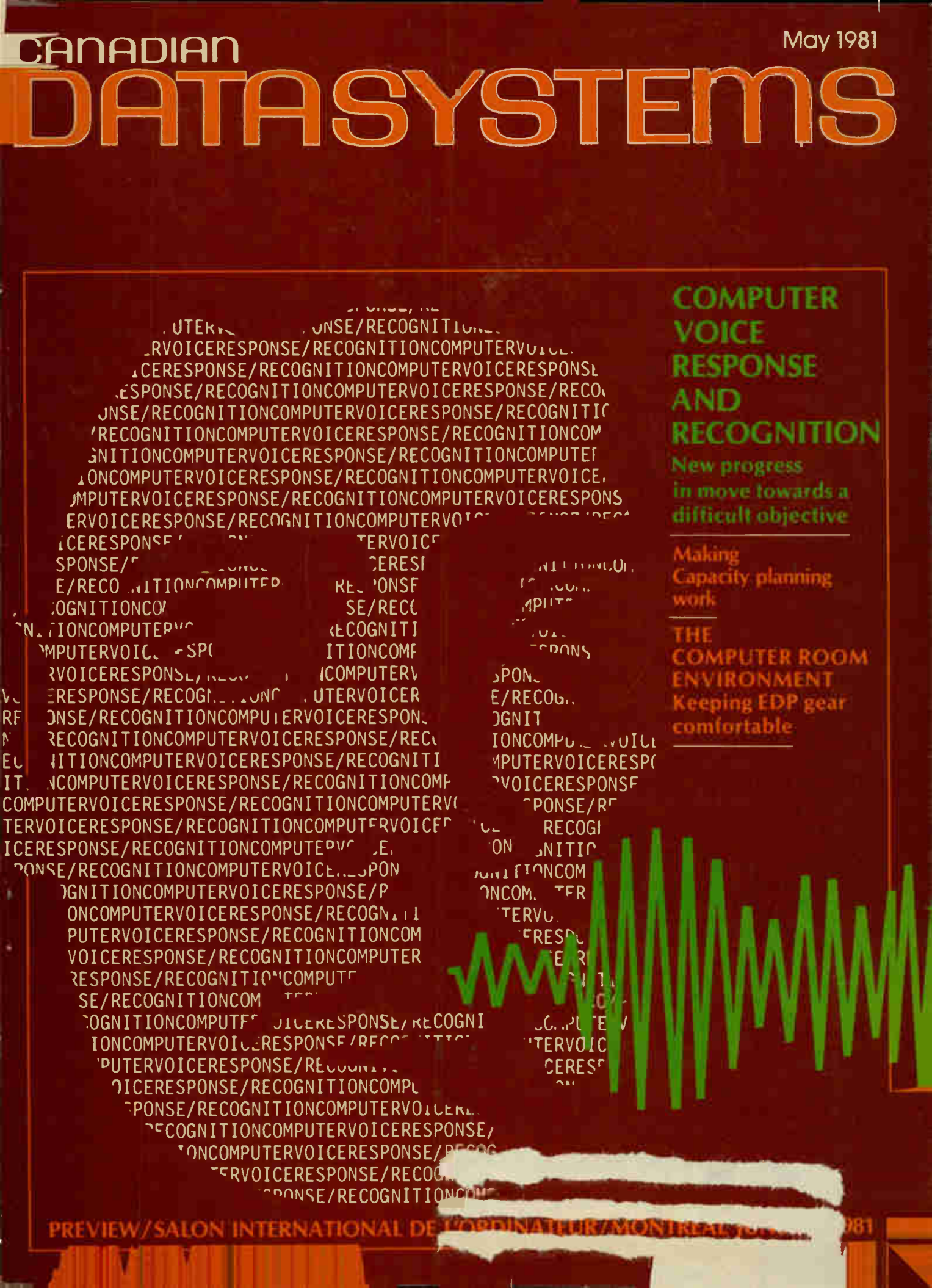
CANADIAN
DATASYSTEMS
May 1981

COMPUTER VOICE RESPONSE AND RECOGNITION

New progress in move towards a difficult objective

Making Capacity planning work

THE COMPUTER ROOM ENVIRONMENT
Keeping EDP gear comfortable



PREVIEW/SALON INTERNATIONAL DE L'ORDINATEUR/MONTREAL

A DEC is a DEC is a DEC is a DEC . . . but

EXPER

We were there at the beginning.

The DEC line-up of terminals offers everything you need.

So why should you choose Lanpar as your source for DEC terminals? One simple reason. We've been there from the start. No other distributor comes close to matching our experience with DEC terminals. Which is why we're by far the biggest independent distributor of DEC terminals in Canada.

Remember the LA30? How about the VT50? The VT05? The VT52? The LS120? The LA36? We still service them. We know them inside out and backwards. We understand how they work and where they work best and how they can, and should, fit into every conceivable user situation.

And we've continued that expertise into each new generation of DEC terminals. Today's magic names are the LA34, the LA120, and the VT-100. Tomorrow, knowing DEC's design and research capabilities, it will be something else even better.

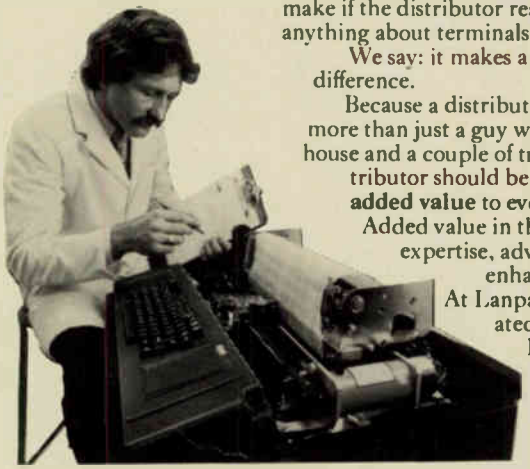
The point is this: we are so experienced, with the terminals DEC has made, that we can offer you advice, servicing, pricing, and follow-up that none of the newcomers to the business can hope to match. To us, a DEC terminal isn't just one piece of hardware that we buy from DEC and ship along to you. It's something we have to know and understand. **Really** understand. And the reason we do the job better is, quite simply, that we've not only specialized in DEC, but we've also been doing it longer.

We know so much about DEC terminals, we can even customize them.

At this point, you may be asking: "What difference does it make if the distributor really knows anything about terminals?"

We say: it makes a whole lot of difference.

Because a distributor should be more than just a guy with a warehouse and a couple of trucks. A distributor should be able to offer **added value** to every terminal. Added value in the form of expertise, advice, product enhancement.



At Lanpar, we've created a special R&D team that can help you get more out of your DEC terminal.

Among their achievements:

- making an LA36 compatible with an IBM2740
- making the LS120 and the LA120 Burroughs-compatible
- offering a board that made it possible to cluster up to seven VT52's to a single printer (without this special board, you would have needed one printer for each VT52).

This kind of expertise doesn't fall out of the sky. It started with our own origins as a company: our principal started in the business by designing a new computer language and selling it to Bell and AT&T; our company has worked in systems design and time-sharing, so we understand the communications and software end of the business thoroughly. In short, we are totally in tune with all of the needs of the end user. We have recruited some of the brightest minds in the business, and their raw talent—plus years of experience—has built an impressive base of technical and design information within our company. (Our own technical manuals, for example, are often more detailed than those of the manufacturers themselves!)

