the major investors in the company is Fujitsu, which has ordered 10 of the computers at a price of some $27 million. Four of them are scheduled for 1974 delivery, the remainder for '75. That should keep the assembly line busy for a while. But beyond that, the two firms are looking toward the formation of an equally owned, joint company to handle marketing outside the U.S.—specifically in Western Europe. And the ties are even deeper, in-

volving the possible purchase of land by Fujitsu in the U.S., adjacent to property that Amdahl has an option to buy.

Fujitsu a neighbor?

Amdahl Corp. currently occupies 120,000 square feet of plant space in three leased buildings, but foresees the need for more. Accordingly, it plans to have four buildings constructed on 18 acres of land across the street from its present location, expanding its space to 200,000 square feet. But it also has an option to purchase an additional 20 acres adjacent to its new location. Adjoining that is another 20 acres that Fujitsu may acquire, possibly marking the entry of that company into the American market.

Fujitsu, the leading mainframe manufacturer in Japan, is the only one of the six largest such companies that has never had a licensing or technology exchange agreement with a U.S. counterpart. Now, however, this has changed, with the two companies exchanging know-how on Amdahl products presently under development.

Presumably this does not include current research on Amdahl's follow-on product line. The firm acknowledges that its success in marketing the 470 line could hinge on sales consummated before IBM starts deliveries of its successor to the 370s. "The company believes this event to be unlikely before 1977," says a spokesman. For the longer pull, the firm is dependent "in part upon the successful development and introduction in 1977 or shortly thereafter of follow-on products to the Amdahl 470 computer systems."

Meanwhile, the company reports the receipt domestically of seven letters of intent for the 470. Its marketing ploy is not to replace existing 360s or 370s but, rather, to increase computing capacities at large-scale installations. Through 1977, it foresees a potential of 900-1,000 such sites domestically, and targets sales at 10-15% of those sites.

As for 470 software, the company says it will distribute and support its own version of operating systems OS/360 MFT, OS/360 MVT, OS/VS1, and OS/VS2. "The company's planned ability to support these operating systems derives in large part from the fact that IBM has placed them in the public domain and imposes no restrictions on their use and distribution." But there will be no emulator mode for those still running second generation programs.

Facilities Management

Orange County Goes FM

Often caricatured as a bastion of conservatism, Orange County, Calif., has done something different.

It is the first sizable county in the country (population 1,565,133) to contract outside for its data processing services. In August the county was ready to sign a $26 million, seven-year facilities management contract with Computer Sciences Corp. The county gave CSC a letter of intent July 31, and CSC took over operation of the county dp operations the same day.

It was a stormy courtship that led up to the expected consummation late last month, with concerned citizens, dp "experts," vendors, and paid consultants all having a say in a series of hearings which began in late spring and ended July 31. And even then, the day on which supervisors officially approved the facilities management concept and issued the letter of intent, there were numerous reservations expressed.

One concerned citizen, Janice Boyer of the Orange County Republican Cen-

tral Committee, said she had read the proposed contract carefully and found it to be "like a hula skirt. Everytime I shook it something new appeared." She said for CSC "it was as tight as a contact lens and, in terms of public safety it was as loose as an old man's teeth."

Changes were suggested by both citizens and some supervisors at the July 31 hearing. These were mostly clarifications in semantics, and were incorporated in a new draft of the contract which Erwin Allen, president of CSC's commercial div., said in mid-August were acceptable to CSC "except for a few typos which will have to be cleaned up." A spokesman for the county's administrative office said the only thing holding up signing of the contract at that time was the posting of a $5 million performance bond by CSC and the furnishing of "necessary insurance."

Univac or IBM

A big undecided issue was the kind of equipment CSC will use. The county had been using Univac gear but CSC originally came in with a proposal for IBM equipment. The issued contract removed any language restricting the use of a single vendor's equipment, and CSC said it would decide between IBM and Univac equipment by Aug. 31.

If CSC goes with Univac its contract calls for a lowering of price based on an anticipated savings. With either vendor there will be an upgrade from Spectra equipment. In the case of Univac it would be to 1110s and in the case of IBM, to 370/155s.

CSC's $26 million bid compared to $37.8 from the county's existing dp division and $44.7 million from Electronic Data Systems of Dallas, which dropped out of the running early. Ronald Caspers, chairman of the board of supervisors, said he wished there'd been more bidders. "I took it upon myself to look into the financial health of CSC and found all comments negative, even derogatory. I believe in the concept of saving county money through use of the resources of private enterprise. The only reservation I have is the company's strength."

A CSC spokesman said he believed Caspers was referring to the company's last year-end report which reflected a loss. He noted that in the first quarter, which ended June 29, the company earned $181,000 against a loss of $1,208,000 for the same period last year.

By mid-August CSC had issued job offers in writing to all of Orange County's 200 dp employees and had held both group and private meetings with many of them. Allen said the reception was "extremely positive."

Bob Farmer, director of the county dp effort since 1966 (when he had a staff of 45 and a budget of $700,000 annually), was one of those offered a job by CSC. The only plans he had made at this writing were to go off to Hawaii for a two week vacation.

"I'll decide when I get back."

Installations

With Screens, Poles, A Movable Feat

In Southern California, Crocker Bank has a dp staff of 330, engaged in everything from credit card operations to check clearance to actual computer operations. And in some years they spent upwards of $100,000 annually just to move desks, walls, and phones with each reorganization or to accommodate new personnel. But the group has cut such expenses to a piddling sum through the use of what's come to be known in office layout parlance as open office landscaping. In essence, it's the use of 6-foot-tall, easily movable unattached screens that serve both to muffle sounds and to provide some semblance of privacy. In addition, it involves the use of power poles that bring electrical power and phone lines down from the ceiling—again, inexpen-

(Continued on page 127)

You never get rich just selling to relatives.

Even if all your relatives are named UNIVAC®

So the Communications and Terminals Division of Sperry Univac provides total communications systems for everybody. No matter what name is on your mainframe.

We can offer the experience and the equipment to meet your toughest requirements. And we can offer the prices, performance and support to meet our toughest competition.

Beginning with the UNIVAC 3760 communications controller, your system builds. With the UNISCOPE® 100 display terminal, the DCT 500 keyboard-printer, the DCT 1000 remote-batch terminal, 610 tape cassette, card readers, paper tape equipment, etc.

The result is a complete, flexible data communications system compatible with your computer.

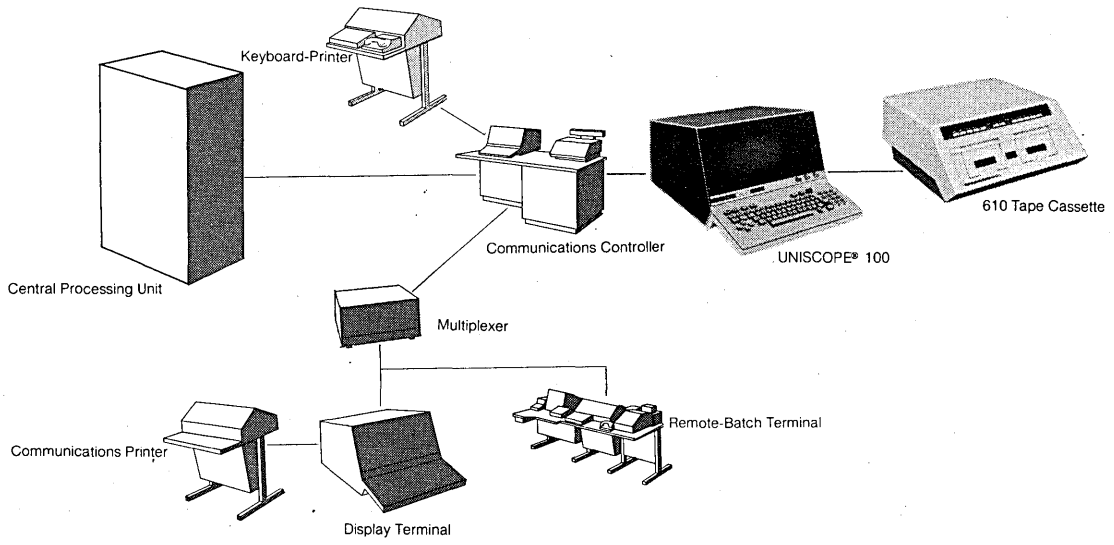
All with the assurance of high-performance equipment.

The UNIVAC 610 tape cassette, for example, interfaces with the UNISCOPE® 100 display terminal for local, low-cost storage of up to 1.4 million characters. With a search speed of 120 inches per second. Dual cassettes let you edit and transfer information quickly, easily. The display terminal and tape cassette work together for dependable, low-cost solutions to a wide variety of data handling applications.

As you'd expect, our systems are backed by an expert worldwide service organization.

For a brochure on our total systems capability, contact the Sperry Univac representative in your area.

Or call free 800-453-5323.



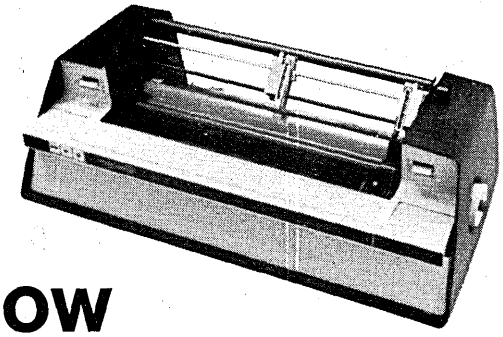
COMMUNICATIONS AND TERMINALS DIVISION

SPERRY+UNIVAC

Only when our customers succeed do we succeed.

SPERRY UNIVAC IS A DIVISION OF SPERRY RAND CORPORATION

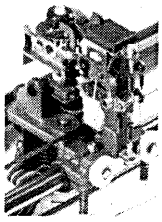
our printers will get under your skins



now

you can buy our new
Model 30 printer
complete for as little as $1123
(OEM quantities)

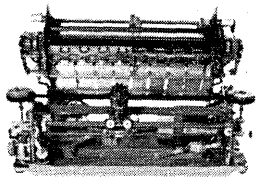
Check the specs. Average 30 cps print speed. Ruggedized print carriage assembly. 47 print characters (26 alpha, 10 numeric, 11 special). Available with split platen; front form feed; pin-feed platens; special stepping motors for printing and tabulation; form out control; red and black ribbon; electronic addressable forward and reverse tabulation; IC control electronics and keyboards.



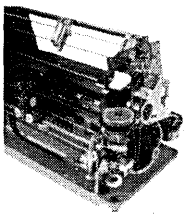
print head assembly

but for you we'll go to pieces

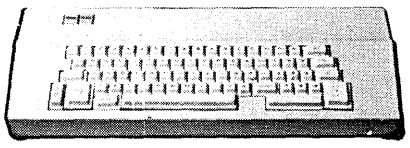
If you value your skins more than ours, we'll sell you the pieces. Any or all. Also, at OEM quantity prices.



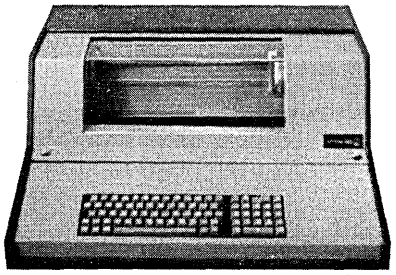
"naked" printer complete



paper carriage and printer



keyboard



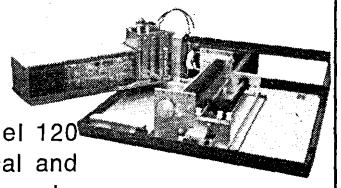
oem model 120

OEM Model 120 is an asynchronous serial impact printer which may serve as a communications terminal, a billing printer for accounting systems, a computer output printer, or a data entry device.

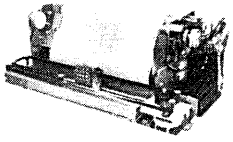
OEM Model 120 is available in a variety of forms, ranging from the basic print mechanism alone, with a parallel interface operating at 120 cps, to a complete KSR with serial interface and operator-selectable speeds of 10, 15, 30, 60 and 120 cps.

OEM Model 120 is compatible with nearly all low and medium speed teletypewriters and an unlimited variety of other peripheral devices.

The basic coding is ASCII. It is also available as an EBCDIC printer, and an option provides both codes in a single printer. The entire 128-character ASCII code is generated by the OEM Model 120 keyboard; all 96 ASCII graphics are printed.

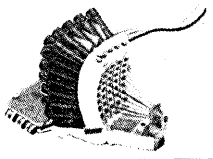


The complete OEM Model 120 printer contains mechanical and electromechanical components, interface, control logic, character generators, motor drive circuitry, and a tractor feed paper transport.



OEM Model 120 produces up to five copies and an original on standard perforated paper stock.

The OEM 120 printhead employs 35 needles and solenoids in the standard 5 x 7 matrix.



so will our ROYTRON line of 60 punches and readers

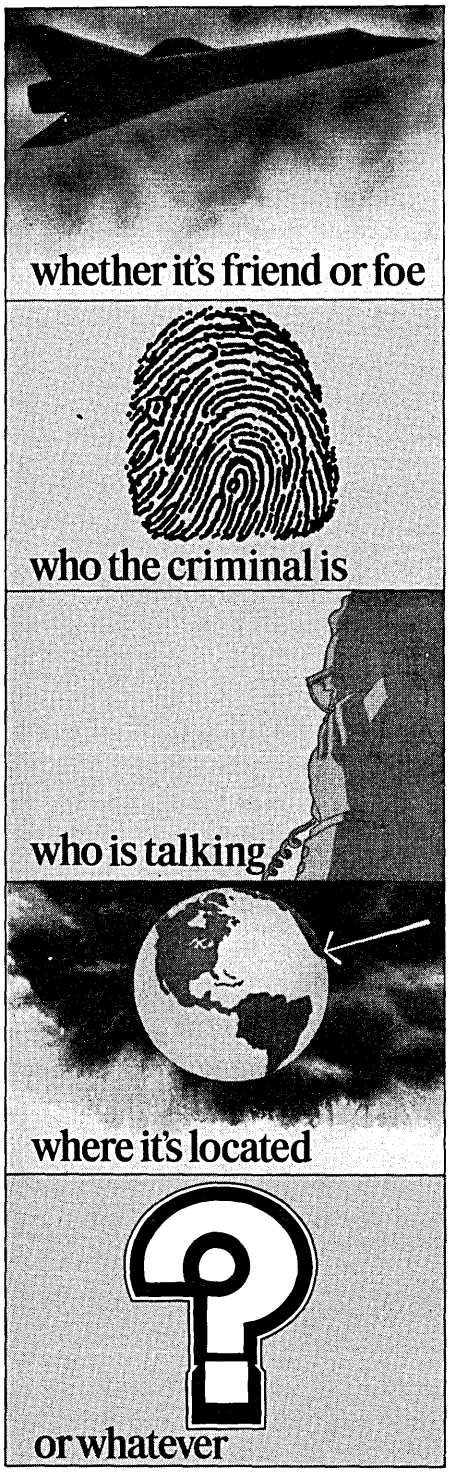
Litton

OEM PRODUCTS DIVISION

LITTON ABS

Automated Business Systems
34 Maple Avenue, Pine Brook, N.J. 07058/(201) 575-8100

Nothing matches Staran for matching. It can tell you in micro-seconds:



Goodyear's STARAN™ associative array processor has no match for correlation capability. Its true-content addressibility (matching data in memory) allows STARAN to search its entire memory in micro-seconds to match given data. Correlation of radar or infrared signatures, map areas, fingerprint files, waveforms from voiceprints, EKG's, etc., are all possibilities. There are more.

STARAN is not everyman's computer. But for those who have problems that require high speed searching of a dynamic data base—or those whose problems require high speed operations on similar data streams—the STARAN associative array processor may very well be the most cost-effective solution.

STARAN is a combination system that does both associative array and sequential processing. It can be added to your system or used in new system developments.

A minimum basic STARAN system sells for as little as $250,000 and software costs can be reduced to one-third of amount required for a conventional system.

Goodyear invites you to try your system problems on the STARAN Evaluation and Training Facility at our plant in Akron, Ohio. See for yourself how STARAN can handle your specific data processing problem.

For more information, or to plan a demonstration, write: STARAN Marketing, Department 920, Goodyear Aerospace Corporation, Akron, Ohio 44315. Or call (216) 794-3631.

GOODYEAR AEROSPACE

CIRCLE 77 ON READER CARD

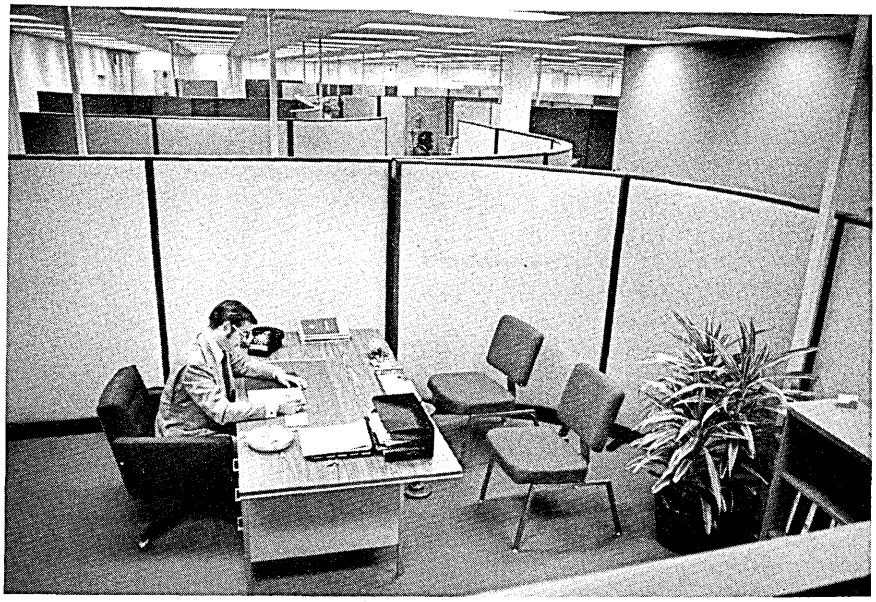
sively moved and easily repositioned.

For more than a year now, San Francisco-based Crocker Bank's data processing facilities and personnel in Southern California have been housed in a new, two-story, 108,000-square-foot building in El Segundo, near the Los Angeles International Airport. Previously, the staff was situated in two buildings about a half-mile apart and served by messengers who made the rounds every 20 minutes. The main facility housed the hardware, the software group, and the check processing personnel, while the so-called annex had payroll, lock box, customer service, sales, and the duplicating departments.