Lanpar has offices in:
Montreal (514) 482-4773, Quebec City (418) 653-1345, Ottawa (613) 238-3966, Toronto Sales and Service (416) 495-9661, Administrative Offices (416) 495-9123, Kitchener (519) 886-5970, Winnipeg (204) 632-4349, Edmonton (403) 453-5946, Calgary (403) 253-8866, Vancouver (604) 689-1516. Service available from Service Centres located in 14 major cities across Canada.

there's one overriding reason to get it from Lanpar.

IENCE

Our size and resources give you more ways to obtain DEC terminals, and much better service.

You're probably not surprised to hear that we're Canada's largest independent distributor of terminals. But you may not realize what our sheer size (150 people)—and experience—means to you.

First it means flexibility. We have the financial strength to be able to offer a variety of sale, lease and rental plans to suit your exact requirements. We pioneered the 'No Stranglehold' lease, offering long-term rates yet with one-day cancellation. And our lease rates can include service, installation and delivery, so you don't have to chase around after a variety of third parties and worry about unplanned "extra" costs that creep in after you've made the deal.

Second, it means depth. We've got the inventory, we've got the coast-to-coast distribution network. Our sales offices in nine cities all have their own stock, so we can conduct demonstrations in your office and ship fast. Our warehouses in Toronto, a new one in Calgary, and an upcoming one in Montreal, mean added inventory depth for prompt delivery.

And third—and perhaps most important—it means better servicing. Our SERVICE POWER® program promises an average two-to-four hour response time. We also have an Application Support Group that fields phone calls and offers immediate answers. Try phoning any other distributor and getting that level of instant technical expertise and help

Yes, it does matter how you choose your source for DEC terminals

So let's go back to our first question: since DEC terminals are, themselves, so undeniably superb, does it really matter where, or whom, you get them from?

Yes.

Because when it comes to terminals, you face a simple choice. You can either get the terminal, period.

Or you can get the terminal, plus a whole lot of extra benefits at no extra cost. Like experience and problem-solving capability. Customization for compatibility with your computer needs. Better terminal, depth for faster delivery. A coast-to-coast service network. Competitive pricing and flexible financing through a wide array of sale, lease and rental packages.

It makes sense to insist on these extra values. And because Lanpar, and only Lanpar, offers them, we've been able to carve out a growth curve that is nothing short of breathtaking. Our client list includes: Alcan, Labatts, Canada Cement Lafarge, C-I-L, CTV, Federation de Caisses d'Entraide, University of Victoria, Canadian Employment Immigration Commission, University of Alberta, SAIT... in all, over 1,500 clients buy regularly from us. These companies are smart. They're sold on having the right terminal of course... but they want more. They want those extras that Lanpar offers.

And that's precisely why, when you think of DEC, you should automatically think of us.

Reader Service Card Number 167

LANPAR

★★★★ EDITION

The Lanpar News

SERVICE POWER

MAY, 1981 WEATHER OUTLOOK: REWARDING.

MARKET BRACES FOR LA120 PRICE INCREASE; LANPAR CUTS PRICE TO $2699* (F.S.T. Incl.)

LATE FLASH
1200 BAUD GDC 212A Modem at special low price when purchased with LA120 – Check your local Lanpar office now.

*FOR LIMITED TIME ONLY

Order for delivery by June 1 and beat the coming LA120 price increase

Lanpar, Canada's largest independent distributor of terminals, has announced a major new pricing initiative—a lowering of the price on the LA120 at the exact moment that the market is awaiting another price increase.

"We know the LA120 price may soon list at $2,900 to $3,000," explains Lanpar vice-president Rene Pardo, "because of our supplier's increase. But we're reducing our price to $2,699 for all new orders placed for delivery by June 1, 1981. We want everyone who is contemplating the purchase, lease or rental of an LA120 to know that Lanpar is the best place to save money right now."

Pardo is quick to point out that Lanpar has always offered outstanding value on the LA120. "Not only have our overall pricing policies been aggressive, but our very flexible leasing program has been another big factor in attracting more potential LA120 users to Lanpar. For example, we can include such features as delivery, installation and service as part of the monthly lease rate—which doesn't happen when the end user has to deal with third parties." Two more reasons to go to Lanpar for the LA120 are the recent addition of the 212A compatible modem for 1200 baud communications, plus Lanpar's famous SERVICE POWER*—coast-to-coast service network that promises an average two to four-hour response time.

Lots of good reasons to go to Lanpar. But right now, the one that most people will be talking about is the new lower price on the LA120. But hurry—this offer is good only on orders placed for delivery by June 1. Act now, and save.

LA120 offers top performance 120-180 cps printing in DEC, HP, Data General and many other environments

The LA120 Dec Writer III teleprinter begins where other 1200 baud interactive terminals leave off. Its major strength lies in its optimized bidirectional printing. Printhead and paper motion are always under microprocessor control, to assure shortened print path and minimized mechanical motion. The results are higher print throughput and higher flexibility of the print mechanism.

The LA120 supports line speeds from 50 to 9600 baud, selectable right from the keyboard, in full or half duplex. The LA120 can by simple operator or cpu control reduce character size, so that 132 characters per line will fit on a standard 8½x11" size form for easy filing and much more convenient handling. Tabbing, margin controls, forms handling, variable line spacing, ANSI compatible printhead positioning, are all standard.

The LA120 is the natural choice in any 1200 baud ASCII environment, and performs well with host systems from HP, Data General, Honeywell, IBM, Prime, Univac and many more. It's also the right choice when upgrading host consoles from 30 cps or less, to the higher speed of the LA120.

Best of all, the LA120 is now available from Lanpar at a low price of just $2,699—at the precise time when prices everywhere else are heading for the $2,900–$3,000 level. It makes more sense than ever, to think of Lanpar when you think of the LA120 or any other DEC terminal.

LANPAR

Lanpar Limited has offices in: Montreal (514) 482-4773, Quebec City (418) 653-1345, Ottawa (613) 238-3966, Toronto Sales and Service (416) 495-9661, Toronto West & Mississauga (416) 494-8031, Kitchener (519) 886-5970, Winnipeg (204) 632-4349, Edmonton (403) 453-5946, Calgary (403) 253-8866, Vancouver (604) 689-1516.
* Service available from Service Centres located in 14 major cities across Canada.

Reader Service Card Number 168

MAY, 1981
VOLUME 13, NUMBER 5

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CANADIAN DATASYSTEMS

MAY, 1981 VOLUME 13, NUMBER 5

COVER:
New strides are being made toward the elusive goal of computer-generated voice response and voice recognition. Cover story begins on p. 26.

NEXT MONTH:
How the motor transport industry shifts into computing gear will be one of the features, along with a look at new developments in the role of computers in materials distribution.

DEPARTMENTS

Data Communications Managers:

Here's a sample of what Dataswitch can do for you ...

Develcon's Dataswitch is an intelligent central switching system which will provide network efficiency for your computer service installation.

Capacity
- Over 2 000 subscribers (terminals, ports or modems)
- Over 1 000 simultaneous connections
- 64 classes of service
- 31 programmable messages
- 64 account names

Transmission
- Speed — 2.4 Mbps (total)
  — Autobaud to 19.2 Kbps (individual)
- Method — ASTSDM

Interface
- RS—232—C
- RS—366—C
- RS—422—C
- 4-wire LDDS

Command Language
- Format — English
- Size — 31 primary commands
  — 29 sub commands

Access Control
- Computer controlled, manually assigned
  — Via parameters
  — Via restrictions
  — Via accounting
  — Via priority

Flexible Connection
Full Statistics Output

Develcon ELECTRONICS

Reader Service Card Number 144

. . . To find out more

Use this handy coupon to get your free copy of our new booklet, **Dataswitch: Designing for Network Efficiency**. Or call us at (306) 374-2202.

Return coupon to: Develcon Electronics
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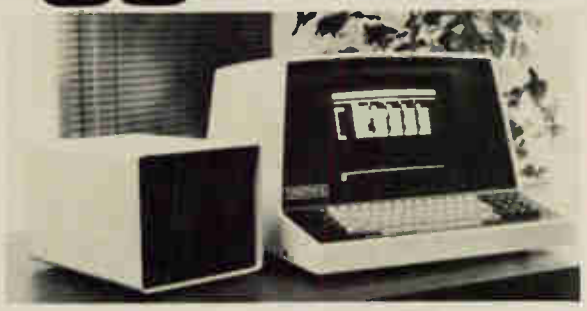
WHAT'S NEW



Vector 2600

TRW-Fuji TFC 8500

Hewlett-Packard 2653B

COMPUTERS

First offering

The Product: computer
Supplier: TRW-Fujitsu Co.
Features: The TFC 8500 is a multi-user, multi-tasking computer and is the first developed by this American-Japanese joint venture.

An entry-level single-station model can be expanded to include 80 local and remote workstations, which can operate on-line to a central computer or in a network. The CPU contains a one-chip, 10,000-gate microprocessor and 700-gate-per-chip bipolar LSI circuits. This design has eliminated the need for a special cooling system.

Maximum main storage is two megabytes, and eight disc storage units can be connected to the 8500. The system operates under Fortran, Cobol and RPG, and application programs are available for wholesale distributors, manufacturers, retailers, as well as insurance, hospital administration, and property management.

Reader Service Card Number 1

High-speed math

The Product: Numeric data processor
Supplier: Intel Corp.
Features: The ISBC 337 multimodule numeric data processor is a high-speed math 'add-in' unit for iSBC 86/12 and iSBC 86/12A 16-bit single-board computers, and for the iSBC 88/40 measurement and control computer.

The plug-on unit is said to give Intel's iSBC 86/88 family up to 100 times the math-computation performance of previous single-board computers. The multimodule option provides iAPX 86/20 or iAPX 88/20 numeric processor capability by combining Intel's 8087 numeric data processor with the iAPX 86 or iAPX 88 cpu already on the microcomputer. It allows equipment manufacturers to use the microcomputers in a wide range of industrial, business and scientific applications that until now required the performance of a minicomputer system.

Reader Service Card Number 2

Corrects errors

The Product: business computer
Supplier: Vector Graphic Inc.
Features: The Vector 2600 small business computer consists of a Vector 3 console with 12-in. display and keyboard, a Z80-based computer and 64K memory. Mass storage units are dual, double-sided, quad-density, 5¼-in. floppy discs, and capacity is 1.2 megabytes.

A controller board automatically corrects up to five erroneous bits in every 256 bytes transferred from disc to CPU, and average access time in 75 ms.

The system has an RS-232C interface port and optional software includes a business accounting program, word processing software, and a video calculator for financial planning.

Reader Service Card Number 3

TERMINALS

French offered

The Product: terminal option
Supplier: Hewlett-Packard (Canada) Ltd.
Features: The HP 2653B printing terminal, which features 190-cps dot matrix printing, is now available with optional foreign keyboards. They are: French, German, United Kingdom, Spanish, Swedish/Finnish, and Norwegian/Danish. This option also provides both seven-bit and eight-bit data communication codes.

Reader Service Card Number 4

Features reverse video

The Product: Dumb terminal
Supplier: Lear Siegler Inc.
Features: The ADM-5 Dumb Terminal console is supplied with reverse video and reduced-intensity visual features as well as limited editing capabilities and a gated extension port for selective transmission of data from the terminal to any serial RS232C peripheral device.

The visual features let the user keep selected data on the screen at lower intensity while variable or secondary data is changed. The editing capabilities let the user erase to the end of the line or to the end of the page, providing convenience for high volume data entry operations.

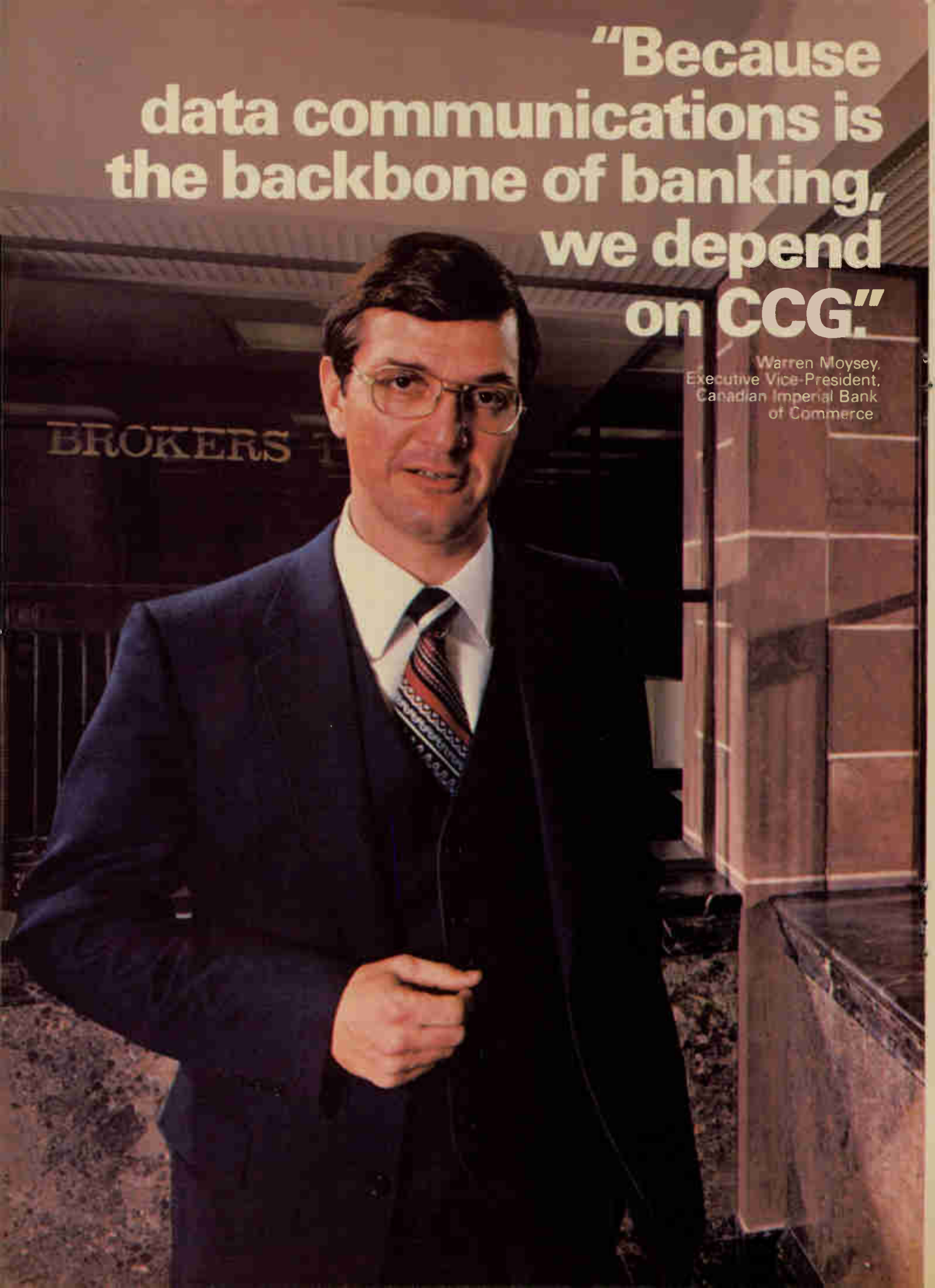
The terminal also features a built-in numeric keypad with 0 to 9 numerals and several other control keys. Other features include a 12-in. diagonal display screen and teletypewriter keyboard.