In March of '72, most of these personnel were transferred to El Segundo, 24 miles from the downtown congestion, into a burgeoning industrial park. What planners had to work with were two expansive floors, each with 54,000 square feet. With the exception of the machine room, storeroom, and parts of the employee cafeteria, it's fully carpeted—for sound deadening purposes as well as appearance. Normally, one begins by constructing walls to separate one department from another, with more walls for executive suites. In time—often in no time at all—it is found that the position of one department relative to another must be changed to improve the work flow. Or one section soon overflows the space alloted to it. And the walls come tumbling down.

"At our old facilities, it might have cost us $3,000 just to move 15 feet of walls," says Jerry N. Hotson, vp and manager of the data center. The job, he explains, called for a carpenter to do the moving and an electrician for the rewiring, maybe even a serviceman from the phone company. "Now, all it takes is two people from the maintenance staff and a total cost of $25." Hotson says it's a lot quicker, causes little disruption among those working in the area, and the difference in wages paid to a maintenance man and a carpenter or electrician is highly significant. "We can move a department with 20 people in a couple of hours. Before, it seemed like we were always knocking down walls. Six months later we'd be putting it back up, sometimes in the same spot."

Even private, walled-in executive offices have been dispensed with at the new facility. Indeed, only a computer rewiring, and maybe even a serviceman room (with a one-megabyte 370/155, a 360/30, and a Burroughs B4700 and B3500) an dthe security officer's quarters are enclosed. The cafeteria and the keypunch department were placed at the rear of the building, just in case it was found that these required floor-to-ceiling walls, says Philip A. Martinelli, assistant vp. But neither did. The adjustments department is adjacent to the cafeteria, separated only by the same movable screens, and no problem has risen from food odors or excessive noise. Next to the keypunch area is the staff lounge, where employees were seen playing cards and reading, and one admittedly could hear the Burroughs MICR encoders running—rattling is more like it.



OPEN OFFICE LANDSCAPING at Crocker bank's new dp center in El Segundo reduces cost of expansion. Even executive offices follow new pattern. Shown here is office of Jerry N. Hotson, vp and manager of bank's data center.

To help drown out such extraneous sounds, along with the ring of the phone and conversations nearby, music is piped in on the same sound system used for paging employees who are away from their desks. But in addition, one constantly can hear a low rumble closely resembling that of cool air being forcefully blown into the building. Actually, it's an artificially induced sound piped in to smother distracting noise. Unless one is aware that this so-called white noise is present, the casual visitor does not notice it. But human psychology being what it is, employees there complained of rising temperatures when this sound was turned off—not aware that the air conditioning system had been operating continuously and silently. When the white noise was again turned on, such complaints stopped.

The acoustical screens, made by Techniques in Wood, Inc., Rochester, N.Y., measure 6′ high by 5′ wide. They're available in other sizes, in straight and curved panels, but all have a thick padding with which to absorb sound. They absorb from 50-95% of the noise striking them, depending on the model chosen, and their prices vary accordingly, from $227-293 list for a straight 60″ x 72″ panel. And they can even be surfaced with cork-faced bulletin boards and/or a chalkboard.

The power poles, made by Wiremold Corp., are spring-loaded to fit snugly between floor and ceiling. They connect above the ceiling tiles to both power and phone lines, these outlets being positioned at the nodes of 10-foot grids. The ceiling outlets, however, have cords that permit the poles to be moved half the distance to the next gridpoint, thereby providing additional flexibility in floor layouts. But for an electrician to move the pole more than one ceiling tile away from the gridpoint and less than 10 feet away costs about $15. A move from one gridpoint to another is minimal in cost.

Wide interest in the facility has been shown by visitors from every major bank in the state and from throughout the country, as well as by visitors from Europe, Australia, and Japan. Spurred by the successful results achieved, Crocker Bank will take the same approach when its Northern California computer operation is moved into new quarters in San Francisco this fall, according to Richard T. Griffith, vp and manager. Crocker will bring together more than 1,000 employees in the dp, credit card, and related operations, housing them in a $17-million, seven-story, 400,000-square-foot building. Some 1,300 screens will be employed there, says Griffith, compared with 800 or so down south.

— E.K.Y.

Personnel

Staffing Up By Contract

"Contract Staffing" and "Facilities Resources" have popped up in some midwestern and California cities as new buzzwords that the author hopes will solve the rush-recruiting problems of dp managers.

Robert W. Spachman, president and founder of Information Industries, Inc., of Kansas City, Mo., says contract staffing is a one-of-a-kind service his recruitment company offers to large dp installations with budgets of $3-4 million which are embarking on new projects and in search of the right people to staff them. His company finds the people, pays their relocation costs, puts them to work with the dp client, but will keep them on his payroll if that's the way the client wants it.

Spachman said that since the 12-man company was formed in 1971, it's placed 150 programmers, analysts and project leaders with 20 clients, including General Motors, Ford, Trans World Airlines, American Airlines and Montgomery Ward. About 80 of them have found jobs with the clients and 70 continue on the I.I.I. payroll. The company, which usually limits its service to clients needing a minimum of six persons, pays the relocation costs, salaries and fringe benefits, and charges the clients an hourly rate that ranges from $14-18.

"On the surface you appear to be spending more out of pocket," says Werner Kruck, vp and director of MIS with Foremost Insurance Co., a Grand Rapids, Mich., company which recently contracted for 14 persons to staff a dp expansion. "But it turns out to be cheaper than to get people directly, because there are hidden costs. Besides, the day they come in they're ready to go to work. They've been moved and they don't need any hand holding or anything."

Kruck said he has the option of hiring any of the I.I.I. staffers after six months for about $1,800—the relocation costs. After they're aboard 12 months, he pays nothing. Spachman said his contracts with other clients are the same, varying only according to the level of the persons he's placed.

Last month an affiliate, Information Industries, Inc., of California, was formed in Los Angeles by Al Strong, founder of Career Data Personnel, a placement agency with some 2,000 dp clients. "Some clients take forever to hire a person, because the one they want is the guy they see when they're shaving in front of the mirror," Strong says. "They'll move faster when they don't have to worry about the recruitment costs." I.I.I. agrees to replace anyone who doesn't work out and will forfeit a month's fee while the replacement is acclimated, Strong says.

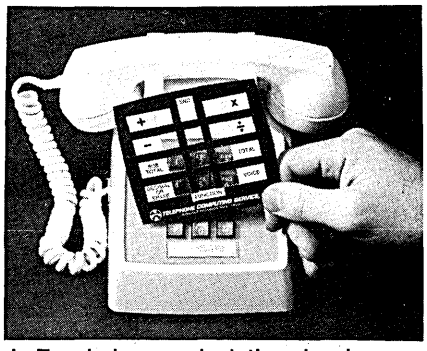
I.I.I. contracts mainly have been with dp installations in small midwestern cities. Strong is counting on a recent turnaround in the computer economy to create a scarcity of experienced people in larger cities such as Los Angeles. He says dp people aren't having trouble finding new jobs and noted that while his Career Data placement agency has tripled its advertising budget since January, the response for people looking for jobs has declined by two-thirds.

Spachman thinks large dp installations soon will farm out most of their recruitment activity. He's now negotiating with one client for that service which he calls "Facilities Resources" and considers to be a more acceptable solution than facilities management because the client doesn't forfeit control of the staff.

Banking

Bank Starts Home Computing Service

It's not really a computing service, although a minicomputer is used. What it is is an information service with a bill-paying feature, accessible from a pushbutton telephone in your home, with an added ability to use your terminal in a calculator mode. This so-called In-Touch service has been placed into operation by Telephone Computing Service, Inc., (TCS) of Seattle, Wash., a subsidiary of Seattle-First National Bank.



In-Touch: home calculations by phone.

Subscribers with a checking account at Seattle-First can pay bills by phone without writing checks to about 30

(Continued on page 132)

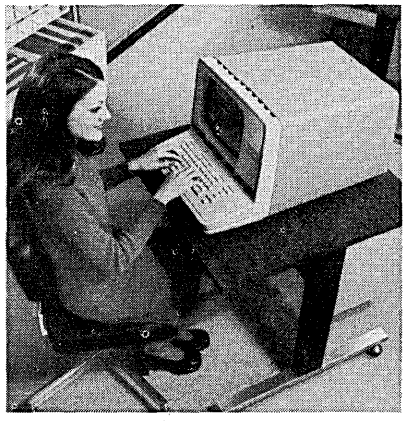
If you use more than one of these media

WE CAN HELP YOU MANAGE BETTER

Just look at all the different types of media you are using today.

As a manager, how can you organize your operations to get the highest productivity from the people and machines that use these media? And, if you are adding such things as microfilm, microfiche, word processing equipment, terminals and computer reports; how can you create storage systems and work station environments that will provide high efficiency, reduced worker fatigue and better housekeeping?

One thing you can do is to recognize the fact that the office furniture you've been used to all these years just can't adapt to the media explosion.



That's why we started with the basic problems of media and the people who work with them and designed an entirely new concept in equipment for the office and computer room.

THE OPTIMEDIA™ CONCEPT

It's called Optimedia because it allows you to tailor your systems to provide optimum use of media by both people and machines. Optimedia also gives you a built-in hedge against obsolescence since it is a living system which you can change at any time to meet your changing requirements. We'd like the opportunity to show you how the Optimedia concept can help you manage better. It's detailed in our new brochures. To receive copies, just circle the readers service number, or contact your nearest Wright Line Media Management Specialist. You'll find him in all principal cities.

Wright LINE

MEDIA MANAGEMENT SYSTEMS

160 GOLD STAR BOULEVARD, WORCESTER, MASS. 01606

A DIVISION OF BARRY WRIGHT CORPORATION

CIRCLE 79 ON READER CARD

NCR CENTURY COMPUTERS PROVIDE MORE RESULTS!

Every day more and more NCR Century computers are serving more firms everywhere. The computer users shown here represent today's progressive management so what they say about their systems can be important to you.

You'll learn these NCR customers have one thing in common: their NCR Century systems are providing them with the information they need to successfully manage their businesses.

Whatever your business, there's an NCR Century System that will provide better results and more benefits for your operation, too.

For complete information on the NCR Century system that's right for your business, call your local NCR man. Or write NCR, Dayton, Ohio 45479.

"We have to know what we produced on the night shift by seven the next morning. That's what our NCR Century gives us, in time, every time."

Frask Loria, Corporate EDP Manager
SOS Consolidated, Inc.
Birmingham, Michigan

"We needed a central information file to remain competitive. The NCR Century had it. And NCR knew how to make it work."

Ken Walker, Executive V.P. and Cashier
1st National Bank of Lake Forest
Lake Forest, Illinois

"Our NCR Century computer gives our job shop the most complete production control system I've ever seen in any shop!"

Charles Phillips, Vice President
Lockwood Manufacturing Company
Cincinnati, Ohio

"Our quarterly reports used to take two full days. Now they're out in three hours. The difference? Our NCR Century."

Bob Schrader, President
Evanston Federal Savings & Loan
Evanston, Illinois

"The best thing about our NCR Century? The way it eliminates guesswork. I get the receivables and sales information I need to make decisions . . . the right ones."

Larry Davidson, Vice President
Davidson and Leventhal
New Britain, Connecticut

"When we decided to computerize we knew we had to pick one company and stick with them. We chose NCR."

David D. Hart, Vice President
Maryland State Savings & Loan Association
Hyattsville, Maryland

"Keeping customers waiting means bad press for any savings and loan. It's a problem our NCR Century eliminated. Twice."

Dick Pokorny, General Manager
Financial Computer Services
Cleveland, Ohio

"We have greater financial control over municipal services than ever before. And the reason is our NCR Century."

Thomas G. Zeidell,
Management Systems Administrator
City of Pontiac, Pontiac, Michigan

NCR
Computers & Terminals

"Our NCR Century gives us so many capabilities it's like having two computers for the price of one!"

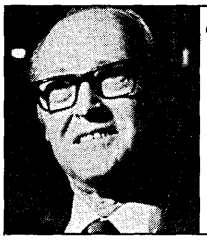
Sam Muldres, President
Western Massachusetts Computer Center
Holyoke, Massachusetts

"Benchmark tests proved the NCR Century could handle our inventory requirements faster and for less cost than other computer systems."

James L. Meagher, President
Stratton & Terstegge, Inc.
Louisville, Kentucky

"Now we measure every activity by its contribution to profit. Key to our success is the NCR Century computer system."

C. J. Sumner, Manager of Data Processing
Continental Steel Corp., Kokomo, Indiana



"With the NCR Century computer, off-the-shelf software is economical and practical, and conversion is quick. Our return on investment began in less than a month."

Harold Canada, Vice President
Hafers', Inc., Salt Lake City, Utah

"Our NCR Century computer prints prices and invoices for same-day shipment. That's great customer service. And we've increased turnover with less staff and inventory."

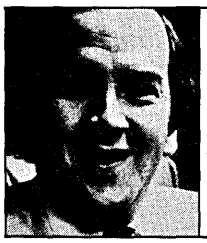
Robert R. Buchanan, President
Northwestern Drug Co., Minneapolis, Minn.

"I was impressed most by the add-on features of the NCR Century, since we are looking for a 100% growth factor in the next 5 to 10 years."

Max Disbennett, Comptroller
University of Tampa, Tampa, Florida

"Our NCR Century Computer helped us increase our annual sales $5,000,000 and decrease our inventory $170,000."

John Caputo, President
Garden Fresh Markets, Clarksburg, W. Va.



"The fact that the NCR Century 100 computer system could grow along with my retail operation sold me on NCR."

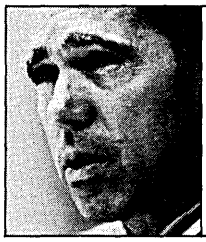
Yale T. Dolginow, Exec. Vice President
Dolgin's, Inc., No. Kansas City, Missouri

"We compared the main manufacturers of computers and picked NCR primarily because of our past experience with the service they've given us on other equipment in our bank."

Wendell H. Conaway, V.P. of Data Processing
Commercial Bank at Daytona Beach
Daytona Beach, Florida

"Town government and citizens of every community are demanding far more accountability from the people who run the schools. Our NCR Century enables us to meet this demand."

Paul R. McDevitt, School Business Administrator
Darien Board of Education, Darien, Connecticut



"To match our NCR Century's performance with another computer system would have cost us twice as much."

Roy J. Bernard, Director of the Computing Center
Southeastern Louisiana University

"We chose the NCR Century because the product for the price was better than anyone else had to offer."

Dan Seyfarth, Data Processing Manager
McHenry Hospital, McHenry, Illinois

"Our NCR Century System has meant new life for this office. Our patient accounts are now always current, accurate and under control."

R. B. Watson, Comptroller/Treasurer
ST. Joseph's Hospital, Asheville, North Carolina

"The greatest advantage from our NCR Century system? I'd say customer service. We can respond to our customers' needs much better than we could before."

Walter F. Urban, Jr., Treasurer
Union Federal Savings & Loan, Pittsfield, Mass.

"With our NCR Century C.I.F. System all data on each customer is in one place for account analysis and creative marketing. Our growth depends on this."

Bert Lance, President
Calhoun First National Bank, Calhoun, Georgia

"Our NCR 280 Terminals brought our stores in Texas two days closer to us."

Archie W. Crittenden
Director of Merchandise Information
Dillard's, Little Rock, Arkansas

(more are being added) local retail establishments, utilities, and fuel companies that, in turn, pay nothing for this service. A number of records-keeping functions are available, the subscriber receiving a twice-monthly printout of his family expenditures that go to make up his budget, a separate list of tax-deductible expenses incurred, plus a reminder of important upcoming dates, anniversaries, or appointments. The user can also set up a file of his valuables with serial numbers, date of purchase, and dollar value, and receive this printout upon a loss or theft. Finally, In-Touch adds, subtracts, divides, and multiplies, providing a voice response of each entry and—in this calculator mode—the answer.

All this costs $6.50 a month, based on an anticipated 100 minutes of hook-up time or some 200 entries a month. Beyond that, there's a 4¢/minute charge. A template that fits over the keys of the Touch-Tone or Touch-Call phone is provided.

For two months before the announcement, 116 demographically selected people in the Seattle area tested the system. In the first month following the announcement but before any formal solicitation of subscribers began, more than 400 joined up. The first mailing to get people signed up started on July 9, and some 10-15,000 subscribers were expected within the first 12 months of operation. To the surprise of everyone there, more than 60 financial institutions around the country reportedly have contacted the company to inquire about an exclusive licensing arrangement. So the company has scheduled two briefing sessions this month for further discussions. According to exec vp Howard Phillips, the service will spread nationally, whether under licensing agreements or performed by TCS. Phillips says the company has had discussions with a major firm, which remains unnamed, with whom TCS might expand the service.

TCS uses a dual PDP-11 system with a Wavetek voice response unit, contracting outside for off-line processing on a 360/40. Phillips adds that applications for small and large businesses are a possibility.

Benchmarks

An Ounce of Prevention: Erwin Tomash, chairman of Data Products Corp., Woodland Hills, Calif.; producer of line printers, core memories, and communications products; returned from a trip to Europe seemingly worried about his company's being a "sitting duck" for a raid by a foreign company which might try to take it over and make it a captive supplier. Data Products reported its best first quarter ever for the period ending June 30, with income of $1,714,000 on revenues of $18,877,000. Tomash told shareholders at the latest annual meeting that its shares currently are selling for less than the company's net worth. "And American securities are dirt cheap in Europe." Tomash asked for and got from shareholders a change in the company's by-laws which had allowed cumulative voting for directors. This meant shareholders had as many votes per share as there were directors to be elected, and could cast them all for one director—so that a holder of one-seventh of outstanding shares (DP has seven directors) could elect a director. One by-laws change Tomash asked for and got restricts voting for directors to one vote per share meaning it would take 51% of shares to elect a director. Another change staggers election of directors with sets of two or three to be elected every three

years, as opposed to the whole board being up for election each year. Tomash stressed the fact that he didn't know of a movement afoot by a foreign firm to take over Data Products. He just felt it could happen.