Reader Service Card Number 5

Easier on eyes

The Product: display terminal
Supplier: Datamex Ltd.
Features: The DT80/1L is a big-screen version of the DT80/1 terminal. It has a 15 in. diagonal screen, which gives nearly twice the total area of most standard displays. Character size is thus much larger, offering better readability and reduced eye fatigue. Screen capacity is 24 lines by 80 or 132 characters.

Reader Service Card Number 6


"Because data communications is the backbone of banking, we depend on CCG."
Warren Moysey,
Executive Vice-President,
Canadian Imperial Bank
of Commerce
BROKERS

"With billions of dollars moving between more than 1,600 branches, we need instant communications."

In a business as precise as banking, you can't afford anything less than consistent efficiency. That's why Canadian Imperial Bank of Commerce's data communications systems come from CCG. 5,000 on-line branch terminals, 8 regional data centres and 3 VISA credit centres are connected to the Toronto host computer on CCG's Dataroute and telephone networks.

Through these systems, CIBC customers can be provided with instantaneous

information on their accounts from most branches. VISA credit authorization can also be obtained very quickly.

Currently CIBC is working with CCG to develop an integrated network that will provide flexible and cost efficient pathways for computerized service. CCG is a leader in nationwide data networks, and they back them up with a team of service specialists who are experts in their field.

You must have efficient, innovative systems, in-depth service and people expertise to be a leader in your field. No one knows that better than a banker.

The Computer Communications Group

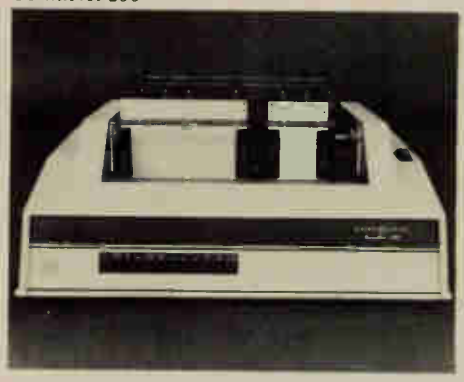
TransCanada Telephone System

Reader Service Card Number 132

CCG Nationwide data communications from your telephone company

BOS-900

TermiNet 200



SOS-500

PRINTERS/PLOTTERS

Platen is split

The Product: line printer
Supplier: Canadian General Electric
Features: The TermiNet 200 split-platen line printer allows users to print two forms simultaneously, but since each platen has its own servo motor, the two sides can operate independently.

The maximum print speed is 200 cps with maximum transmission of 9,600 baud. Nine-part forms with a maximum thickness of 0.028 in. can be used, with those on the right side ranging in width from 2-8½ in. and those on the left from 2-4½ in. Options include an alternate character font and a 2k input data buffer.

Typical applications are expected to be: general ledger accounting; drug store prescription invoice and label production; cheque and receipt writing; and bill of lading and warehouse 'pick' sheet printing.

Reader Service Card Number 7

Pinpoints problems

The Product: line printer
Supplier: BDS Computer Corp.
Features: The BDS 132-column band printer operates at 1,100 lpm with a 48-character set, 900 lpm with a 64-character set, and 672 lpm with a 96-character set. The printer incorporates diagnostic routines and a dual-digit status display that lets operators pinpoint and correct minor problems, such as character-read errors and vertical format unit faults.

It uses fan-folded paper forms from three inches wide to 16 inches wide, with up to six parts.

Interfaces and controllers are available for computers from DEC, Data General, Hewlett-Packard, IBM, Interdata, Burroughs, and Control Data.

Reader Service Card Number 8

Operates two ways

The Product: matrix printer
Supplier: E.S.S.N.A. Ltd.
Features: The Epson MX-70 dot matrix printer operates in two modes. The Text mode is used for general data processing and offers 80-cps unidirectional printing in 40 and 80-column widths. The Bit mode is for printing illustrations, charts, graphs, block lettering, etc. The printer has a standard parallel interface and a low-cost, disposable print head.

Reader Service Card Number 9

DATA ENTRY

More I/O interfaces

The Product: data acquisition computer
Supplier: Sonotek Ltd.
Features: The SDS500 data acquisition and process control computer series is compatible with the SDS1000 series, and although it is cheaper it has an expanded line of I/O interfaces.

The SDS501 Datalogger offers a 16 x 32-character CRT, keyboard, a PDT500 recording unit with a 48-column impact printer, and dual DC100A cartridge tape drives.

Reader Service Card Number 10

User-programmable

The Product: field data entry system
Supplier: MSI Data Corp.
Features: The MSI electronic field reporting system combines a handheld data entry terminal (MSI/fsr) with customized software and an integrated acoustic coupler. The terminal weighs one pound and measures 3.5 x 6.0 x 1.5 inches. The memory is 16K bytes, eight of which are used for the operating system, four of which are reserved for data collection and temporary storage, and four of which hold customized application programs that can be read-only or erasable/programmable read-only memory. These Program Load Modules can be changed, making the system user-programmable.

Reader Service Card Number 11

DATA COMM

Up to 64 async devices

The Product: Multiplexer system
Supplier: Transduction Ltd.
Features: The Emulex CS11/H communications multiplexer gives users of any PDP-11 or VAX-11 computer the capability to connect up to 64 asynchronous communications line devices to a single controller board housed within the CPU backplane.

The multiplexer uses a single-hex-size circuit board for the communications controller. This is connected by a 34-conductor ribbon cable to as many as four CP 11 distribution panels, each containing its own integral power supply and either one or two eight-channel CALL line adapters.

Reader Service Card Number 12

2000 crossconnects

The Product: Data PBX
Supplier: Electronetic Systems
Features: TL 460 intelligent data switch and port contention unit features user campon if a port is busy, console control, call transfers, redundancy and billing statistics. It accommodates up to 4,000 terminations and up to 2,000 simultaneous crossconnects, even if all are operating at 9,600 bps. The 4,000 terminations may be any combination of ports or lines. The TL 460 is data transparent, so it requires no change to existing front ends or software. Terminal users may access any port on any computer.

Reader Service Card Number 13

Financial software so advanced that Anaconda wants to keep it a secret.

Anaconda. And over 1,000 other companies.

Their software is so far ahead they'd prefer we didn't talk about it. So let's just say that Anaconda uses their McCormack & Dodge Accounts Payable package to analyze vendors, process invoices, write checks, and stay on top of the complex disbursement demands of a world-wide natural resources business.