Univac in point of sale: Univac, which bought RCA's computer customer base nearly two years ago, is going it again with RCA's grocery store automated checkout system, acquired last month for close to $5 million. RCA had developed test systems using both keyboard entry and automatic scanning methods. As Univac prepares to enter the point-of-sale business, it is flush with higher-than-expected revenues from the RCA computer base it retained after buying it for a $70.5 million downpayment in January 1972 and an agreement to base future payments on a revenue-sharing basis. Last month the two firms announced that RCA will now realize more than $137 million from the agreement, compared with the $100 to $130 million it first expected. RCA also has generated $10 million in revenue from the sale to Univac of spare parts and services.

Motorola's Inn: Latest offering to the automation-resistant lodging industry comes from Motorola, Inc. It has been widely known that the diversified electronics company had been working for the past two years with Holiday Inns on development of a system, but little was known of its nature until it was formally introduced last month in the 468-room Holiday Inn in Hollywood, Calif. The totally redundant system uses PDP-11s with 12,288 words of core, small Caelus disc drives, Diablo printers, and Motorola's own crt's and acoustical couplers. Eventually the system will consist of four modules for guest registration, room control, housekeeping control, and guest charge accounting. Prototypes of the registration and room control module and the housekeeping control module were demonstrated in Hollywood. Motorola said it will install 16 additional two-module systems for Holiday Inns this year. The value of its contract was not disclosed. Additional modules should be ready early next year.

Compatibility: National Cash Register Company, which last year finalized its joint computer peripherals venture with Control Data Corp., has now joined CDC and two overseas companies in Multinational Data, a Belgium-based joint study company formed in May 1971. France's CII and Britain's ICL are the other partners in the company which is working on developing standards to make each other's computer products compatible.

Bilingual Computer: Sperry Univac last month demonstrated a computer-generated voice system which provides responses in 12 languages, including Mandarin Chinese, ancient and modern Greek, Hebrew, and Urdu (the language of West Pakistan). Dr. Carl Hammer, director of computer sciences for the Federal Systems Div., said the system is capable of up to 24 minutes of non-repetitive English speech, uses an average of 20 words a minute, and can speak 400 words in each of six foreign languages. Communication with the "talking computer" is via touch-tone telephone. In the demonstrated system, the computer assembled complete pre-recorded words in the right sequence for playback. Hammer sai systems of the future are expected to actually assemble and speak words from individual sounds stored in memory. □

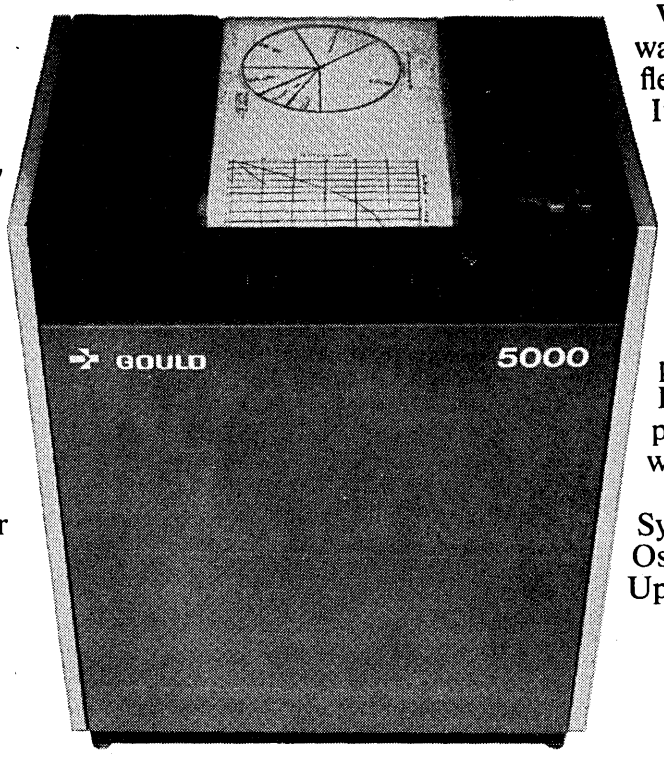
It's everything you've ever wanted in a peripheral for your mini. With a price/performance ratio superior to every other electrostatic printer/plotter on the market.

In fact, the Gould 5000 gives you 1200 lines per minute—or 600 more than Brand V. And at a lower price.

That means you get high speed for improved mini throughput efficiency. Low cost for economic justification. And, of course, high reliability backed by Gould's reputation for quality.

But you also get a lot more. Resolution of 100 dots per inch. Full alphanumeric and graphic capabilities. 132 characters per line. A 64 ASCII character set. Fan fold and roll paper. 8 bit wide data path.

Optional features? The Gould 5000 is loaded. 96 ASCII character set, upper and lower case. 128 ASCII character set custom designed to your requirements. On-line mini-computer and off-line magnetic tape interfaces.



What's more, Gould software is the most efficient and flexible available anywhere. It lets your mini print and plot considerably faster than competitive units.

We say that the new Gould 5000 is the best buy on the market, with the best features of any mini-computer printer/plotter. And our Pete Highberg or Bill Koepf can prove it to you. Get in touch with them now at Dept. D9, Gould Inc., Data Systems Division, 20 Ossipee Road, Newton Upper Falls, Mass. 02164.

The new Gould 5000. Twice as fast as any printer/plotter ever designed for mini-computers.

DATA SYSTEMS DIVISION

GOULD
DATAMATION

CIRCLE 28 ON READER CARD

What looks like data here could be garbage there. And vice-versa.

If you've ever tried to combine data interchangeability and low cost digital recording you know the problem: data in, but sometimes only garbage out.

So we've come up with a system for cutting costs without cutting corners:

The "Scotch" Brand Data Cartridge and 3M Data Cartridge Drive.

Fully compatible with proposed ANSI Standards for ¼" cartridge devices, our system records—and retrieves—up to 5.5 million bits of data on each of 1 to 4 tracks. Shuttles bidirectionally at 90 ips. Reads, writes and backspaces at 30 ips. And provides a data transfer rate of 48,000 bps.

You get reel-to-reel performance for about the price of a 0.150" cassette system.

The medium is our own ¼" "Scotch" Brand Data Cartridge, with its unique endless drive band. A new concept in tape handling, it requires no external tape guidance and external power at only a single point. Tape handling is so gentle, so precise tape can't cinch, spill, stretch or break and cartridge life expectancy is in excess of 5000 passes.

And to ensure data interchangeability, we've developed a drive with the same simplicity and reliability. A single dc motor with a tachometer feedback speed control. Servo control of the start/stop ramps for accurate inter-record gap lengths. A die cast top plate for exact cartridge positioning. And foolproof, drop-in loading that automatically positions the cartridge in precisely the same position even after thousands of load/unload operations.

In OEM quantities, the basic DCD-3 Data Cartridge Drive—with a single-channel, read-while-write head and servo electronics—is less than $350. Full-blown evaluation units with data and control electronics in a 4 track, read-while-write configuration are just $961 and available now.

It's your chance to clean up your data interchange problems. And your costs.

Contact Data Products, 3M Company, 300 S. Lewis Rd., Camarillo, Calif. 93010. Telephone (805) 482-1911. TWX: 910 336-1676.

We've been there. And brought the answers back.

3M COMPANY

Hardware

Off-line

Memorex has scrapped a psychedelic label design intended to make its computer tape recognizable while in motion. We hear that the colorful label was designed to combine with the 60Hz frequency of overhead lighting to produce the desired results. Unfortunately, those who stared at the tapes too long tended to walk smack into walls, and the Santa Clara, Calif., manufacturer has enough current problems without inviting lawsuits from dazzled operators.

IBM's change of position regarding disc pack cleaning is being hailed by a Calif. manufacturer of disc pack cleaning equipment as a major advance in its efforts to educate users on the benefits to be derived from the process. Joseph Ludka, president of Randomex, Inc., cites a letter from IBM's Information Records Div. to its salesmen stating that under certain conditions, cleaning packs can improve their performance.

In an effort to streamline the operation of Congress, a system of 32 Western Union Data Services EDT 300 terminals has been installed in the Senate, House of Representatives, and the Capitol. In operation, editors summarize verbatim accounts of Senate proceedings and broadcast synopses to the terminals at 15-minute intervals. The pilot system is intended to keep Senators who must be away from the Senate floor apprised of the proceedings.

When a Porsche 914 being raced in amateur competition showed signs of a mysterious handling trait, Hank Fallek, marketing manager for Hewlett-Packard's 5451A Fourier analyzer, suggested that the car undergo dynamic chassis analysis. It was determined that the car's frame had a natural frequency of 12Hz which, in certain types of turns, set up a bouncing condition that lifted the rear wheels as much as an inch off the ground. Through chassis modifications the problem was solved, and as a result, Hewlett-Packard plans to offer dynamic auto analysis as a commercial product later this year.

The "Big" System/3

In offering up to 128K bytes of memory and dual-stream multiprogramming, it seems that IBM has introduced a very good competitor for its own 370/115 in the System/3 Model 15. About the only major feature the 115 has that the S/3 does not is virtual memory, and a lot of small users can probably do without that anyway. It's just possible that the new Model 15 has been introduced to satisfy a body of users simply not interested in converting to the 370 line, preferring instead an enhanced version of the world's most popular computing system.

Memory on the Model 15 is IBM's latest MOSFET chip design, with 2K bits/chip. The basic cycle time of the memory and cpu in the system remains unchanged, at 1.52 usec. Peripheral memory limits have been raised too, and the new big little machine can have a total of 91.72 megabytes spread over four 5445 and 5444 disc drives. A second Binary Synchronous Communications Adapter is now offered on the Model 15, and a crt console/keyboard is now standard.

Two peripherals cannot be used with the mod 15 that were offered with previous versions: the 3881 optical mark reader and the 1255 magnetic character reader. These peripherals can be used on a mod 15 if it is run in a Model 10 mode, but that would seem like a waste of processing power to us.

There are two ways of implementing multiprogramming on the Model 15. One is to run a two-partition system with a maximum partition size of 48K, which requires approximately 22K bytes of supervisor. The alternate method uses a Communications Control Program (CCP), which adds roughly 20K to the basic 22K requirement. In this mode the 15 can be adjusted to have a front partition ranging from 2-32K, with the balance in the background partition.

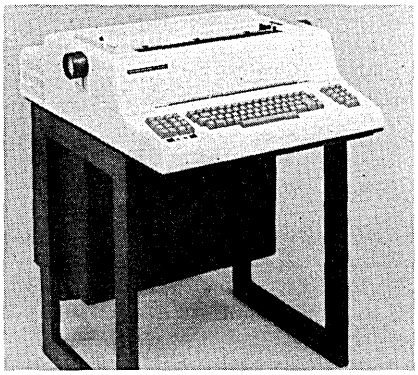
A small mod 15, with 48K of memory, crt/console, one 5444 cartridge disc unit (4.9 megabytes), a 5424 card unit, and the 465-lpm version of the 1403 printer, rents for $3,240/month and can be purchased for $136,575. A typical large configuration might include 128K of memory, one bisynch adapter, one 5444, four 5445 disc pack drives, multifunction card unit, and the 1100-lpm 1403 N1. This system is priced at $298,480 and can be rented for $7,127. Deliveries of the System/3 Model 15 are scheduled for early next year. IBM CORP., White Plains, N.Y.

FOR DATA CIRCLE 321 ON READER CARD

Conversational Terminal

The IS/5741 is an amalgam of features seen on a number of other terminals but perhaps never before combined into one package. The terminal prints at two switch-selectable full-duplex data rates up to 300 baud, or 30 cps, with characters drawn from a print wheel that has an upper/lower case ASCII font. The print wheel is easily interchangeable to accommodate other character sets. The 5741 has a standard 132-character line, with 156-character lines optional.

There are a number of other options available for the 5741, including remote and local forward and backward skip, addressable horizontal and vertical tabulation, and half-line spacing in forward and reverse (the latter two provide the unit with plotting capability). Also optional are a pin feed platen, removable forms tractor, built-in modems, acoustic coupler, answerback and unattended operation, parity generation and detection, and terminal-to-terminal transmission. Rental on the basic unit is $115/month with deliveries beginning early in the fall. GTE INFORMATION SYSTEMS, Stamford, Conn.



FOR DATA CIRCLE 322 ON READER CARD

Minicomputer Line Printers

Owners of the most popular mini's, including Novas, DEC PDP-11s, H-P's, Honeywells, Varians, and Digital Computer Control models, can have

FOR LIBRARY CIRCLE 44 ON READER CARD→

an interfaced 125-lpm or 200-lpm line printer at prices from $4,895 to $5,795. Built to print up to six copies, the units are called the 2311 (125-lpm, six lines/inch) and the 2312 (200-lpm, either six or eight lines/inch), and are actually built by Tally.

Printing is done by Tally's unique 132-column crossbar mechanism, and paper control is handled by an 8-channel VFU. The units are said to be simple enough for a user to install, but installation help is available. Nationwide maintenance is also available, at about $150/month. MEDIA III, Fullerton, Calif.

FOR DATA CIRCLE 323 ON READER CARD

Disc Storage

The mod 11s of the 3333 disc storage and control, 3330 disc storage, and 3336 disc pack devices can't help but become popular items in IBM dp shops. They are logical extensions of the extremely popular 3330 disc storage unit, they offer double the storage capacity per pack of the original 3330 (200 megabytes/pack versus 100), and they are reasonably easy to convert to. All this for perhaps 40% more than the original 3330 pricing, which works out to a net *decrease* of roughly 29% in the cost-per-byte of storage for users. With the prices of everything else going up, it's good to see a 29% price cut on anything.

There are some other nice features of the mod 11s, too. Up to three 3330s —in any combination of new and previous models—can be attached to the new or existing 3333 models. And while the 100 megabyte disc packs can't be slapped on the mod 11s as is, IBM will bring the old packs up to latest specs for $650/pack. The string switch feature announced with the 3333 is also offered on the mod 11s, and installed 3333s or two-drive 3330s can be made into mod 11s in the customer's shop. Curiously, no 8+1 configurations of the new storage subsystem are offered, only two-up spindles. Another modification made to the 11s' controllers is a feature that allows the data channel and control unit to simply issue erase commands to the spindles and then disengage to perform other I/O activity, which could help performance somewhat.

Offered with all 370 models in the range including the 135 and the 168 running under OS/VS1, VS2, or VM/370, the new units and field conversion teams are scheduled to go to the field next March. The prices are $74K for a two-spindle 3330, $87K for a 3333, which includes a controller, and a $1,150 for new 3336 packs. Monthly rentals on the 3330 and 3333 mod 11s are $1,845 and $2,174 respectively, and the units are available on IBM's extended term plan. IBM CORP., White Plains, N.Y.

FOR DATA CIRCLE 324 ON READER CARD

Small-scale System

Burroughs has supplied a growth-path computer for its rapidly expanding base of 1700 series system users. The B1728 offers them increased performance based on larger memories, some faster and/or larger peripherals, and increased communications capability.

Main memory on the 1728 ranges from 64- 256K bytes of semiconductor memory in 16K increments, with the same cycle time as the old top-of-the-line 1726 model at 167 nsec for a full three-byte transfer. Additionally, the control memory on the 1728 has been increased to 6K or 8K to hold more of the Master Control Program monitor, which should increase performance somewhat. Macro routines that didn't make it into control memory are stored in a new head-per-track disc unit with an access time of 20 msec, expandable from 8-40 megabytes. Data files can also be stored on this unit. The 1728 will also accommodate three dual-disc pack drives with a combined capacity of 525 megabytes, an average access time of 42.5 msec, and a transfer rate of 625KB. A new 16-line communications adapter services 9600 lines operating in synchronous and asynchronous modes.

Language processors on the 1728 include the traditional COBOL, FORTRAN, RPG, and BASIC, and include two new languages. One is called Network Definition Language (NDL), a compiler-based language that allows a user to define and generate network control programs; and User Programming Language, said to allow experienced users to solve complex message handling problems.

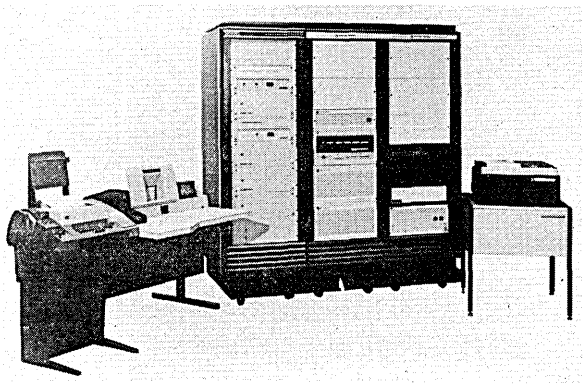
A B1728 with 128K bytes of main memory and 6K of control memory, 175 megabytes of disc pack storage, 8 megabytes of head-per-track storage, 750-lpm 132-column line printer, 800-cpm 80-column reader, 100 cpm 80-column punch, two 9-channel tape drives with 96KB transfer rates, and a console/printer/keyboard, sells for $456K and rents for approximately $9K/month on a five-year lease. First deliveries are scheduled for next quarter. BURROUGHS CORP., Detroit, Mich.

FOR DATA CIRCLE 326 ON READER CARD

Minicomputer

It seems like the builder of the world's most powerful commercially available computer line can't build anything that isn't fast and powerful, even minicom-

product spotlight



Voice Identification

The Voice Operated Identification Computer Entry (VOICE) is a voice recognition system that would typically be a component in applications requiring positive, high-speed identification of users, as in banking by phone. Incoming voice patterns are stored on a small disc unit until pulled off for processing by a 15-bit 250K Hz A/D converter and a minicomputer. As many as 4K points in the voice print can be analyzed in approximately 50 usec, and a go/no-go decision sent to the computer to commence processing. The system is expandable from eight to 128 lines.

While it might seem that such a technique might be susceptible to errors caused by variations in voices, the vendor claims that just the opposite is true; the way in which a person says his or her name doesn't change appreciably throughout life, and the same goes for numbers. Even hoarseness doesn't affect the basic frequency pattern of the voice, it's said.

The VOICE system is installed as a turnkey system, with an eight-line system priced at approximately $150K, depending on a user's particular requirements. Also because of the custom nature of installations, availability of roughly five months ARO is given. DATAWEST CORP., Scottsdale, Ariz.

FOR DATA CIRCLE 320 ON READER CARD

hardware

puters. The basis of its new SYSTEM 17 line is the 1784 processor, available in a choice of 600- or 900-nsec semiconductor memory in capacities ranging from 4-64K 18-bit words. Standard features of the 1784 include hardware multiply/divide, 196 mnemonic instructions, 16 programmable interrupt levels, a direct-memory-access channel, seven general-purpose registers, seven-level memory addressing, memory parity/protection, an operator panel, and a pc board controller for a tty or crt console. The price for this configuration (with 4K of 900-nsec storage) is $13,500, and the rental is $330/month on a one-year lease. Maintenance is an additional $97 per month.

The 1784 is an extension of CDC's 1700 line, and is upwardly software compatible with it. The primary markets for the new mini are thought to be in process control, health care, and communications. Software for the 1700 includes the standard Mass Storage Operating System (MSOS), a complementary paper tape-based Reduced

Core Monitor operating system, and even a magnetic tape-based subset of the SCOPE operating system that operates on CDC's medium- and large-scale products.

A number of new peripheral products were introduced with the 1784, including a 4.4-million-word cartridge disc drive ($14,500), a magnetic tape subsystem that allows up to four 37.5 ips tape drives to be handled by one controller ($11,500), a 300-lpm line printer (with a 64-character set) priced at $17K, and a 300-cpm table-top card reader for $6K. First deliveries are set for the fourth quarter. CONTROL DATA CORP., Minneapolis, Minn.

FOR DATA CIRCLE 325 ON READER CARD

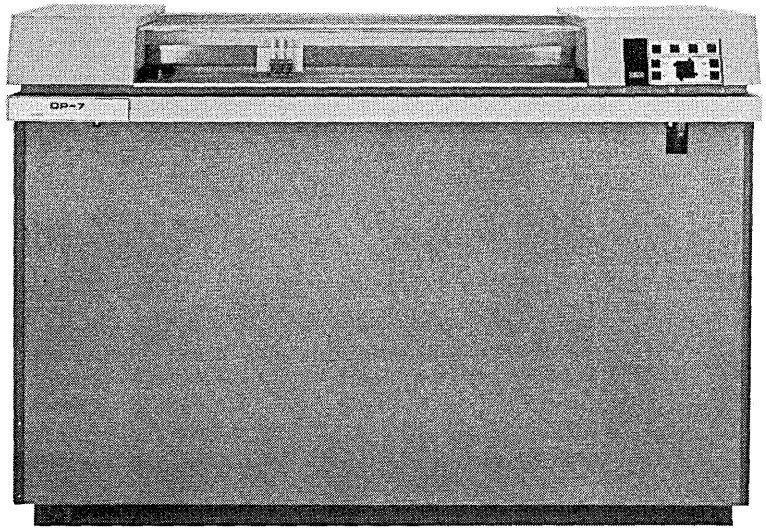
Communications Terminal

There are two principal reasons why the DTC-300 data communications terminal will become very popular with users: one is its highly regarded Hy-Type print mechanism from Diablo,

Online . . . Offline . . . or Time Sharing

36" CØMPLØT®

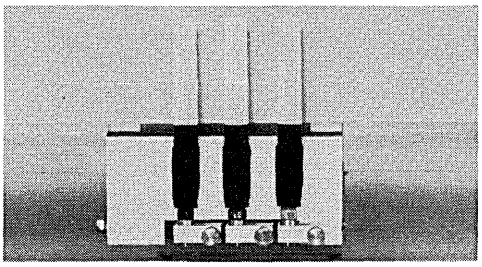
DIGITAL PLOTTER



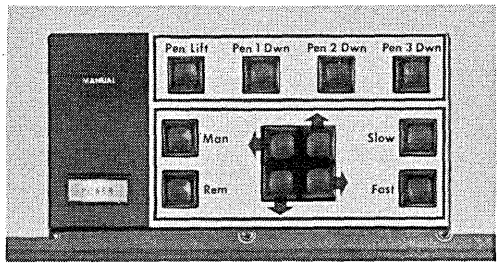
DP-7
$11,950.

- ☐ 36" wide, 1800 increments/second
- ☐ Three pens — in color — automatically selectable
- ☐ 0.0025 inch step size (or metric equivalent)
- ☐ Vacuum buffered paper transport

The new DP-7 CØMPLØT unit is a 36" wide high speed digital plotter that works online or offline to produce computer graphics such as: Contour Maps, Critical Path Drawings, Logic Diagrams, Piping Drawings, Weather Maps, Printed Circuit Artwork, and lots more.
It's a flexible, accurate, high speed unit that is limited only by the programming imagination and the computer. And it's priced right. Send for brochure today. Also ask for companion MRT-4 Magnetic Tape Reader that gives you an offline plotting system.



Three pen option — and your choice of ball point, liquid · ball point, fibre tip or india ink.



Simple push buttons control paper, pen and power; low paper supply and low vacuum shown by indicator lights.

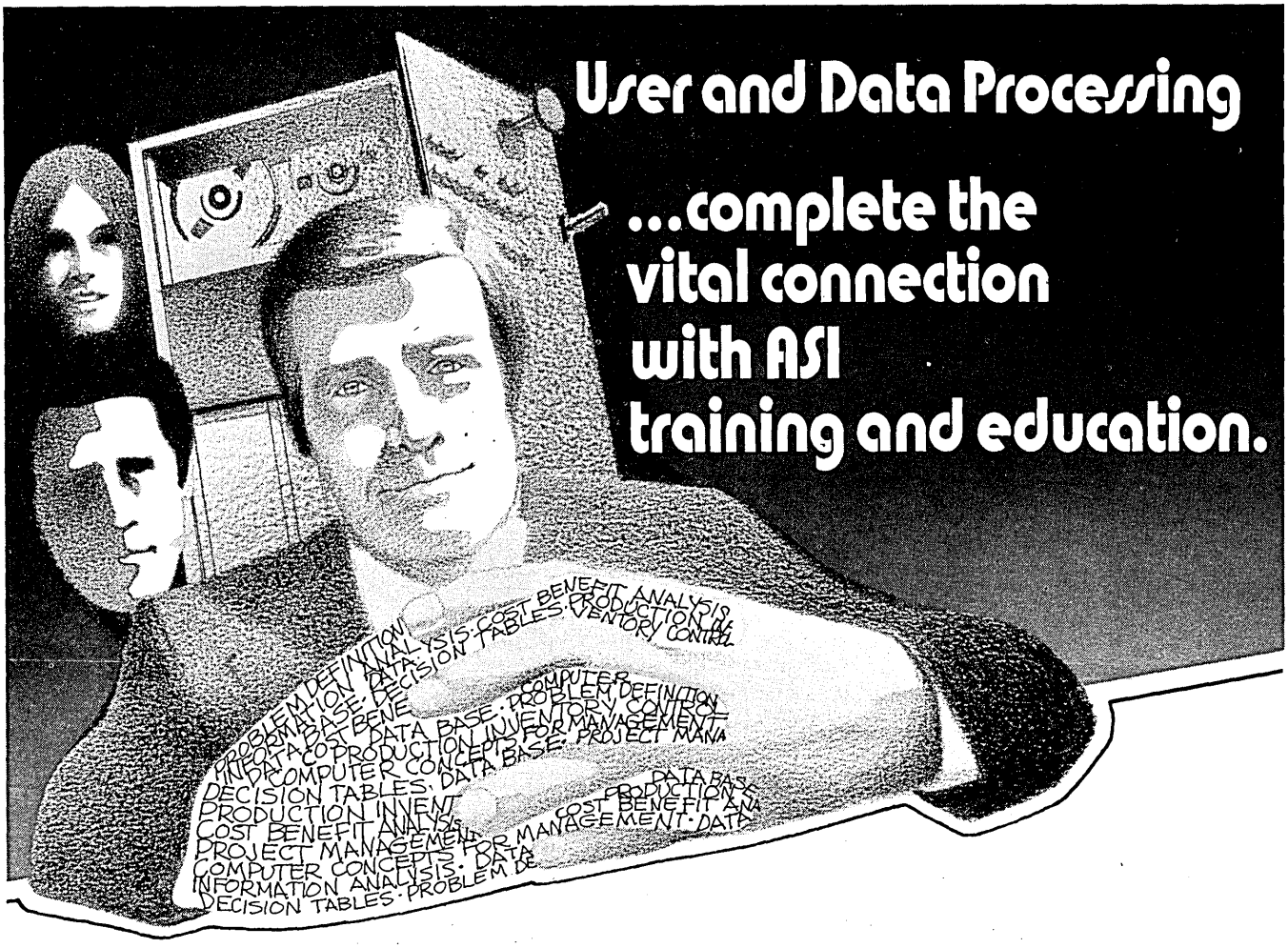
**Registered Trademark of Houston Instrument*

THE RECORDER COMPANY | houston instrument | DIVISION OF BAUSCH & LOMB

4950 TERMINAL AVENUE, BELLAIRE, TEXAS 77401
(713) 667-7403 TWX 910-881-5782 CABLE HONICO

European Office Rochesterlaan 6 8240 Gistel Belgium Telephone 059-27445 Telex BAUSCH 19399B

CIRCLE 35 ON READER CARD



Computers and computer people have become a vital, integral and growing part of your investment. Their machines can save you time, money and aggravation. Yet, does it often seem as though there is something incomprehensible about the people and something faintly sinister about their machines that hum and whirl and blink and spew out reams of printed paper?

Advanced Systems Incorporated has a way for you to overcome that feeling of intimidation. The feeling that you're not getting what you want, when you want it. It's called education and training. And it works through Video Assisted Instruction. The courses are on video and audio tapes with a comprehensive student and instructor's guide. The tapes can be used in-house on a one-to-one or a group basis and are available on a lease or buy plan.

We have a total curriculum of courses like Computer Concepts for Management, Project Management, Cost Benefit Analysis, Production Inventory Control and many others all designed to give you a better understanding of how computers can help you. And better information and understanding lead directly to greater profit.

ASI is the world's largest supplier and producer of in-house video assisted instruction with a client list that reads like an international "Who's Who" of financial and industrial institutions, government and education. We believe the end result of education must be quantifiable, measurable change. And our instructional and training systems are designed to produce results now.

For more information on how ASI can help your people, fill out and mail the coupon.

Developing today's Man for tomorrow's challenge

ADVANCED SYSTEMS INCORPORATED

Corporate Office, 1601 Tonne Road
Elk Grove Village, Illinois 60007
Phone 312/593-1790

Offices in Atlanta, Boston, Chicago, Cleveland, Dallas, Detroit, Los Angeles, Minneapolis, New York, Philadelphia, Pittsburgh, San Francisco, St. Louis and Washington, D.C.

International affiliates in South Africa, Australia, Canada, England, West Germany, Iran, Mexico and Sweden.

ADVANCED SYSTEMS INCORPORATED
Dept. 3
1601 Tonne Road/ Elk Grove Village/ Illinois 60007

Please send me more information on your User's Curriculum.

NAME_____

TITLE_____ PHONE_____

COMPANY_____

ADDRESS_____

CITY_____ STATE_____ ZIP_____

---

iomate of the month

The industry's broadest line of mini peripherals. Paper tape equipment. Disc, magnetic tape and mag tape cartridge storage systems. Line printers. Card readers. OEM data-entry and communications terminals. Controllers and adapters. All available from one supplier. With volume discounts across the full product mix.

This month's iomate is the iomec representative. Your single source for a complete mini peripheral program.

He starts with hardware. Advanced data input, output and storage equipment designed specifically for mini computer applications.

Next, he can provide the interfaces. Software compatible interfaces that link iomec peripherals to the most popular mini computer systems. They're completely transparent to your present operating system.

And he can back your systems with customer engineering. Maintenance service that's available to you and your end-user customers from fully equipped, professionally staffed service centers in major cities across the country.

Finally, he can cut your peripheral costs. With OEM discounts based on the total volume of peripherals you order. Even if your order includes several different iomec product lines.

Call your iomec representative today. He can save you a lot of shopping around.

iomec inc

Route 9, Southboro, Massachusetts 01772 (617) 481-2500
345 Mathew Street, Santa Clara, California 95050 (408) 246-2950

and the other is its microprocessor supplied by Intel Corp. The 300 operates at switch-selectable print speeds of 10, 15, and 30 cps. There is also a switch that controls font size so a 96-character ASCII font can be pica or elite. If the size is pica, the terminal prints across 132 columns and six lines/inch, and for elite, the unit automatically sets up for 158-column print lines at eight lines/inch. The 300 has tab controls to allow plotting with a resolution of 48 points/inch in the vertical and 60 in the horizontal plane. Rounding out the standard features are a local/off-line switch, a 10-key numeric pad, and an RS232 interface.

The Intel processor incorporated does such things as fill the character buffer during carriage return operations, convert ASCII bit streams to parallel for printing, and handle plotting chores. (In this last function the processor handles the tabulation skips.) The little processor also makes possible a number of options: ASCII/EBCDIC code conversion making the 300 look just like an IBM 2741, operation with Telex (Baudot) code at Telex line speeds, and answerback messages of up to 20 characters. Also optional are manual or automatic built-

in modems, and a sprocket feed mechanism.

The basic terminal is priced at $3,950. Service arrangements for the DTC-300 have been made in a number of major cities, and delivery is quoted as 60 days. DATA TERMINALS & COMMUNICATIONS, San Jose, Calif.

FOR DATA CIRCLE 327 ON READER CARD

Message Switcher

The software from the 7000 series multiple-processor message switching systems has been distilled to fit into a single cpu, allowing the announcement of a less expensive emulator for IBM 270X's and 370X's. Called the Model I, the communications system is offered with 32K bytes of core, 1.3 megabytes of fixed-head disc, a color display console, and interfaces for 32 low-speed lines (110 to 300 bps) at a price of $125,000. Line speeds to 50K bps can be accommodated and 256 asynchronous or binary synchronous terminals can be supported—up to a total throughput of 3000 cps.

The system has been tested with BTAM, QTAM, TCAM, HASP and CICS, and can be attached to several IBM 360 or 370 processors simultaneously. The vendor claims that many of the Model I's operating features, including alternate routing, broadcast and group addressing, and user-defined checkpoint/recovery, are not to be found in other systems of this price.

To be delivered with software as a turnkey system, the Model I will be maintained nationwide by the vendor's own service organization. COMPUTER COMMUNICATIONS, INC., Culver City, Calif.

FOR DATA CIRCLE 328 ON READER CARD

Graphics Terminal

The CYBER graphics terminal represents CDC's latest thoughts on what such a product should look like for

engineering and computer-aided manufacturing applications. A successor to the model 274, the controller is a 24-32K 16-bit version of CDC's SC1700 computer, and is powerful enough to do graphics work, on-line batch processing, and even remote job entry duties without measurably degrading graphics performance, it is claimed. Up to three 24-inch-diameter display screens can be appended to the system, each accompanied by a keyboard with 10 function, 16 mathematical, and 96 alphanumeric keys.

The screen displays a 4K x 4K matrix of addressable points with a standard refresh rate of 50 frames/second. The refresh rate drops as the amount of information on the screen goes up, of course, but you have to display 11,400 characters, 20,900 eight-inch lines, or 10,000 points to pull the refresh rate down to 30 Hz. The character generator is rated at 3 usec/character, and the vector generator is rated at 1 inch/usec.

Communication between the CYBER subsystem and a host CYBER 70 or 6000 series large-scale computer is accomplished at 40.8 kilobaud rates. A basic system, comprised of a 24K word controller, display console, communications adapter, magnetic tape cassette unit, and terminal software is priced at $120K, or $3K/month on a one-year lease, excluding maintenance charges. Units will be available in the first quarter of 1974. CONTROL DATA CORP., Minneapolis, Minn.

FOR DATA CIRCLE 329 ON READER CARD

Terminal Switching

A series of channel switches are offered that permit users of Memorex 1270, or IBM 270X, 3704, and 3705 communications controllers to switch individual or groups of lines between controllers. The 5100 series switches are available in 8- and 16-channel versions for insertion between the communications controllers and the local modems. Data rates up to 230 kilobaud can be supported. The switches are priced at $1,575 and $2,675 respectively, and are said to be so easy to install that even a user can do it. T-BAR INC., Wilton, Conn.

FOR DATA CIRCLE 330 ON READER CARD

Tty Buffer

Here is a relatively simple product that vastly expands the usefulness and efficiency of the Teletype Corp. teleprinter and is priced right. It's called the Teletypewriter Terminal Buffer (TTB), and it consists of either an 8 or 16K MOS memory and editing controls. The TTB allows a user to enter data at the standard tty rate, edit it by character, line or file, and then send it across phone lines at up to 1800 baud. The TTB can further reduce user line costs by transmitting data during times when phone rates are lower, since an unattended operation feature is optional.

Other options include automatic tty motor on/off, low paper indication, data compression, and reverse channel transmission to insure that the message is being received. Another nice feature of the TTB is that the user can choose whether the data in the buffer is to be erased or saved as it's being printed. This choice has to be made before the buffer is transmitted, which should eliminate accidents.

The TTB models are said to be completely compatible with IBM 3704 and 3705 processors, and IBM reportedly offers an RPQ that adapts 270X transmission control units to handle TTB-equipped terminals. The units are said to be easily mounted to the back or side of tty or equivalent terminals, and sell for $1,600 and $2,200, respectively, with leases available. Delivery is quoted as 60 days. FAIRCHILD COMMUNICATION EQUIPMENT, Sunnyvale, Calif.

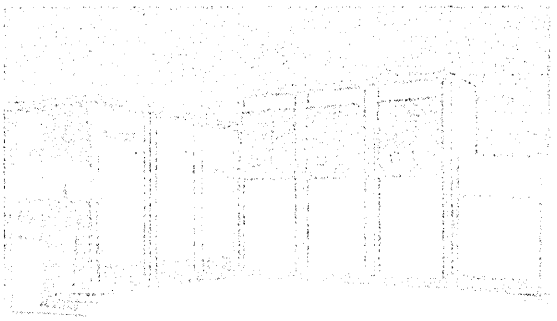
FOR DATA CIRCLE 331 ON READER CARD □

COMPLETE MINISYSTEM

30-DAY DELIVERY

You can have a custom-configured Raytheon 10-billion-transaction system delivered 30 days after we have your order. Maybe even less.

(How long do those other systems take? 60 days? 90? 120?)



In every Raytheon system will be complete, with powerful software. Programs that have been proven out in everything from seismic exploration to biomedical research to plant automation to flight data analysis. And just about the biggest choice of peripherals in the industry.

Service? By Raytheon's 2,500-member service organization.

Backing? By the international Raytheon Company.