The rest of the story is public record:

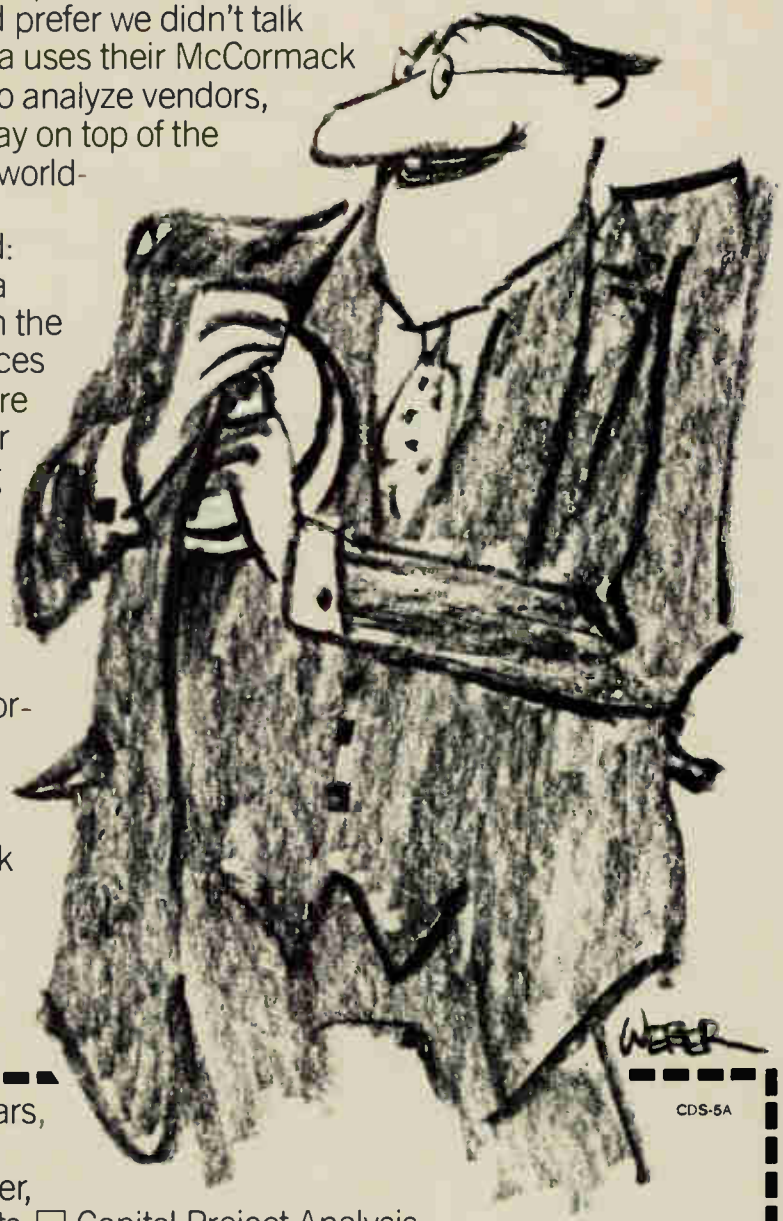
In McCormack & Dodge, Anaconda found a vendor with proven success in the highest echelons of the natural resources industry. Whose client list includes more than 100 of the *Fortune* 500. Plus over 900 other leading companies, ranging from the oldest and biggest to the youngest and fastest growing.

McCormack & Dodge. Where R and D is a religion, and follow-through is a promise kept. Where only accounts payable specialists are authorized to present and sell accounts payable software.

And where, in seven out of ten cases, prospects who sit down and talk do more than just talk. They become customers.

We'd like to show you why.

Reader Service Card Number 172



CDS-5A

Please send schedule of free seminars, plus information on:
☐ General Ledger, ☐ Purchase Order,
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Name_____ Company_____ Title_____

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Our new B-900 helps keep the DP department ahead of a growing demand for printout. It's the fastest member of our reliable B Series family of band printers.

Like the B-300 and B-600 models, it has Dataproducts' patented Mark V hammer system at its very heart. The system is virtually friction-free. The result is a remarkable level of reliability.

That reliability is proven, too. With over 20,000 units in the field, our B Series printers have become the industry standard for excellence.

Fast and easy.

The B-900 was designed for high performance, printing up to 1100 lpm with a 48 character set. It prints out 900 lpm with 64 characters and 670 lpm with a 96 character set.

All the B Series were designed with the operator in mind. The long lasting ribbon cartridges are easy to load. The bands can be changed in less than a minute. Sophisticated self diagnostics let the operator identify problems and often correct them without a service call.

The quiet type.

With fully sound-insulated cabinets, the printers operate at only 60 dbA—even less than the noise level of a

With Dataproducts' B-900 Band Printer, every department gets what's coming to it.

GREAT MOMEN

typewriter. These cabinets are available on the B-300 and B-600, standard on the B-900.

A name you can trust.

Dataproducts is the world's largest independent printer manufacturer. For 19 years, we've built printers for the biggest OEMs in the business, putting their names on our machines. These customers make sure our printers live up to some pretty tough standards.

Now our B Series band printers are available with our name on them. Or with your name.

We're here to help.

We have distributors and sales representatives throughout the world.

We'd love to show you how our printers can improve your systems.

Ashworth Automation Ltd.

315 Steelcase Road East
Markham, Ontario
L3R 2R5
Telephone
(416) 495-0222
Telex
06-966838

Reader Service Card Number 117

TS IN PRINTING

Control your network with the Gandalf PACX IV

CONTROL COMPUTER ENVIRONMENTS

CONTROL GROWTH

CONTROL CONTENTION

CONTROL COSTS

The Gandalf family of Private Automatic Computer eXchange (PACX) systems is designed to automatically connect a number of terminals with various service requirements to a number of computer ports capable of supporting those requirements. Configurations can be provided for up to 1024 terminals and 512 ports.

CONTROL YOUR SYSTEM

Your whole communications network interfaced to PACX IV is easily controlled by entering commands either via an ASCII console terminal or through the Control Panel. These versatile control facilities allow you to:

- reconfigure your network without service interruptions
- reallocate ports using up to 128 different service classes
- control the access of up to 16 groups of terminal users to specific service classes
- check the status of any terminal or port on the system
- monitor data activity for any connection
- match speed of terminal to port

Other features include:

- unlimited queueing
- fully prompting Keyboard Class Select allows user to access desired service class
- time stamped statistics log
- redundant power supplies and redundant control logic options
- PACX IV to PACX IV routing option
- speeds independent of number of active connections
- battery back up for configuration data

To see how a PACX IV system can fit into your existing or future network, call your nearest Gandalf office today.

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SOFTWARE UPDATE

news of software and services

Combines DP/WP work

The Product: WP/electronic mail software
Supplier: Micos Computer Systems Inc.
Features: The Mitext word processing electronic mail and POS software system is designed to run on the Micos business computer system. It provides full word processing capability plus the ability to produce telex tapes or connect directly to the telex network. The package is intended to run concurrently with any other data processing software such as order processing, accounting, and information retrieval.

The system can create, file, retrieve, correct and print documents. The number of users on the system is limited only by the number of terminals, and multiple users may access the same or different documents. The telex communications allows creation of telex messages interactively on the terminal screen.

Reader Service Card Number 21

For financial analysis

The Product: Financial modeling package
Supplier: Minicomputer Modeling Inc.
Features: The 'Data-model' financial planning and analysis system for 32-bit Perkin-Elmer computers features on-line, interactive planning and analysis.

Automated spreadsheets may have up to 30,000 rows and 500 columns. A maximum of 64 KB of memory is required to process models, making it practical for one or more users to model without impacting other jobs and users.