One final word. That 30-day delivery applies only to orders received before the end of this year, so better start planning now. A phone call is the best way to start.

Raytheon Data Systems, 1415 Boston-Providence Turnpike, Norwood, Mass. 02062. (617) 762-6700. Attention: Bill Rainsford. Raytheon — for fresh ways to transmit, display and process your data.

RAYTHEON

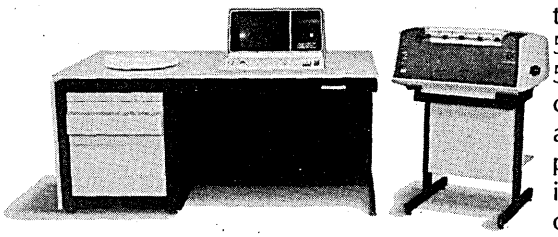
If you design software for end users, we have the system they need:

Lockheed System III

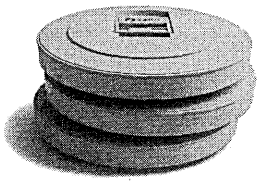
Why stop at selling or leasing just your application software to end users? Now you can offer them a complete minicomputer package system.

This way they can get everything they need from you. And you get everything you need from us.

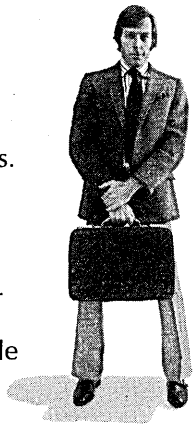
Meet Lockheed System III. A basic configuration of 16K bytes of memory, decimal arithmetic processor, CRT, keyboard plus a 10 key pad and 8 function controls, and IBM 5440 compatible 5 million byte capacity disk, and 100 cps line printer. Housed in an attractive desk enclosure.



Software you need. To make your programming burden lighter we offer a full set of software tools: beginning with an RPG II that is 98% compatible with the industry standard. Then a System Program Package of editors, sort/merge, an assembler and link loader. Control them with a Disk Operating System which includes operator communication programs and utilities. That's real ease of programming. And we're the only minicomputer company we know of that unconditionally warrants all our software for a full year.



Peripherals and expansion. The Lockheed System III has a full line of peripherals plus core memory expansion up to 62K bytes. Add 3 more disk drives, punched card and paper tape devices, magnetic tapes or cassettes, or line printers up to 600 lpm. Just what your customer needs. And when his needs change, so can the system. Easily. Anytime.



Economical. Bundled to save you money, the basic hardware configuration with software is competitively priced. Quantity discounts are available, of course.

Maintenance too. We'll handle any and all problems your customers might have, promptly and expertly, anywhere in the U.S. And we'll do it by contract or on call, either way you want it.

We also offer training classes in maintenance as well as in programming.

Add it up. So what you'll have is a more salable package to offer an end user. Everything he'll ever want or need in a minicomputer system, right down to the enclosures. Everything ready and working from the minute it's wheeled in his door.

And you'll be dealing with an established, reputable company, well-known for product reliability. A company that you can count on.

Let's talk. Call the number below, collect, or write us at 6201 E. Randolph Street, Los Angeles, California 90040.

Call us.

Boston 861-1880 • New York metro (215) 542-7740 • Philadelphia 542-7740
Washington (703) 525-3600 • Atlanta 266-0730 • Detroit 557-5037 • Chicago 833-4600
Dallas 231-6163 • Houston 682-2617 • San Francisco (408) 257-3357

Software & Services

Updates

Many software vendors are reluctant to supply source listings of their products for fear that the proprietary logic of the package will find its way into unauthorized installations. At the same time, many potential buyers of independent software grumble about being unable to obtain the source coding so that it won't be stuck with a package that can't be maintained should the vendor go out of business. International Computer Programs, Inc., seems to have come up with a solution to this problem, which has plagued dp from the beginning. ICP will enter into a three-party agreement between the buyer and the seller whereby the source decks, documentation, and other materials will be kept in a bank vault so that the user can always get his hands on the source code should the vendor falter. There is a one-time charge of $400 plus an annual charge equal to 1% of the lease value of the package. ICP, 2506 Willowbrook Parkway, Indianapolis, IN.

A clearing house for APL programs has been established at the State Univ. of New York at Binghampton. All APL users are invited to join APL/PIE (Program and Information Enterchange) by merely sending tapes compatible with the version 1, mod 1 36K workspaces (5734-XM6) compiler running on SUNY's 370/155. Programs will be listed and described in a catalog sent to members on request. The catalog could have been called A Listing of All Manuals or Other Documentation Entries (ALA MODE) but it's not: it's called Detailed Documentation.

After several months in the field, the fourteenth release of the MARK IV file management system is being acclaimed by its users as surpassing COBOL execution times by as much as 3 to 1 in typical situations says Informatics' president John Postley. One comparison given by Informatics was a Michigan appliance manufacturer that required only 23 cpu seconds to run a job under MARK IV that had taken approximately 233 seconds under COBOL on a 370/155.

CICS Program Generator

Display Management System II works in conjunction with IBM's Customer Information Control System to provide users of the 3270 intelligent terminal with a handy "fill-in-the-blanks" method of generating application programs. On one set of forms provided with DMS II, the user describes where data for a particular application should be displayed on the 3270's crt. The forms resemble the layout of the display screen to make formatting of the information easier. Other forms are filled out with file descriptions and the maintenance operations that are to be performed. The resulting program can be immediately applied to the application files. Written in assembler language, DMS II's memory requirement depends on a large number of parameters, but IBM states that if the customer has enough memory for CICS and OS/VS1, or OS/VS2, or DOS/VS, there should be sufficient memory available. The program generator will be available at $375/month next month for the first two operating systems, and for DOS/VS, in June of next year for $275/month. IBM CORP., White Plains, N.Y.

FOR DATA CIRCLE 311 ON READER CARD

Character String Scanner

The character string scanner (CSS) searches data sets for user-specified groups of characters, and is thus suited for applications such as key word extraction from text, text editing, and even conversion of a set of code into a different set of code. Output from the relatively small FORTRAN IV program (79 card images) is a listing of the data set searched, with selected character groups flagged by asterisks. The program, identified as number GSC-11787, is priced at $25, with documentation an additional $6.50. COSMIC, Athens, Ga.

FOR DATA CIRCLE 312 ON READER CARD

Dp Auditing Seminar

An edp auditing seminar is offered to accountants, auditors, and dp personnel to familiarize them with the techniques necessary to audit existing dp systems, and plan for the auditing requirements of new applications. The seminar is concerned with the auditing requirements of individual organizations and all participants must be from the same company. A combination of lectures, discussions, case studies, and situational analyses are presented, and it is assumed that participants will have a sufficient knowledge of how their present auditing procedures work in order to benefit from the presentations. The seminar lasts for three days (with homework for two nights) and is priced at $3K for 10 people, including materials and lunch, but not transportation. UNICORN SYSTEMS CO., Los Angeles, Calif.

FOR DATA CIRCLE 313 ON READER CARD

Non-technical dp Course

One of the most frequently heard complaints in our industry is that the technical people are so busy talking buzzwords that they can't (or won't) take the time to explain what they are doing to general management. An eight-session course in dp geared to non-technical management might go a long way toward equipping company management with a basic understanding of how the dp function works. If nothing else, the course could act as a workshop to get the two forces talking to each other, since it is designed to be presented to management by a technical team from its own dp department.

Basically, the course consists of more than 350 slides, a detailed instructor's guide, and student texts. The material begins with a brief history of computing, computing trends, the importance of management involvement, and attendant problems. Next, hardware and software are explained in two separate sessions, and session four explains system concepts, applications programs, and data bases. Sessions five through seven are concerned with what is involved in building a corporate data base and how it should be used; "moving data," where the rapidly expanding communications and computer networking concepts are presented; and building applications systems using the latest tools. Session eight concentrates on the proper role for management in all of this. The "Management Perspective for Creative Computer Applications" course is priced at $4K and has already been pilot-tested with a number of large companies, it's claimed. KATCH & ASSOCIATES, Atherton, Calif.

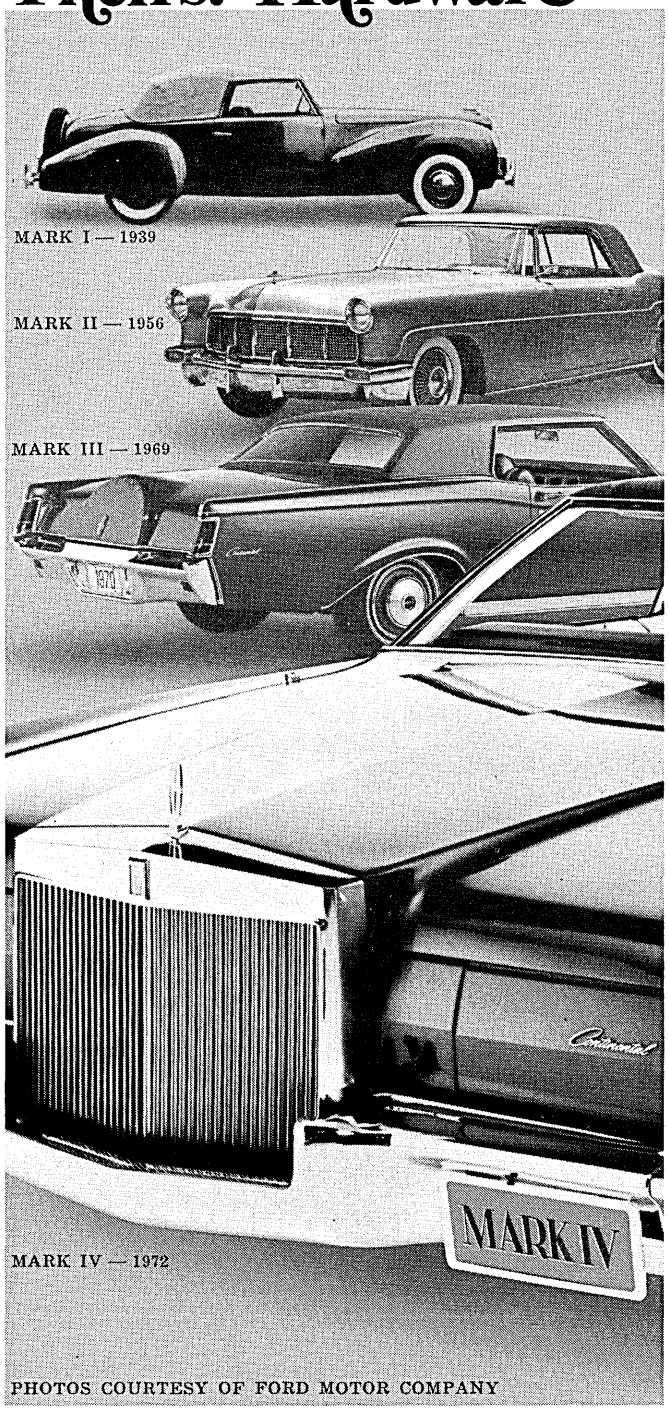
FOR DATA CIRCLE 314 ON READER CARD

Cobol Tracing

JSCDEBUG is a trace routine to help programmers debug COBOL programs. Without recompiling the subject program, the utility package uses control cards to provide such facilities as the ability to display selected file and working storage areas at any time during a run; to analyze the logic flow through selected points; identify records associated with fields causing data exceptions; and to continue execution regardless of data exceptions. The assembler language program requires approx-

MARK IV: the mark of excellence.

Theirs: Hardware



PHOTOS COURTESY OF FORD MOTOR COMPANY

Ours: *Software*

Our carefully engineered computer software products have grown and improved during the past five years—improving with deliberate built-in excellence.

In order to measure up to our reputation for producing the finest software products in the world—we cannot allow the smallest design detail to go unnoticed. Our models are internationally famous also and carry our trademark:

MARK IV® SYSTEMS

Automatic
General Purpose
Computer Software
for all
Data Processing

With more than 550 satisfied users, our MARK IV File Management Systems have undergone over 1200 improvements since the original. And our newest model fulfills the most sophisticated data processing requirements for IBM 360/370 and Univac Series 70 computer users.

If you want to ride in Mark IV elegance, see your Lincoln dealer.

If you want to compute in MARK IV elegance, see Informatics.

North America—
MARK IV Systems Co.
21050 Vanowen Street
Canoga Park, California 91303
Telephone (213) 887-9121

Europe—
Informatics S.A.
12a Route de Meyrin,
CH 1202 Genève, Suisse
Telephone 022/34.42.42

informatics inc®

imately 4K bytes of 360/370 storage and operates in batch mode. The package has a two-month trial period and can be purchased for $2,500 or rented for $100/month for all IBM operating systems. JOSEPH SIDER & ASSOC., Canoga Park, Calif.
FOR DATA CIRCLE 315 ON READER CARD

Data Base Management

The Application Management System (AMS) consists of a data base management system (DBMS) and data dictionary, a data management language, a high-level programming language, an "intelligent" link editor, and some sophisticated maintenance modules. The file structure is entirely proprietary, but interfaces for "foreign" structures are in the works (foreign could then be taken to mean IBM's information management system in this context). The data base language supports all IBM file and record structures, but is unusual in that it can handle two separate types of syntax: keyword and decision-table forms. The latter allows functional notation of applications rather than straight sequential notation. Where this really comes in handy is in altering program logic, where the changes can be loaded into the decision table by function rather than tearing the logical sequence of the program down and rebuilding it.

A design and programming language (DPL/1) is offered as a better way to do things than standard COBOL, but COBOL, FORTRAN, and PL/1 language processors are all operable under AMS. DPL/1 looks like a hybrid of COBOL and assembler languages. Configurator is the word given to a module that performs many of the functions of a link editor, but instead of merely tying program segments together, the configurator resolves all data addresses, accepts the functional notation changes, and generally puts the program together so that it will run as efficiently as possible. Documentation of programs that operate on the data base seems to be assured under AMS, because it is generated every time a program logic change is made.

AMS typically requires something less than 100K bytes for the DBMS, approximately 90K for the DPL/1 compiler, roughly 50K for the configurator, and a batch mode overhead of 26K, excluding access methods. The system operates on all 360 and 370 computers except those running DOS and DOS/VS monitors. AMS is priced at $150K, or $5K/month on a 30-day cancellable lease. Object code modules of the system are supplied, but the vendor is willing to discuss turning over source code listings to customers if sufficient safeguards can be arranged. AMS has completed "beta test" and turned the first installation over to a major holding company, it's claimed. TRES COMPUTER SYSTEMS, INC., Dallas, Texas.
FOR DATA CIRCLE 316 ON READER CARD

Time-shared Cobol

Tymshare has principally offered scientific languages during the first six years of its existence, and is just now getting around to putting COBOL on the air. It's ANSI standard COBOL, complete with an interactive debug package, editor, decision table processor, and report generator. Indexed-sequential file organizations and shorthand commands are also accommodated. There is a monthly minimum charge of $80, but more typical would be a charge of $390 which would provide approximately 12 connect-hours of service. TYMSHARE, INC., Cupertino, Calif.
FOR DATA CIRCLE 317 ON READER CARD

Off-line Data Capture

The Sanders 804 intelligent terminal can now perform off-line data capture applications by using the IN-FORM package, supplied without charge to users of the terminal. IN-FORM stores

information on a cassette in pre-defined data fields. Changes to formats are made by using the terminal's keyboard editing features rather than requiring the operations to be done by a host mainframe. IN-FORM contains a remote batch communications program, for transmittal of the information to IBM 360 and 370 computers, that is compatible with IBM's BTAM, QTAM, and TCAM communications access methods.

The package is intended for businesses with remote facilities that must periodically collect data generated at these facilities, use this data to update central master files, and return updated operating reports back to these facilities. Several users of IN-FORM implemented such applications as a hospital patient account system and an insurance company premium accounting system during the checkout phase of the monitor. The 804 terminal sells for $12,780 and rents for $401-478 depending upon length of lease. SANDERS ASSOCIATES, INC., Nashua, N.H.

FOR DATA CIRCLE 318 ON READER CARD

software spotlight

3705 Software

The latest software package offered by a firm that specializes in developing modules for the IBM 3705 communications controller is called the Network Facilities Package. It can be used with both 360 and 370 host computers and provides a technique for communication lines to contend for assignment to 360 and 370 addresses. Additionally, terminal users may select any interactive processing system on the cpu, as the access ports do not have to be dedicated. In the event that the application system is saturated or down, installation-catalogued messages are returned to the terminal user. The NFP requires modifications to the 3705 emulator program (approximately 30 bytes) but none to 360 or 370 system software. Perhaps the nicest feature of NFP is that it can handle programs on the 360/370 side that are not designed around the TCAM access method.

The package is supplied as a collection of additional and altered SYSGEN macro instructions for all necessary routines in object deck form. A manual supplied with the tape describes the functions and installation procedure. A 30-day free trial is offered, which was long enough to convince a major university that it needed NFP. Combined with previous modules for automatic terminal speed selection and code conversion, NFP is priced at $3,500. COMMPRO ASSOCIATES, Manhattan Beach, Calif.

FOR DATA CIRCLE 310 ON READER CARD

3270 Network Planning

The PLANET70 simulation service would ideally be used before installation of communications networks utilizing the IBM 3270 intelligent terminal or equivalent (i.e., must use the same bisynchronous communications protocol). Built into PLANET70 are a discrete event simulator, a multipoint polled network synthesizer, and various auxiliary programs such as a response time distribution curve plotter. Descriptions of candidate network characteristics are conversationally entered into PLANET70 in English. The output can be used to specify display, printer, and modem requirements, and predict line loading factors. There is a one-time charge of $2,500 for using PLANET70 which includes any customizing to client requirements. One of the first two users of PLANET70 is claimed to have reduced the cost of a network by $30-40K per year by relaxing a system specification of five-second response time to six seconds. BERGLUND ASSOCIATES, INC., Moorestown, N.J.

FOR DATA CIRCLE 319 ON READER CARD □

Literature

Banking Software
An eight-page brochure introduces the *ICP Industry GUIDE: BANKING*, a new biannual software guide. With sample pages and descriptions, the brochure shows the type of information provided by the first issue (June 1973), which gave a formatted delineation of each of 279 software products currently being offered to the banking industry. Cost per issue is $90; special introductory rate for the first issue is $70. INTERNATIONAL COMPUTER PROGRAMS, INC., Indianapolis, Ind.
FOR COPY CIRCLE 300 ON READER CARD

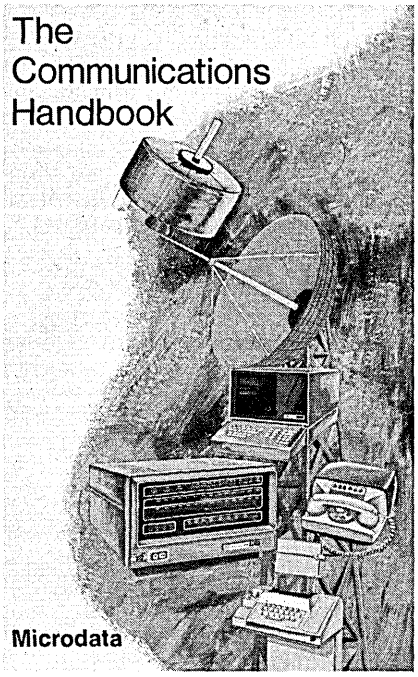
Documentation
A 100-page manual on documentation gives procedures for documenting all phases of a system's development, guiding readers to develop, test, and refine their standards. Divided into 14 steps, the method is designed to make documentation a useful, time-saving, standardized tool. Cost: $5. ASSN. FOR SYSTEMS MANAGEMENT, 24587 Bagley Rd., Cleveland, OH 44138.

Security and Control
A 20-page bibliography on computer security and control gives a comprehensive list of publications in the following classifications: auditing and edp, edp management planning and computer operations, review checklists, edp education for auditors, systems controls, generalized computer audit programs, edp insurance, management reviews, on-line/real-time systems, computer security and fraud. The list was compiled from over 100 journals and other publications from the last 10 years. Cost: $6.50. MANAGEMENT ADVISORY PUBLICATIONS, P.O. Box 151, Wellesley Hills, MA 02181.

Japanese Marketplace
A foldout pamphlet describes the Japanese dp marketplace, giving practical information on Japan's economy, customs, and culture. The pamphlet also introduces Okidata Corp., formed earlier this year to engage in the import and export of dp peripheral equipment, terminals, and components between the U.S. and Japan. OKIDATA CORP., Moorestown, N.J.
FOR COPY CIRCLE 301 ON READER CARD

Graphic Systems
An eight-page foldout brochure on the SketchPrep Automated Graphic Information Systems tells the advantages and applications of these systems, which can be used for electrical schematics, logic diagrams, maps, PERT diagrams, process control drawings, and mechanical drawings. System hardware includes an input digitizer, graphic display, digital processor, and library system. DIMENSIONAL SYSTEMS, Weston, Mass.
FOR COPY CIRCLE 307 ON READER CARD

Communications Manual
This 323-page handbook can be used as an introductory text on data communications, as a reference manual during the design phases of projects, and as a guide in specifying and designing typical communications systems. Information is given on fundamentals of data communications, design and implementation of communications systems, and the role of computers in various communications applications. Cost: $3, including postage and handling; in California, add 5% sales tax. MICRODATA CORP., Dept. C, 17481 Red Hill Ave., Irvine, CA 92705.



Business Language
This 64-page simplified users guide, for users of the Datapoint 2200 business computer system, can also serve as an introduction to the DATABUS language, a COBOL-like high-level language created primarily for business and commercial applications. The 2200 system, which has printers, tape units, and a disc drive as options, incorporates a fully programmable general purpose computer, a video display screen, a keyboard, and internal tape units. DATAPOINT CORP., San Antonio, Texas.
FOR COPY CIRCLE 305 ON READER CARD

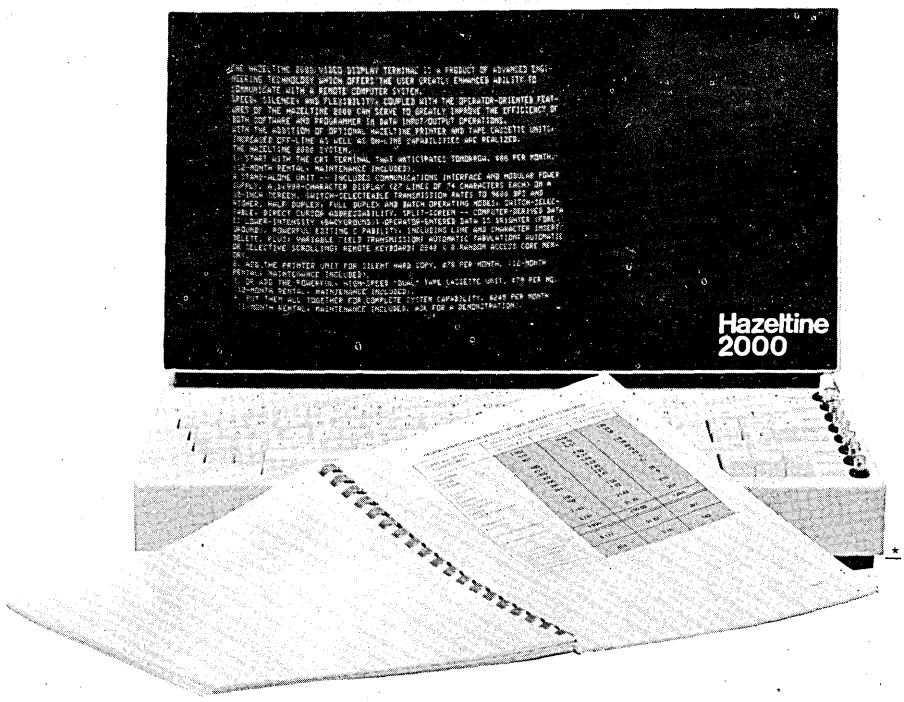
Minicomputer
The subject of this 12-page brochure is the Naked Mini/LSI and its companion, the Alpha/LSI. The Naked Mini/LSI, called a "computer on a card" and priced at $990 in quantities of 200, uses a general-purpose 16-bit LSI processor with DMA, up to 8K 16-bit words of memory, and four of the most common options on a 15 x 17-in. board. COMPUTER AUTOMATION, INC., Irvine, Calif.
FOR COPY CIRCLE 308 ON READER CARD

Speaking of Minicomputers
All About Minicomputers is a 40-page report which includes a set of detailed comparison charts on 128 minicomputers from 47 manufacturers and a minicomputer user survey. The 83 respondents of the survey, using 1,268 minicomputers, were generally well-pleased with the reliability and effectiveness of their hardware, but much less satisfied with the associated technical support and software. Cost: $10. DATAPRO RESEARCH CORP., One Corporate Center, Rte. 38, Morrestown, NJ 08057.

Manpower Management
A 12-page brochure describes the PEOPLE program, "directed toward attracting, retaining, potentiating, and integrating an efficient data processing team." PEOPLE—Personnel Evaluation, Organization, PLanning and Education—is a comprehensive, interrelated family of consultant programs and services designed to help dp management use their human resources most effectively. THE BERTON GROUP, INC., New York, N.Y.
FOR COPY CIRCLE 303 ON READER CARD

Electronics Market
The 116-page 1973 *Electronic Market Data Book* presents detailed breakdowns, statistical tabulations, and descriptions for each of the major segments of the U.S. electronics market. Electronic equipment sales in 1972 totaled $29.4 billion, 40% of which was in the category of communications and industrial products (including computers and peripheral equipment). Cost: $15. ELECTRONIC INDUSTRIES ASSN., Marketing Services Dept., 2001 Eye St., N.W., Washington, DC 20006. □

This year, minicomputer users plan to buy more Hazeltine CRT terminals than any other... more than twice the nearest competitor!*



*1973 Minicomputer Market Survey by Modern Data magazine.

Why not try a Hazeltine terminal on your mini?
Call us for an on-site demonstration.

Hazeltine Corporation Computer Peripheral Equipment Greenlawn, N.Y. 11740 (516) 549-8800 Telex 96-1435

EAST: NEW YORK (212) 586-1970 ☐ BOSTON (617) 261-5867 ☐ EDISON, N.J. (201) 828-5678 ☐ PHILADELPHIA (215) 676-4348 ☐ PITTSBURGH (412) 343-4449
WASHINGTON, D.C. (703) 979-5500 ☐ ROCHESTER (716) 852-6570
MIDWEST: MINNEAPOLIS (612) 854-6555 ☐ CHICAGO (312) 986-1414 ☐ CLEVELAND (216) 752-1030 ☐ DETROIT (313) 355-3510
SOUTH: DALLAS (214) 233-7776 ☐ ATLANTA (404) 252-2045 ☐ GREENSBORO, N.C. (919) 855-0307 ☐ HOUSTON (713) 783-1760 ☐ ORLANDO (305) 423-1201
WEST: SAN FRANCISCO (415) 398-0686 ☐ DENVER (303) 770-6330 ☐ LOS ANGELES (213) 553-1811 ☐ SEATTLE (206) 242-0505
IN CANADA: CAE ELECTRONICS, LTD. (514) 341-6780

FOR WORLDWIDE SALES INFORMATION CALL: (516) 549-8800

HAZELTINE AND THE PURSUIT OF EXCELLENCE

NOW!

...not late 1974

T-COMM 7 by Periphonics puts data communications to work for you now. It gives you a system that is totally transparent to virtually any cpu and any terminal. It eliminates the need for TP programming in the mainframe and lets you concentrate on implementing more applications.

T-COMM 7 has proven its reliability and versatility in installations across the country. This powerful programmable front-end processor is being used by banks, credit card companies, auto manufacturers, freight forwarders, retailers and many other businesses. And with good reason!

T-COMM 7 is currently operating on every model 360/370 except the 20. It is also interfaced to Burroughs, Univac, and other mainframes.

T-COMM 7 installations are supporting terminals by IBM, Burroughs, NCR, Siemens, Olivetti and others.

T-COMM 7 with Periphonics VOICEPAC 2000 not only gives users the highest quality audio response output, but provides the largest vocabulary capacity available — one T-COMM 7 installation has a vocabulary of 1370 words!

T-COMM 7 is installed and operating for more satisfied customers than any other individual front end available.

If it all sounds too good to be true, we're ready to prove it to you. Take the first step to reliable, versatile data communications — drop the coupon in the mail. **Do it NOW!**

Periphonics corporation

Airport International Plaza, Bohemia, New York 11716
(516) 567-1000

☐ Yes. Tell us more about the Periphonics Path

Name _____

Title _____

Company _____

Address _____

State _____ Zip _____

☐ Have your salesman call for an appointment.

Send to: **PERIPHONICS CORPORATION, DEPT. DA-9**
Airport International Plaza
Bohemia, New York 11716

Books

Data Base Management Systems, A Critical and Comparative Analysis

by Leo J. Cohen, William E. Burr and George M. Del'Marmol
Lawrence K. Grodman and Edwin F. Kerr, ed.
QED Information Sciences, Inc., 170 Worcester St., Wellesley Hills, Mass.
340 pp. $385

This book is a standout that belongs in any data processing library. It contains more useful material on the subject of data base and data management systems than has appeared anywhere in the literature previously. On a subject which is commanding as much attention as data base, this is newsworthy indeed.

The first of the book's six chapters introduces the subject of data base management systems and differentiates the data base approach from traditional file management approaches.

Chapter two discusses the management techniques that should be initiated and applied to evaluate a data base package. The reader who is only interested in data base systems may find this chapter gratuitous since it defines a management style. The selection and organization of an evaluation team, which is an essential, often neglected subject, is treated extensively.

Chapter three returns to what I consider the real meat of the book as it gets into the definition of the primary evaluation elements that must be analyzed in looking at data base systems. Data manipulation, query capabilities, application programming support, file organization, data communications, and tools for system installation are all discussed in detail. A solid foundation of functions, terminology, and definitions is established for understanding chapters four and five.

Chapter four gets right into it. Four IBM oriented data base management systems are discussed in detail: IMS/2, TOTAL, ADABAS, and SYSTEM 2000. An average of about 40 pages is spent describing each one with respect to the general criteria defined in chapter three. It is here that the report shines. The functions and the program design of each system are presented in-depth.

Chapter five takes the four data base systems through a comparative analysis rating on the same criteria as mentioned above and offers examples of each system's good and bad points. Mr. Cohen stops short of assigning numerical values to his opinions of the various systems. The level of detail is impressive. For example, under data manipulation alone, several pages are devoted to such topics as data entry, update and deletion, privacy, integrity, format modification, file convertibility, redundancy and consolidation, and growth and data manipulation. Make no mistake about it, while chapters one and two are for the edp laymen, chapters three, four, and five get into technical details of the type which appeals to and, in some cases, can only be understood by someone with substantial technical skills. It is chapter five which brings the understanding of all four data base management systems into focus. One should oscillate back and forth between chapters four and five, reading the points involved, in order to gain a clear understanding of the separate issues.

Chapter six contains an extensive glossary of terms relevant to data base generally, then those specific to each of the four systems.

The key problem with the report is that the authors have attempted a major work obviously under time pressure. There are certain sections that need clarification, when even multiple readings do not completely satisfy a basic level of understanding. For example, on page 4-93, Cohen states, ". . . there is no apparent consolidation of separately defined data bases. Consolidation within the files is solely at the individual data base level . . . this is an oversimplified example that may be circumvented through other facilities . . ." I think I understand this, but I'm not really sure.

To summarize, I strongly recommend this book (even with its high price) to anyone seriously interested in business data processing. Even if you're not actively considering data base management techniques and instead want to use standard COBOL file techniques or file management systems such as MARK IV, an understanding of data base concepts is essential in order to be current. This book represents the only publication available which can help to give you this understanding.

—George Schussel

Book Briefs

Computerized Accounting Methods and Controls

by Michael R. Tyran
Prentice-Hall, Inc., Englewood Cliffs, N.J., 1972
256 pp. $19.95

Written for directors of financial operations, controllers, project financial officers, and accounting and budgeting organization managers, this book presents a systematic approach to the design, development, and installation of a completely automated accounting system. Chapters cover gathering the data for the automated system; organizing the cost accumulation and control structure; managing direct labor cost, distribution, and control; handling accounts payable; indirect expense, allocation and control; travel analysis, ex-

penditure and control; computer utilization cost control and allocation; implementing a mechanized plant, property, and equipment; handling sales orders and backlog balances; administering the product pricing and billing process; structuring the mechanical general ledger system; financial data integration and control; financial statement report system; and the budget and forecasting program.

Planning Guide: Digital Data Communication Services

Center for Communications Management, P.O. Box 324, Ramsey, N.J., 1972
60 pp. $42.50

Recognizing the inherent weaknesses of utilizing the existing telephone plant for efficient and responsive digital data communications, several new and established common carriers are now offering specialized digital data transmission services. This report discusses digital data systems, switched digital systems, and system planning considerations. Appendixes cover AT&T's DDS and the proposed networks of Datran, MCI, and Western Union. In addition, there are 12 other tables, drawings, and charts. The report predicts that the user will come out ahead: 1) Leased line rates for digital data communications will drop at least 50% from current tariff; 2) meter-time rates via specialized switch network may drop as much as 70% from current tariff; 3) the quality of transmission pathways will be significantly improved.

Simulation in Social and Administrative Science

by Harold Guetzkow et al
Prentice-Hall, Inc., Englewood Cliffs, N.J., 1972
768 pp. $15.95

This book is written for a wide audience in social and administrative science and for decision-makers in organizations. The utility of simulation for modeling decision processes and in assisting decision-making is an important theme running through the various chapters. The book comprises a set of overviews, case-examples, and readings. Two of the overviews are designed to provide a general framework for evaluating simulation in social and administrative science. The remaining overviews present specific critical examinations of the use of simulation in different fields or disciplines. Each is accompanied by a case-example showing a relevant application of simulation in that field. The readings supplement the other chapters by providing a discipline-based but generalizable discussion of theory-building and comparison with simulation.

Security for Computer Systems

The National Computing Centre Ltd. David & Charles (NCC Publications), South Devon House, Newton Abbot, Devon, England, 1972
172 pp. £4.50

Although security is rapidly becoming an important consideration in computer systems design, a great deal still needs to be done to establish recognized codes of good practice. This book provides a review of security techniques, putting each into broad categories of cost and effectiveness. The techniques cover the hardware and operating system functions, as well as personnel management problems and physical security. Appendices include checklists, further references, and three cost/effectiveness matrix charts.

Dictionary of Industrial Digital Computer Terminology

Instrument Society of America, 400 Stanwix St., Pittsburgh, Pa., 1972
120 pp. $16 ($12, ISA members)

This dictionary was prepared by the Glossary Committee of the Purdue (Univ.) Workshop on Standardization of Industrial Computer Languages, held twice a year since 1969, cosponsored by ISA. The committee selected terms on the basis of their usage in industrial applications, customizing them from a bibliography of 18 major sources. □

Join Datamation's powerful selling tour of Europe this Fall
Five countries in five weeks–THE GRAND TOUR

DATAMATION, with the support of the United States Department of Commerce, presents a hard selling series of exhibitions of U. S. Computer products all over Europe this Fall. You are invited to join The Grand Tour of DATAMATION for an extraordinary opportunity to increase your total marketing program in Europe.

A TAILORED APPROACH TO THE MARKETPLACE

Looking for agents to distribute and service your products?

Meet them at the exhibitions. Interview several consecutively. Begin your selling months earlier in the lucrative European market.

Already have agents or direct sales offices?

Support them. Evaluate them. Let them see, touch, use your new product lines. Provide them with the chance to show your products to their customers at **the** prestige EDP exhibit in Europe this year. It's the one **all** the buyers will attend.

Not familiar with the European potential for your products?

Use The Grand Tour to gauge their acceptance. There is no better way for **you** to judge the market for either your present — or new — products than by face-to-face meetings with your prospects.

This year too soon? Think maybe you'll wait until next year?

Your competition isn't going to wait. The Grand Tour is this **November.** If you expect to derive sales profits from Europe in 1974, you've got to start **this** year.