The package is said to allow unlimited levels of consolidation, and offers a wide range of financial routines, complete row and column manipulation, and flexible report writing. Financial routes include amortization, depreciation, internal rate of return, and present value. Applications include consolidated budgeting, variance analysis, profit and cash planning, sensitivity analysis, goal seeking, project investment analysis, asset/liability management, and liquidity analysis.

Reader Service Card Number 22

Adapts to changes

The Product: General micro language
Supplier: Cromenco Inc.
Features: The C programming language for use on Cromenco Z-80A based, S-100 microcomputer systems is an effective package combining the features and powers provided by assembly languages with the structured programming techniques available in higher level languages.

The system is designed for writing operating systems, languages, utilities and I/O drivers, communication software, database management systems, file management software, and fast graphics software.

The language is not tied to any particular hardware system, allowing easily developed 'portable' programs that can be run without change on a variety of computers.

The language operates under Cromenco's multi-user, multi-tasking CROMIX operating system and produces relocatable code that can be linked with Cromenco Fortran, Cobol, and assembly language, or called from Basic.

Reader Service Card Number 23

Promotes efficiency

The Product: Operating system
Supplier: Texas Instruments
Features: The Distributed Network Operating System (DNOS) is a multi-tasking, job-oriented package for use on the larger systems in TI's DS990 minicomputer family. Using bit-oriented communications protocols, the package aids in program management and promotes more efficient use of system resources through resource sharing. The system output spooler supplies additional efficiency via priority scheduling of output among available printing devices. File-based error messages allow adaptation of messages to the application environment.

Additional features include increased terminal capacity for the DS990, multi-volume file support, configuration capability, and job/task synchronization tools. The system also features job accounting.

Reader Service Card Number 24

Aids IBM conversion

The Product: Conversion package
Supplier: Application Development Services
Features: The 'Data Dictionary Plus' software package is designed to assist users converting from an IBM System/34 to a System/38. The menu-driven, interactive package standardizes existing file and field names so that they can be used with the new IBM System 34/38 conversion package. The system makes program file and field names consistent to enable users to go more quickly to externally defined files. It also creates the DDS specifications necessary for the System/38 data base.

After printing reports of current specifications, the package creates a data dictionary from existing input specifications. The user may then update the dictionary and let the system create the new input and output specifications.

Reader Service Card Number 25

Upgrades ANSI specs

The Product: MP/Basic upgrading language
Supplier: Data General (Canada) Ltd.
Features: This MP/Basic high-level programming language for the microNova and Nova 4 computers includes several extensions to the ANSI specification that make it suitable for technical, scientific, and educational applications.

Enhancements to the ANSI standard include: string variables of any length, string concatenation, substrings, and letter-digit array names. Also included are nine additional math functions, eight string functions, fixed and variable length file manipulation and integer data types.

Reader Service Card Number 26

Sorts a-n lists

The Product: Sort utility
Supplier: Symbolis Systems Inc.
Features: This sort utility program is designed for DEC word processing stations and can sequence a list into the order specified by the user. It handles numeric and alphanumeric data without changes to the original list. The data being sorted is not restricted to a position in a record.

The utility can simultaneously sort up to four fields in a single operation.

Reader Service Card Number 27

Developments in microprocessor technology, applications

Desktop business computer offers 5-MB Winchester

What is billed as the first totally integrated desktop business computer to include a five-megabyte Winchester disc drive has been released by the microcomputer division of Digilog Inc., Horsham, Pa.

The System 1500 is intended for business applications previously reserved for higher-priced minicomputers, or markets not previously satisfied by existing products. In addition to the Winchester drive, there is an integrated 700K double-sided, double-density flexible disc drive as a back-up, and for program and data transfer. Eight floppies can back-up the full Winchester capacity. Data transfer rate for the Winchester is five million-bits/sec, and maximum capacity is 5.2 megabytes.

Automatic error-correction allows the disc controller to correct up to 11 bits per physical sector, greatly enhancing reliability. The rest of the System 1500 includes a solid-state keyboard with 60-key typing array and 13-key numeric cluster; up to 64K of RAM; a 12-in CRT with 24 lines of 80 characters each; a Z80 microprocessor; and interfaces for data comm and printer output.

Reader Service Card Number 28

Xylogics announces move to mini/micro packages

Xylogics, Burlington, Mass., is expanding from its traditional role as a manufacturer of peripheral processors and storage subsystems into the mini/microcomputer packaged systems market.

The initial systems are expected to be ready by this spring, in time for the National Computer Conference in May.

The new systems will integrate DEC processors and software with Xylogics storage subsystems. The systems will be packaged in processor/peripheral configurations that, in many cases, are not currently available.

Principal market for the systems is expected to be OEMs and dealers who want to get around long lead-time delays, and need an integrated system that they won't have to package themselves.

'Cut-throat' competition seen for mini/micro market: study

A market study by International Resource Development Inc., Norwalk, Conn., says that soaring shipments of mini- and microcomputer systems will be accompanied by 'cut-throat' competition for OEM sales as the Eighties unfold.

No new suppliers are expected to enter the market, the study reveals, and several existing minicomputer suppliers may be pushed out of the OEM sector by increasingly vertically-integrated semiconductor manufacturers.

Shipments of 'computer-on-a-board' units surpassed $300 million in the US in 1980, and by 1990 the shipment level of such compact models will be more than $6 billion—despite continuing declines in unit price.

Office automation equipment—desktop computers, 'executive workstations', and the like—will account for much of the continuing demand in this area, with market saturation unlikely before the end of the century. Growth will also come from a migration downwards from traditional centralized EDP centres, and so-called 'super-minis', typically with 32-bit word lengths.

Backplane for DEC micros accepts up to 18 modules

A backplane from Digital Equipment of Canada, Kanata, Ont., intended for use with the firm's LSI-11 series of microcomputers, will accept up to 18 processor, memory, and interface modules.

The H9275-A backplane holds up to 18 dual-height modules, nine quad-height modules, or a mixture of both, and features 120-ohm signal termination networks to avoid the need for a separate termination module. Included is a wire-frame card cage with intergral card guides and two screw terminals for connection of normal and battery backup power sources.

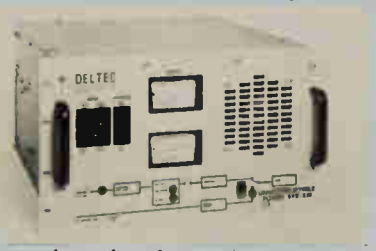
Comshare Apple-II system keeps employee records

'Microshare' is a complete employee benefit record-keeping system, designed to run on an Apple II micro, released recently by the trust services division of Comshare Inc., Ann Arbor, Mich. According to the developers, this is the first system for employee benefit trust operations to be marketed for a minicomputer.

Features of Microshare include: allocation flexibility, allowing users to adjust allocation procedures and vesting schedules to suit particular plan requirements; operational flexibility, providing on-line inquiry to participant data, as well as a feature for handling repetitive transactions such as salary posting whereby individual call-up of records is avoided; 'unrun', an automatic error-correction feature that lets one error correction fix all consequent errors; and 'recall', which retains all deleted plan data and allows reinstatement of a participant.

UPS system from Sogecom backs-up small systems

An uninterruptible power system from Sogecom Inc., Montreal, is sized to provide standby power for small business computers, PABX, and process-



control and other microprocessor-based equipment.

The Gould-Deltec Model DSU720 is a 700-VA unit with battery power supply lasting from five minutes to more than four hours. The unit is claimed to use only half the number of components of earlier designs, enhancing reliability.

Performance options include filtering options that allow the system to operate in the critical RFI/EMI environments often posed by communications equipment and mini/micros, and a static transfer switch option that operates the bypass in as little as one millisecond and automatically resets whenever the overload condition reduces.

The front panel shows operating status as well as AC voltage and current levels. Contact closures provide full status information for use at a remote monitoring location.

Reader Service Card Number 29

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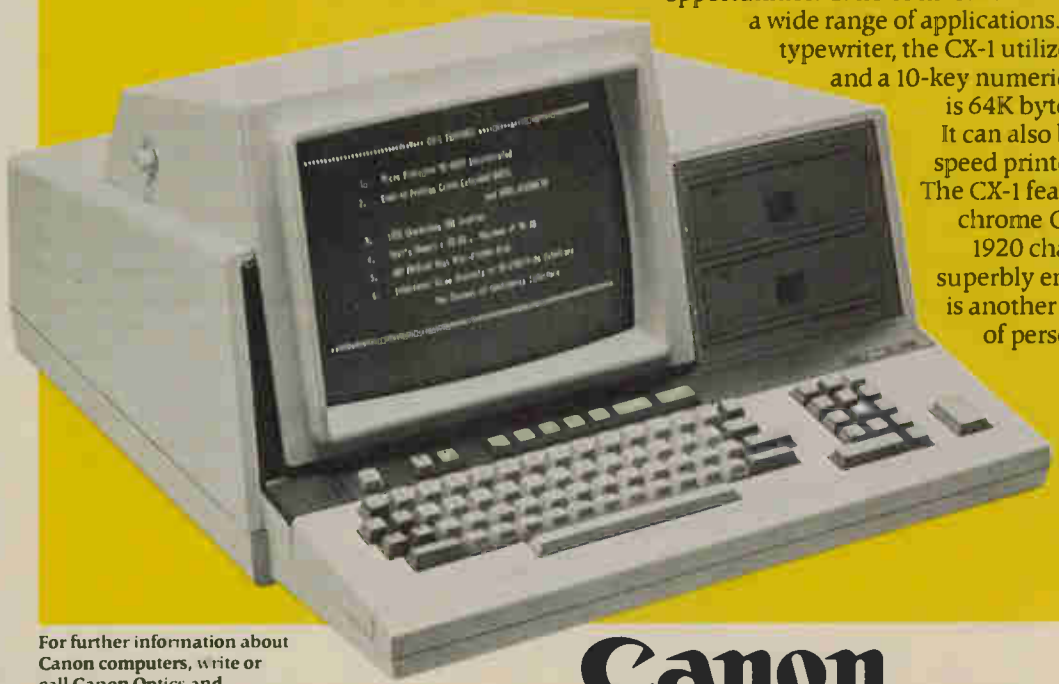
CX-1 This is the desktop computer that gives the small company the ability to increase its business opportunities. Canon's most advanced personal desktop, it offers a wide range of applications. About the size of a standard typewriter, the CX-1 utilizes a full typewriter keyboard and a 10-key numeric pad. Its processing capacity is 64K bytes expandable to 128K bytes. It can also be expanded by adding high speed printers and 8" floppy disk drives. The CX-1 features a 12" P-31 green monochrome CRT with a screen capacity of 1920 characters. This handsome and superbly engineered desktop computer is another example of Canon's mastery of personal computer technologies.



For further information about Canon computers, write or call Canon Optics and Business Machines Canada Ltd., Systems Division, 3245 American Drive, Mississauga, Ontario L4V 1N4 (416) 678-2730.

Canon

Reader Service Card Number 128

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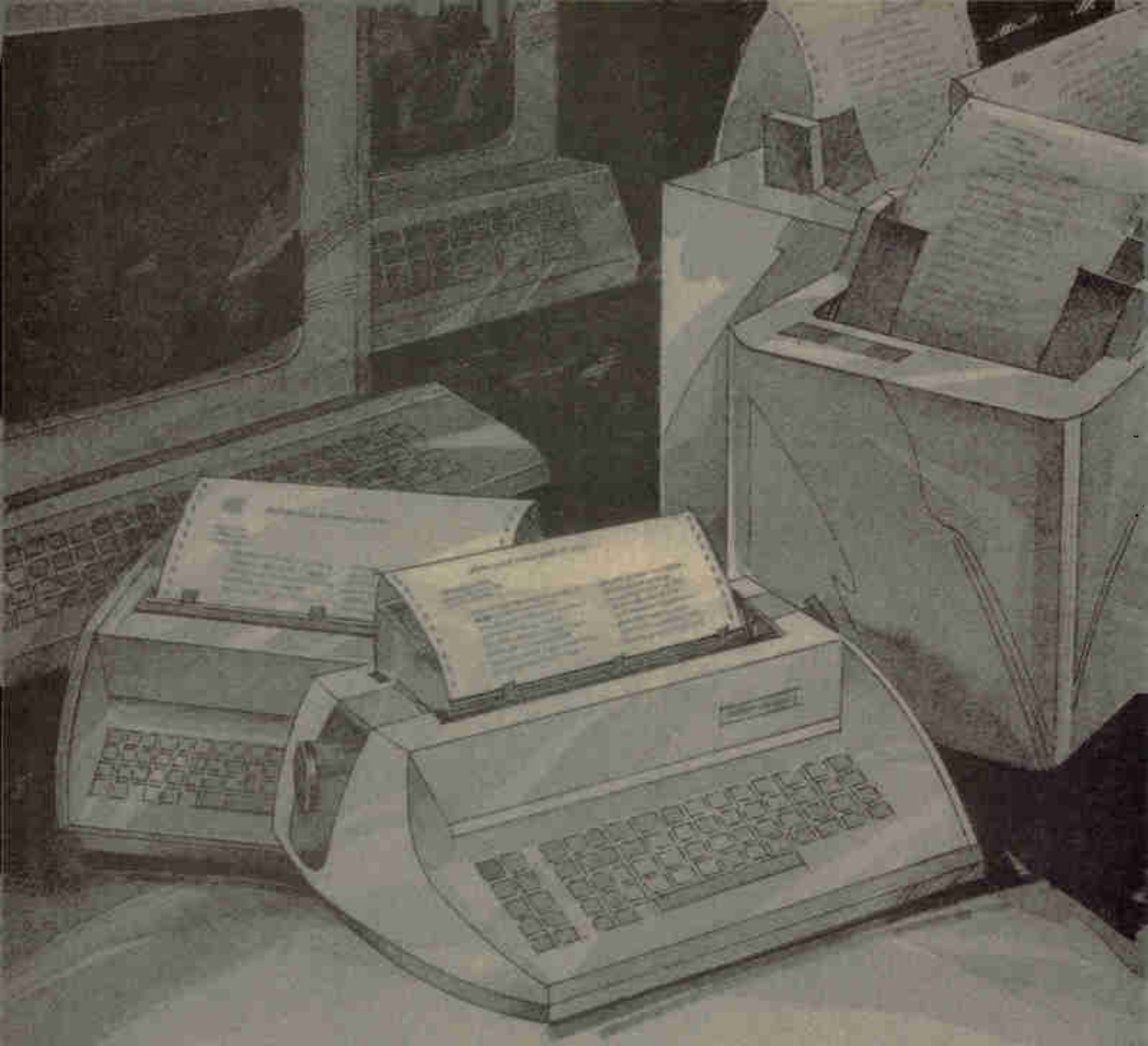

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Graphics terminal package aimed at educational field

A graphics terminal package specifically designed for educational applications is being introduced by Digital Equipment.