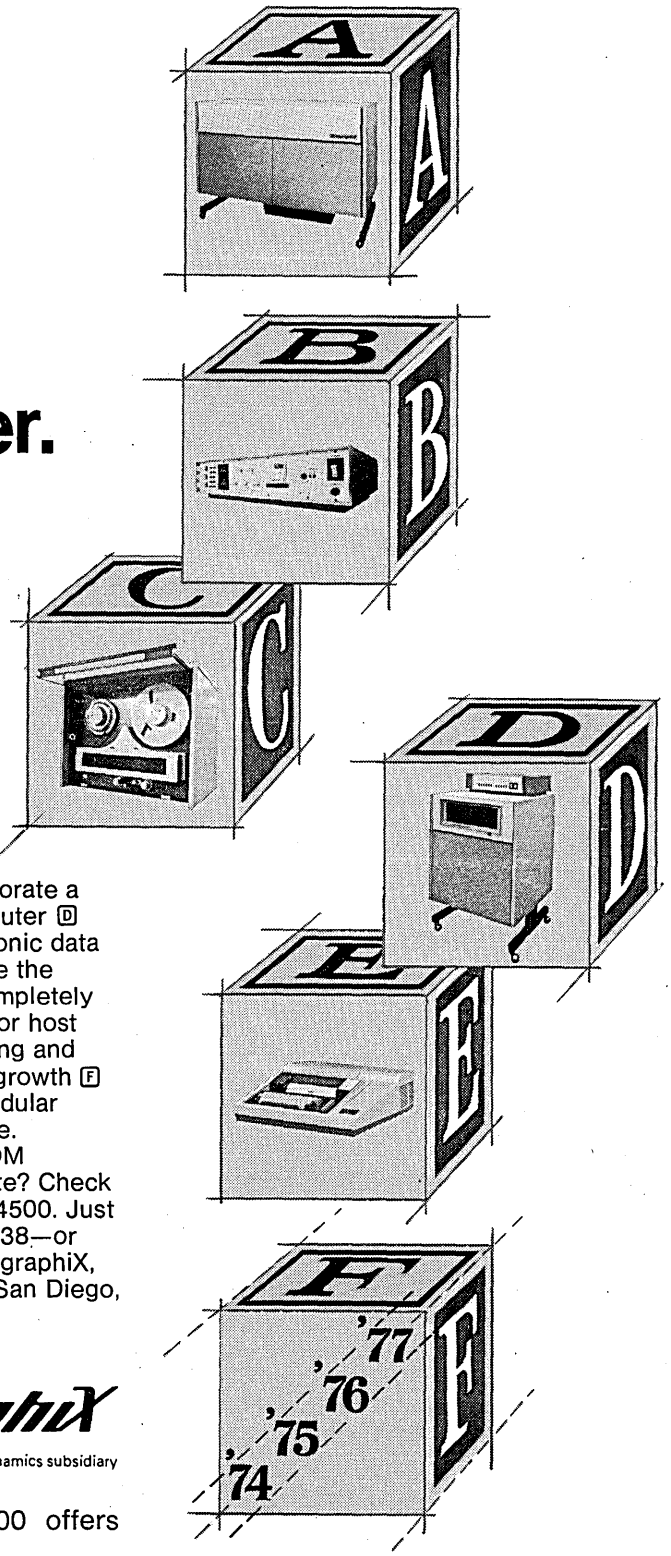
Who'll Attend?

OEMs or end users? It's up to you. This is the first EDP exhibition ever held in which the exhibitor specifies — in advance — the precise universe he wants to reach. DATAMATION then tailors a mailing and promotional program to attract the exact class of buyers to whom you want to show your products.
European promotion for The Grand Tour is starting now. Give us your requirements — and put us to work for you. Call or write for immediate details.

Charlie Asmus, Sales Director, The Grand Tour, DATAMATION, 35 Mason St., Greenwich, Conn. 06830. (201) 444-4271 or (203) 661-5400

London — October 30, 31, November 1; **Stockholm** — November 6, 7, 8; **Paris** — November 12, 13, 14; **Milan** — November 19, 20, 21; **Munich** — November 27, 28, 29, 30.

Let's put a better COM recorder together... together.



Your COM requirements won't be the same in a few tomorrows as they are today. That's why we designed the System 4500 in modular blocks—units that fit together now to meet your exact needs. And even more important, you can build on each unit with additional modules that practically "plug in" for future flexibility.

Our basic Model 120 COM recorder [A] is designed for direct online interface with existing high-output computer equipment. The convenient operator control panel [B] with job setup card virtually assures error-free operation. Moving up to a versatile Model 130 offers you off-line capability and allows acceptance of magnetic tapes [C] from a wide variety of computers.

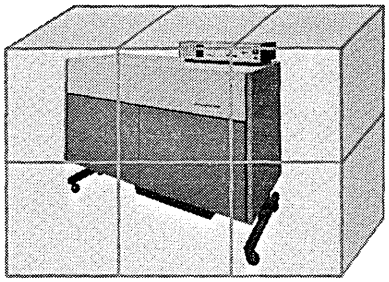
When you incorporate a high-speed minicomputer [D] and solid-state electronic data terminal [E], you have the Model 150, which completely eliminates the need for host computer data handling and reformatting. Future growth [F] is assured as new modular developments emerge.

Want to make COM obsolescence obsolete? Check our modular System 4500. Just call us—(714) 283-1038—or write Stromberg DatagraphiX, Inc., P.O. Box 2449, San Diego, CA 92112.

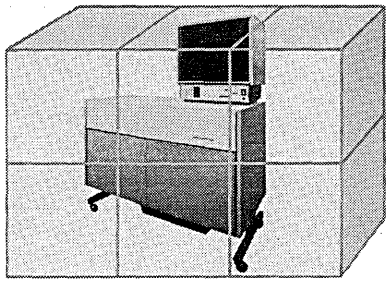
DatagraphiX

Stromberg DatagraphiX Inc □ a General Dynamics subsidiary

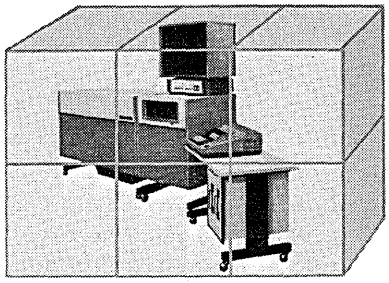
MODULARITY. Only DatagraphiX System 4500 offers add-on capability that grows as your needs grow.



Model 120



Model 130



Model 150

People

The Look of Professionalism

Frank Butash, new director of dp for Capehart Corp., a Norwich, N. H. home entertainment products manufacturer, likes the look of professionalism. Butash moved to his present job from Ross Perot's Electronic Data Systems, Dallas, where a white shirt, tie, and a crew-cut meant a lot. He wants his people to dress professionally which means, he says, "dressing IBM or EDS."

Frank Butash

Butash moved to his present job with a heavy background in both military and civilian dp. His big bag is man/machine interface and he's now at the point he's wanted to reach for a long time. Capehart has a System/3 and he hopes to parlay that into a network of System 3's. He believes that IBM, prior to the S/3, ignored man/machine interface. "If IBM had designed the automobile, we'd still be adjusting the spark plugs, cranking, and motor, and adjusting the mixture." Butash sees the System 3 as "probably one of the greatest accomplishments technologically since the transistor."

He sees his appointment by Capehart as a decision by that company "not to nickel and dime" dp any more."

Butash holds a BSEE degree from Hofstra Univ., and an MSEE from New York Univ. He holds a CDC and RBP from the Data Processing Management Assn.

WILLIAM B. WENNING, JR., former vp for engineering for Pitney Bowes, is the new exec vp of Pitney Bowes-Alpex . . . JAMES E. LODGE was appointed associate director of the Operations and Automation Div. of the American Bankers Assn. He had been with Optical Recognition Systems, Inc. . . . EDWIN CARLSON was appointed president of Litton Industries' Litton ABS Div. . . . PAUL R. LIKINS was named vp, staff services, for Xerox Computer Services . . . C. GUS GRANT was elected president of Southern Pacific Communications Co. which this month begins offering services on the first segments of its planned 11-state specialized voice and data communications network.

The Best Way to Management

Glen Belden, new president and chief executive officer of the Computer and Communications Services Div. of United Airlines, is a graduate electrical engineer who decided early that his dp skills were more in demand than his engineering skills and were a better route to a career in management.

Belden joined United Airlines in 1968 as a senior systems analyst. Prior to his recent promotion he was director of computer resources for United in Denver, which meant responsibility for two of United's four dp centers, those in Denver and San Francisco. The center in Denver, based on parallel 360/95's and a support 360/65, handles all UAL reservations. The San Francisco center, at San Francisco International Airport, has two 360/65's and handles maintenance operations.

Glen Belden

Belden, before joining United, was with Sandia, in Albuquerque, as a member of the technical staff. Primarily he was in radar systems analysis and used the computer as a tool. Before Sandia he was with RCA Service

people

Co. where he taught programming.

He was graduated from Purdue Univ. in 1965 with a BSEE, and took an MSEE from the Univ. of New Mexico in 1967. It was before Purdue that he'd had his dp experience and after his master's that he learned its true value. He believes dp as it leads to management "offers a great challenge."

R. STANLEY LAING, former NCR president, has joined the board of directors and executive committee of MI² Data Systems, a Columbus, Ohio data communications company. . . . JAMES B. SUTTON, assistant dp officer, Birmingham Trust National Bank, Birmingham, Ala., is the new international president of Data Processing Management Assn. (DPMA) . . . WILLIAM P. LAMBERT was named director of computer information services for Spring Mills, Lancaster, S. C. . . . GERALD TELLEFSEN was elected vp of the information systems div. of Booz, Allen & Hamilton, Inc. . . . DONALD A. PUSEY was promoted to staff vp-computer sciences for Eastern Airlines.

More Growth Ahead in Terminals

J. David Hann, new president of Courier Terminal Systems, Inc., Phoenix, believes increasing interest in terminals of the point-of-sale type, and in specific industry terminals such as those for bank tellers and credit authorization, will propel the terminal industry, already growing at twice the rate of the computer industry, into even greater growth over the next few years. He also looks for advances in programmable terminals to be "a significant factor" in the growth of terminal markets.

J. David Hann

Hann joined Courier in October, 1971, and prior to his latest promotion, was senior vp of operations. He got into data processing in 1956 when, as an engineer with General Electric in Schenectady, he began programming. He later served as computer marketing manager for the computer control division of Honeywell, and from 1968 to 1971, first with General Electric and then with Honeywell Information Systems, he was program director for Series 6000, and product plan manager. He holds a BSEE from the Univ. of Minnesota.

Hann believes Courier's share of the burgeoning terminals market will grow "if we can keep up with the industry." Last year the company was predicting it would have 14% of the market by 1975. Hann said Courier will broaden its marketing range this fall with a new 3270 compatible terminal which will be microprogrammed.

DAVID MARTIN was named vice-president, end user marketing, and JOSEPH TROMBADORE, vice-president, systems manufacturing for Advanced Memory Systems, Inc., Sunnyvale, Calif. . . . GEORGE R. MARTIN, former director of the Data Processing unit of the Georgia Department of Revenue, was named director of information services for Days Inns of America, Inc. . . . HARRY SCHEUER has moved from ECRM, Inc., Bedford, Mass., where he was vice president and general manager, to Innovex Corp. of Bedford where he is the new president and treasurer. Innovex produces floppy disc devices. . . . ARTHUR W. ELIAS was appointed director of information services planning, Informatics Inc. Systems and Services Co. □

letters

Continued from page 27

ments represent what I believe will be a growing feeling within the data processing community.

Software in check

The article, "Software and Its Impact: A Quantitative Assessment," by Barry W. Boehm, (May, p. 48), is excellent. In fact, his article discusses many of the principles we have recently been pursuing in software development efforts.

The only questions I have concerning Dr. Boehm's comments are those with respect to APOLLO software errors, on page 57. He states, among other things, that "during APOLLO 14, there were 18 discrepancies found in the software . . . " Actual GN&C on-board *software* errors which were experienced during flight for *all* APOLLO flights added up to a total of only one, and this was a benign problem. The APOLLO 11 problem referred to by Dr. Boehm was not a software problem. In fact, it was the software that prevented a potentially disastrous situation. Even though there were recorded system problems, software was not a culprit. I would like to mention, however, that the cost to reach the needed reliability was high, especially because the flight software was man-rated. Our experience to date has been very successful and certainly confirms the methods recommended by Dr. Boehm to reduce these costs in the future.

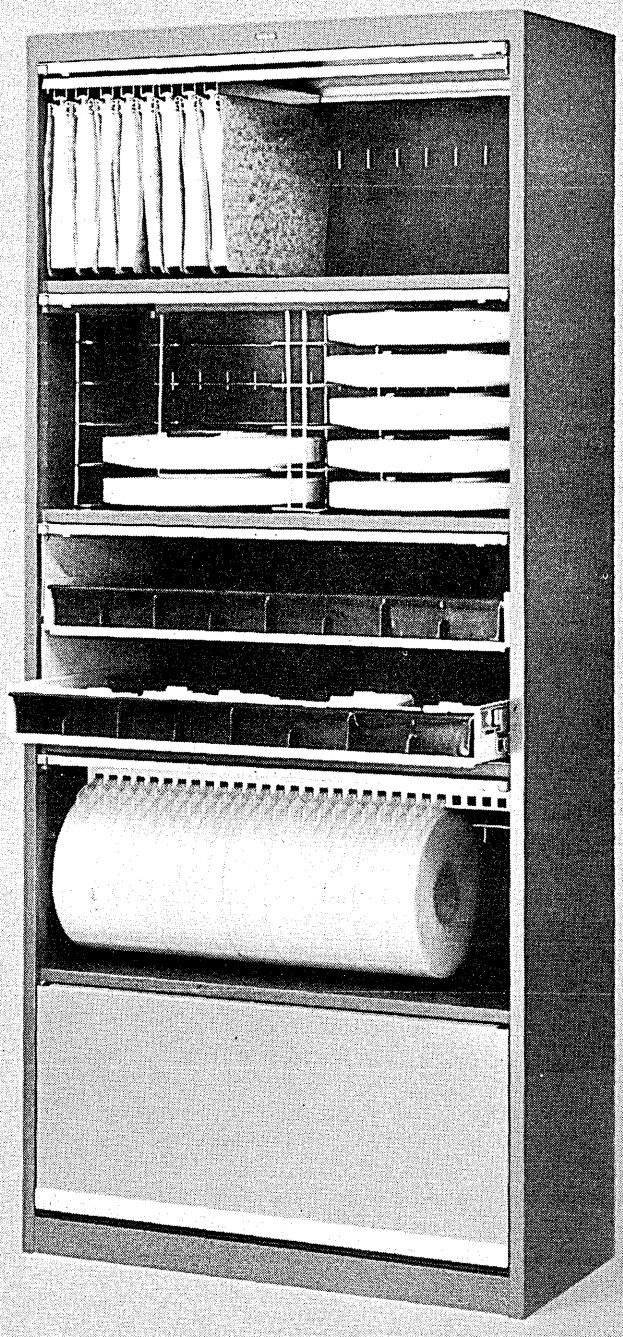
MARGARET H. HAMILTON
Director of Flight Computer Programming
Charles Stark Draper Laboratory
Cambridge, Massachusetts

Dr. Boehm replies: I would like to reiterate that I consider APOLLO an example of **extremely well-checked out** software, and was simply using it to point out the difficulty of achieving perfection in complex software systems. The reference to APOLLO 14 was indeed to the real-time operations on the ground and not on-board. The APOLLO 11 situation surfaces one of those fundamental questions about the nature of software: "Is an error of omission in system design, that is not caught during software development and testing, a software error?" You can resolve it either way; however, consistency would suggest that to the extent that the software deserves to take credit for "preventing a potentially disastrous situation" on APOLLO 11, the software also deserves to take the responsibility for diverting Armstrong during the lunar landing phase. □

DATAMATION welcomes correspondence about the computer industry. Write to 1801 S. La Cienega Blvd., Los Angeles, CA 90035.

Orderly, Safe Storage In Minimal Space —that's proven Tab Data Media Cabinets. Versatility was born into these cabinets. They have been designed to accommodate hanging printout binders, disk packs and racked or hanging magnetic tape. They are even ideal for storing cards. Tab Data Media Cabinets can be ordered with roll-out shelves that bring data media right to your fingertips. And, if storing miscellaneous office paraphernalia is a problem, forget it. Just tuck it away in the generously-sized Data Media compartments and close the stylish TrimLine doors. Neat. For complete information about Tab 2, 3, 4 and 5 high Data Media Cabinets, call your local Tab representative. Or, write Tab Products Company, 2690 Hanover Street, Palo Alto, California 94304.

Tab System/3 Organizer



TAB
PRODUCTS CO.

Look Ahead

(Continued from page 18)

been tightening and reorganizing under the most difficult of all policies; no layoffs, only firings on the basis of performance.

DPMA CLOSE TO BECOMING 14TH AFIPS MEMBER

The Data Processing Management Assn. (DPMA) may be ready to cough up the $3,000 a year it will take to join the 13-society American Federation of Information Processing Societies (AFIPS). Formed to produce conferences and exhibits, AFIPS in recent years has expanded its charter to that of a spokesman for the industry (see July, p. 87), but critics complained its credentials were weakened without the 25,000-member DPMA.

DPMA's executive council was to meet Sept. 13-14 to rule on the recommendations of a committee of six which has been studying an invitation made by AFIPS in June. With the council's go-ahead, a vote by the DPMA board would be taken through a mail ballot, long before the next scheduled board meeting in June. But that still won't be in time for DPMA to merge its ailing annual conference and exhibit with the AFIPS-sponsored National Computer Conference next May in Chicago. DPMA said it will hold its affair the following month in Minneapolis, but has cancelled plans to hold the '75 conference in Los Angeles where the '75 NCC also will be held.

WHO AM I?

Fred Gruenberger's Popular Computing submits the following designations for persons in the computing profession: "Computist" (a specialist in computing who is skilled in or practices the art of computing), and "Computerist" (one knowledgeable about the construction and design of computers). But industry sage Frank Wagner of Informatics, says the names won't catch on because, even though they're logical and definitive, they lack glamour and "don't flow trippingly from the tongue." Educator-author-publisher Gruenberger who likens the terms to "physicist" and "chemist," says they're a heck of a lot more appealing than "numerologist" and "computologist" which some other groups have advanced.

RUMORS AND RAW RANDOM DATA

Digital Equipment Corp. may open Australia's first computer plant -- and be followed by Interdata and perhaps Data General. DEC's move would depend on its success in landing juicy contracts from Australia's Labor government which is understood to be putting behind-the-scenes pressure on foreign computer suppliers to increase their investments down under. Mainframers IBM, Burroughs, and Honeywell won't open plants, but vigorously seek local suppliers; CDC has been making crt's in Australia for a year...Also down under, Melbourne's newspaper, The Age, found in a survey of the public's view of different professions that the computer programmer ranks at the bottom with printers and stockbrokers. Doctors rank first... Twenty-eight branches of Seattle First National Bank are using a new $25/month crt called Comset and a touchtone telephone to verify checking account balances at the central Honeywell 6088 computer. The bank likes the low-priced terminals so well, it will install them in all 147 branches before year-end...Hughes Aircraft has not swapped the IBM core on its 165 for AMS memory as reported erroneously in August (p. 76)...The only real controversy at Montreal's peace-making session on data base systems (see story above) arose when IBM took 45 minutes instead of the 15 minutes each manufacturer was alloted to comment on the discussion.

Advertisers' Index

tpc Technical Publishing Company

Arthur L. Rice, Jr., Chairman of the Board
James B. Tafel, President
Gardner F. Landon, Exec. Vice President
Calverd F. Jacobson, Financial Vice President
Edwin C. Prouty, Jr., Secretary and Director of Data Processing

Advertising Offices

Sales Manager and Vice President
John Brennan: Greenwich, Ct. 06830
35 Mason St. (203) 661-5400
Cable: DATAMATION, Greenwich, Connecticut

Eastern District Managers
A. Treat Walker, Irwin L. Werfel, Warren A. Tibbetts: Greenwich, Ct. 06830
35 Mason St. (203) 661-5400

New England District Manager & Vice President
Warren A. Tibbetts: Manchester, N.H. 03104
112 W. Haven Rd.
(603) 625-9498

Midwest District Manager
John M. Gleason: Chicago, Ill. 60606
205 W. Wacker Drive
(312) 346-1026

Western Manager and Senior Vice President
Hamilton S. Styron: Los Angeles, Calif. 90035
1801 S. La Cienega Blvd.
(213) 559-5111

District Manager
Alan Bolté, Jr.: Los Angeles, Calif. 90035
1801 S. La Cienega Blvd.
(213) 559-5111

Western District Manager
James E. Filiatrault: Redwood City, Ca. 94061
61 Renato Ct.
(415) 364-3171

U.K., Scandinavia, Benelux
Wallace K. Ponder, European Director
31 Lyncroft Avenue
Pinner, Middx. HA5 1JU
England
Tel: (01) 868 9289
Cables: PACOM, Pinner

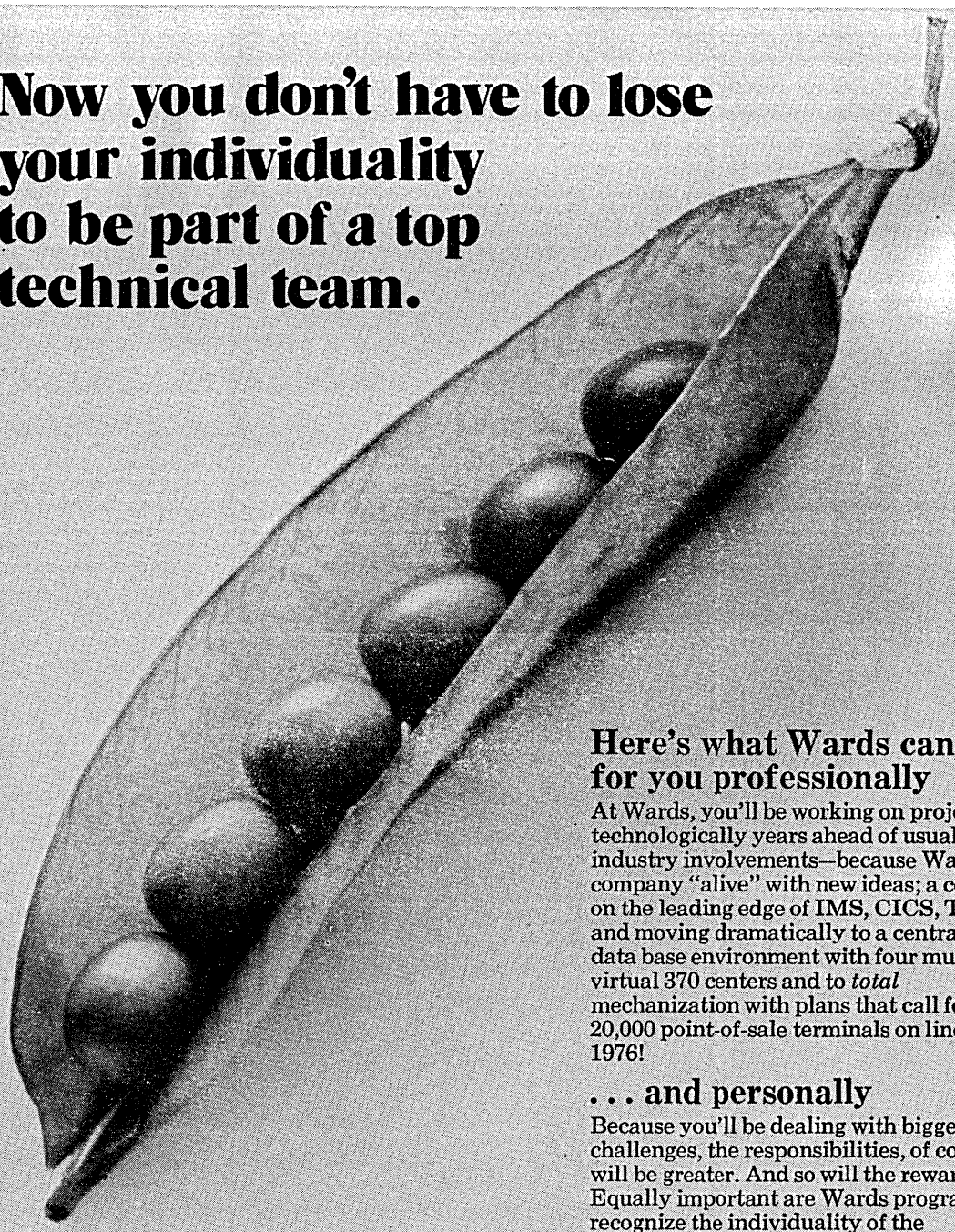
France, Switzerland, Italy
Gerard Lasfargues
48 rue Vital
75016 Paris
France
Tel: 288 90 22

Germany
Bohn International KG
6000 Frankfurt/Main 1
Hansaalee 7
Germany
Tel: 0611/55 80 77

Other tpc Magazines

Plant Engineering
Pollution Engineering
Power Engineering
Purchasing World
Research/Development

Now you don't have to lose your individuality to be part of a top technical team.



Here's what Wards can do for you professionally

At Wards, you'll be working on projects technologically years ahead of usual industry involvements—because Wards is a company "alive" with new ideas; a company on the leading edge of IMS, CICS, TSO and moving dramatically to a centralized data base environment with four multiple virtual 370 centers and to *total* mechanization with plans that call for 20,000 point-of-sale terminals on line by 1976!

. . . and personally

Because you'll be dealing with bigger challenges, the responsibilities, of course, will be greater. And so will the rewards. Equally important are Wards programs that recognize the individuality of the individual. Open Discussion Forums stimulate the free flow of ideas among all DP levels; Management Information meetings develop the potential of people for management roles in systems or elsewhere in Wards growing organization; Seminars and training zero-in on tomorrow's technology, today.

You see, at Wards we're as concerned about your future as we are with ours. For information on specific openings, send resume and area of interest in confidence to:

I. A. Gruber,
Corporate Systems
Personnel

MONTGOMERY WARD

140 South State St. • Chicago, Ill. 60603

An Equal Opportunity Employer M/F

This forum is offered for readers who want to express their opinion on any aspect of information processing. Your contributions are invited.

The Forum

Data Base Hazards

Let me react on Mr. Patterson's article "Data Base Hazards" which appeared in your magazine (July 1972, p. 48). It is my view that Mr. Patterson "hit the nail on the top" at last, and I cannot but agree with him completely.

The things he is saying are those I have been discussing within our computing society ever since the very first news about the data bases saw the daylight in my country. It happened to me that DATAMATION's July '72 issue came on my desk at the very same time as No. 5 (Jan 24, 1973) of the *Computer Digest* (a new British special interest publication). Surprisingly enough I have found exactly the same views of the data bases in both of them and needn't say I was jolly pleased to read them.

It seems to me, in accordance with Mr. Patterson, that we have got to fight against all possible misconceptions in the data base (DB) design and its utilization right now. If we don't, we will soon find ourselves in a situation where any malfunction in the company's management will result in putting blame on dp people and the DB inclusive of data base management systems (DBMS). This would mean, of course, throwing out all that we have accomplished so far.

Up to now we have seen and have been told about several panaceas which were to cure the diseases of modern management. Let me recall for instance operations research, PERT, CPM, decision tables, and others. As in the case of any fashion, the boom didn't last long, the method turned out not to work as we thought it would, and we had to have a look back again at problems like human relations, management and company objectives, planning, incentives, organization structure, etc.

Being fully aware of the fact that some (mostly technical) whiz-kids would certainly take issue with me on what I am saying, I dare compare the case of the DB and its techniques (by the way R. F. Schubert presented a really good survey of DBMS in that very issue of DATAMATION) to the above methods. Once we have managed to load often terrific amounts of the company's data into our computers and made our application systems work, we have also produced something that is called inflation of information. The speed of the third generation computers made it possible to spit out incredible piles of computer output in a few seconds - containing, in most cases, a high percentage of redundant and even useless information. Nevertheless, we did succeed in showing that the computers can improve company management and relieve the people at the lowest level of the management pyramid by handing over the major portion of their routine job and operations to the computer.

Certainly the next logical step under these circumstances

should be integration and continuous movement at the upper levels of the management pyramid. Okay, so we got the idea of interrelating the data files thus allowing even the senior management to make direct use of our computer; hence also the company's data. But, as Mr. Patterson has correctly pointed out, even the best DB is too far from the real management information system (MIS) though it seems to me that a great many people do not realize this substantial difference.

And that's where I see real danger of the whole DB development. We are aiming to give our management something better, a sort of advanced mechanism which would give them access to any data used and maintained in their company, and by means of getting that data in the shortest possible time and most suitable format (other well-known characteristics of DB), to improve their decision-making which is the core of management.

But is it true after all? Are we going the right way? I am afraid not. If we undertook a census asking the dp people what they consider to be a DB, we might get rather alarming results. Still, too many of them think of DB in terms of the DBMS, i.e. almost exclusively from the technical point of view. That's why we can see now most of the DBMS's having been defined and specified almost in detail, while we still do not have an absolutely precise picture of what they may be used for—and lack experience in this field.

Mr. Patterson has already named the most important arguments and factors in his article, which should be taken into account when designing our DB (costs, time, space, etc.). Because of them and the above mentioned misconceptions, one might suggest that the following be done before we actually start to think of any DB and DBMS:

1. All current application systems must be carefully reviewed and revised in order to get rid of all redundant data (mainly on output).
2. Management information needs must be carefully analysed and investigated and any possible savings and reductions must also be embodied in the application systems.
3. Hand-in-hand with the above mentioned analysis, a very deep and complex analysis of the current applications and conventional approaches must be done. This may or may not prove their capability of satisfying all the management needs. However, we shouldn't move towards the DB implementation if we cannot completely cover for all the requirements. Maybe another application would fill in the gap as well (remember there are still a great many aspects of the company that we haven't touched yet). I reckon

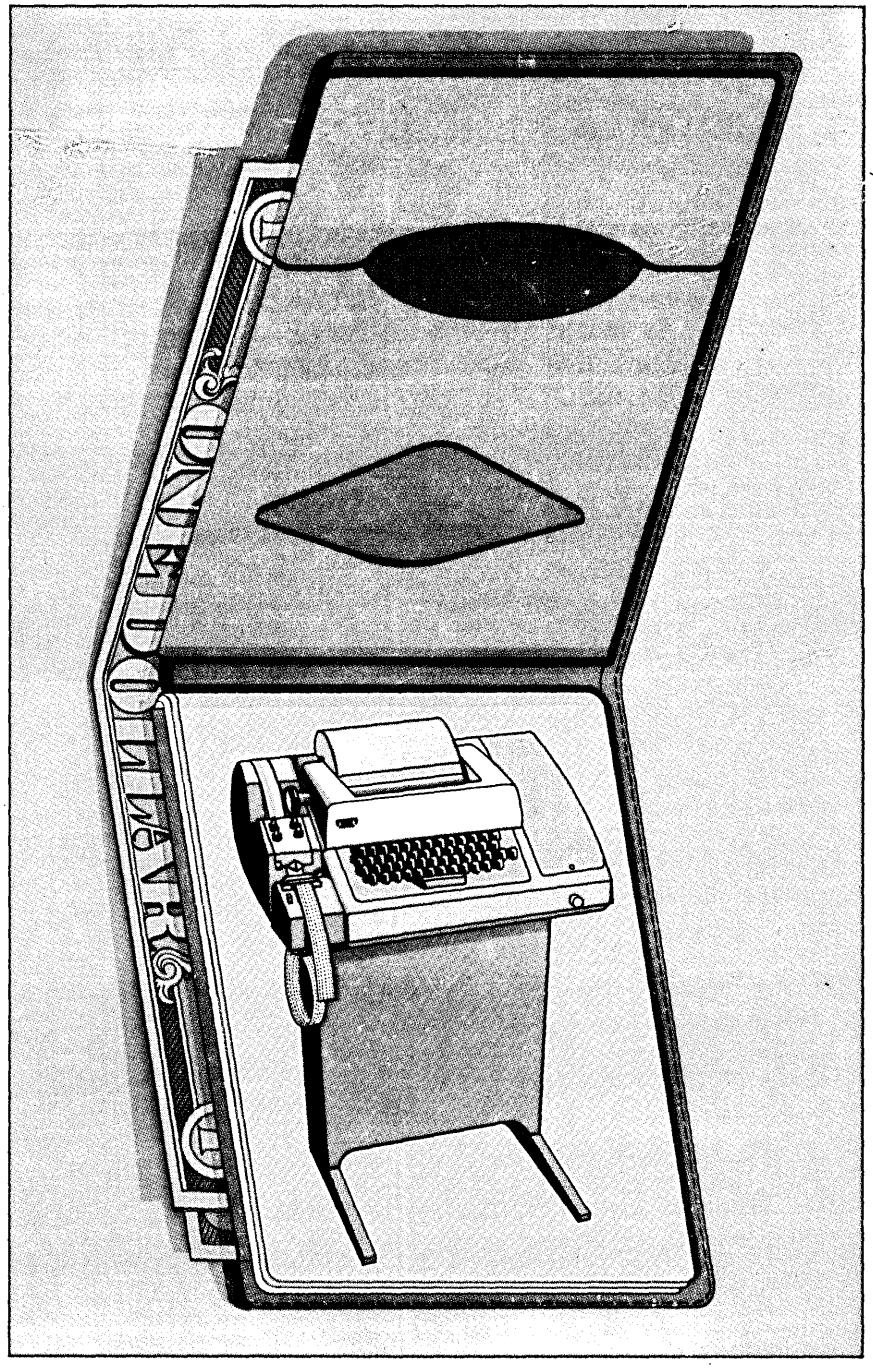
this will be the case of most of the users unless they have been engaged in dp for a sufficiently long time and succeeded in gathering necessary experience and gained the company management's trust. In other words, the means we offer to our managers must be commensurate to their actual requirements and needs.

4. Once we embark on the decision not to go on in a conventional way but to implement a DB, our design policy must include:
   a. Deep indoctrinating propaganda necessary to make our management fully aware of all the advantages and disadvantages of the DB approach.
   b. Deep management involvement in the data base design and its overall philosophy. Needless to say, this is felt to be by far the most decisive factor which may itself affect the whole project.
   c. While we still can build up an MIS without the DB, it is only a waste of money and time to develop the DB without being used in an MIS.
5. It is very unlikely that the implementation of the company's DB and the MIS do not require some changes in the management and organizational structures, as well as changes in methods and style. That's why we have got to allow for careful planning throughout the whole project, and admit some other company specialists to participate in this project more closely than before.

—Vaclav Chvalovsky

Mr. Chvalovsky is a senior designer working on a data base project at the EDP Center of CKD PRAHA, one of the largest computer installations in Czechoslovakia.

This member of our family is still the thriftiest ASR terminal around.



Dollar for dollar, the Teletype® model 33 is the least expensive, most reliable data terminal in its class. Because once you see how well it performs, you won't believe its price.

That's one reason why the model 33 is the most popular terminal in the industry. But it's hardly the only reason.

The model 33 is designed and built for extremely reliable operation at 100 wpm. And since it operates on the eight-level ASCII code, it speaks the language most computers understand. Both mini-computers and maxi-computers. Which makes compatibility another reason behind its popularity.

Then there are some reasons you can't see. But they're there just the same. Like complete technical sales and service back-up to help you with installation and maintenance.

Available in three basic configurations, the model 33 is a lot of machine. At a very small price.

It takes more than manufacturing facilities to build the machines Teletype Corporation offers. It also takes commitment. From people who think service is as important as sales. In terminals for message communications and computers.

That's why we invented a new name for who we are and what we make. The computercations people.

TELETYPE

The computercations people.

For more information about any Teletype product, write or call: TERMINAL CENTRAL, Teletype Corporation, Dept. 81P, 5555 Touhy Avenue, Skokie, Illinois 60076. Phone 312/982-2500.

Teletype is a trademark registered in the United States Patent Office.

CIRCLE 3 ON READER CARD

If you liked APL, you're gonna love this.

Now we can put you face to face with our 4013 computer graphics terminal.

It delivers the 4013's CRT graphics in switchable APL/ASCII —so you can run BASIC or FORTRAN as well. Our software lets you plug interactive graphics right into your present APL-speaking system. Including your 360 or other 2741-compatible APL system.

If you ever thought there might be more to APL than noisy, slow, paint-by-number plotting, you owe yourself a date with the 4013.

Once you touch our standard keyboard and watch that screen respond, we think it's going to be love at first sight. Complete with speedy, dry-process keepsakes from our plug-in hard copy unit.

We'll even help you get introduced. Our applications engineers can wheel a 4013 right into your office for a demo, or send you literature on APL, or answer your specific questions.

So don't be shy. Call your nearest Tektronix field office, or write Tektronix Information Display Division, P. O. Box 500, Beaverton, Oregon 97005.

TEKTRONIX®

CIRCLE 2 ON READER CARD