Called GIGI, for General Imaging Generator and Interpreter, the portable unit is a microprocessor-based 'intelligent keyboard' that can be used with user-supplied video monitors. It provides interactive graphics and incorporates educational functionalities such as an integral graphic instruction set, ReGIS (Remote Graphics Instruction Set).

According to DEC, it has multiple character sets, local intelligence, including a Basic ROM memory implementation, eight-level colour and shading support, and a set of application software packages. It also has provisions for interfacing either a graphics tablet or a printer.

GIGI and its associated software are supported under RSTS/E, VAX/VMS, and TOPS-20 operating systems.

The company also announced a new receive-only graphics printer for GIGI that provides users with a hard copy of the images that appear on the monitor screens.

Toronto firm markets pharmacy DP system

I.B.A. Microsystems Ltd., Toronto, is now marketing a computerized dispensary system for pharmacies. The system is built around a 52K Ohio Scientific CPU with dual-floppy discs for back-up, Winchester hard disc (10-74 megabytes) for patient profiles, drug information, doctor listings, etc., Lear Siegler peripherals, and software developed by I.B.A. over the past two years.

The turnkey stand-alone system performs all necessary pharmacy functions, including: third-party print-outs, prescription label and receipt preparation, price calculations, patient profile, interaction/allergy warnings, nursing-home capabilities, management reports, inter-store charges, narcotic and control drug reports,drug usage reports, and gross profit reports.

The stand-alone feature is claimed to offer more flexibility over on-line time-sharing approaches, along with full inventory control, automatic price updating, and absence of communications charges. Downtime is said to be eliminated through the inclusion of an emergency battery pack in case of power failures.

The system currently complies with the pharmacy regulations of Ontario, Nova Scotia, New Brunswick and Quebec.

New thin film read/write head (left) in Seagate ST512 5¼-in. micro-Winchester drive compared with standard ferrite type head. Thin film head can read data with higher packing densities on the total surface of the disc, allowing more data to be compressed into same disc space.

Micro Winchester gets thin film heads

A new 5¼-in. micro-Winchester from Seagate Technology, Scotts Valley, Ca., is billed as the first disc drive smaller than 14-in. to use thin film head technology.

The ST512 has a storage capacity of 12.76 megabytes unformatted and 10 megabytes formatted on two discs, which is double the storage of the firm's current ferrite head drives, the ST506. The increased capacity is provided in the same 5¼-in. Minifloppy.

The thin film heads allow the device to store bits at 10,202 bits/inch. This compares with conventional ferrite heads at 7,690 bits/inch. According to the company, this increased bit packing permits the recording of data on the unused portion of the disc surface closer to the centre, while maintaining the same number of total bytes on the track. This results in doubling the number of tracks from 612 to 1,224, thus doubling the total capacity of the disc drive.

A significant technical feature of the thin film heads is that they do not require write precompensation on the innermost tracks of the disc. This was previously required on ferrite head drives to maintain low error rates.

Specs of the drive include an average latency of 8.33 msec, an average seek time of 100 ms, a settling time of 15 ms. The drive rotates at 3,600 rpm. According to the company, the unit requires only two voltages +5 and +12 vdc ±5%. It does not need a separate AC drive motor voltage.

The drive's reliability figures are given as a soft error rate of 1 in 10^{10} bits read, a hard error rate of 1 in 10^{12} bits read, and a seek error rate of 1 in 10^{6} seeks. Expected life of the drive is 5 years and mean time to repair is 30 minutes. It requires no preventative maintenance states the company, and has an expected mean time between failure (MTBF) of 11,000 POH. □

Hardware expansion plans for BCSC

Expansion plans for the British Columbia Systems Corp. call for the addition of three processors.

An IBM 3033 Model U is on order for delivery in May of this year and a 3081 with 16 megabytes of memory for Jan. 1982 and another 3081 are for May 1982. These units will replace the currently installed multiprocessor.

Current hardware at the organisation's central site include one 3033 MP, some 52 disk drives of which 36 are STC 8650 units. In addition there are 16 IBM 3420 tape drives a number of printers, communications controllers and one switching unit.

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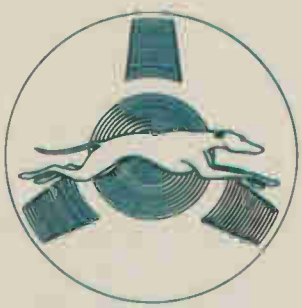

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IBM CANADA DELAYS DELIVERY OF 3380 DIRECT ACCESS STORAGE TO FOURTH QUARTER

Initial delivery of the 3380 Direct Access Storage system has been postponed until later this year due to a technical problem in the 3380 identified during tests prior to shipment. Changes have been undertaken and testing is continuing, says IBM Canada.

Based on the successful completion of tests incorporating these changes, IBM expects to announce new delivery schedules for the disk storage device and some associated control units in the third quarter of this year. Initial delivery will be in the fourth quarter, notes the company, and deliveries of fixed-head versions of the 3380 will be rescheduled at a later time.

CSG MOVES INTO HEALTH DATA SERVICE MARKET WITH NEW ACQUISITION

Canada Systems Group, Mississauga, Ont., is moving into the health care data processing market with the acquisition of Datapharm Systems Ltd., Rexdale, Ont., a firm that provides computerized prescription-filling and record-keeping service to more than 100 pharmacies in Ontario and western Canada.

"The medical health market is the third-largest for computing services, behind banking and insurance," said William B. Boggs, president of CSG. "The acquisition of Datapharm expands our range of services and provides us with an excellent vehicle for entry into this market."

The Datapharm system uses a display terminal and printer, connected by high-speed lines to one of five minis at the firm's Rexdale offices. Information is entered through the terminals and the printer produces labels, receipts, and a history of patient prescriptions.

The Datapharm operation will function as a separate division within the CSG Professional Services Group under vice-president David Herd.

IN BRIEF:

Burroughs OCR Systems, Burlington, Mass., has announced that it is expanding its dealer network for its optical character recognition page reader up to a level of 275 dealers in the U.S. and Canada by the end of 1981. The network currently stands at 200 dealers, following two years of steady expansion.

Preparations are under way by the federal Department of Communications to participate in a federal-provincial conference of communications ministers that will meet in Winnipeg, possibly sometime in June. The meeting will be co-chaired by the Manitoba Ministry of Communications, and will contain discussions on topics including competition and industry structure, industrial impacts of communications policies, and the sharing of responsibilities over cable.

Greyhound Computer of Canada Ltd., Toronto, has announced that 1980 showed the highest earnings level in the firm's history, with net income of $889,000 as compared with $826,000 for 1979. Total revenues were almost $5.1 million last year, down somewhat from $6.7 million the year before and due to a reduction in the amount of equipment on lease.

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Reader Service Card Number 155

INVESTMENT GROUP FORMED TO PROVIDE CAPITAL TO NEW EDP/ELECTRONICS VENTURES

A Toronto group of investors has formed the Informatics Investment Group and is actively seeking venture capital investments in the computer and microelectronics industry. Headed by Toronto lawyer Robin J. Wigdor, the group consists of Informatics Small Business Development Co. and Informatics Investments Inc. The group will consider unsolicited proposals, said Mr. Wigdor. Its aim is to provide start-up and expansion capital to small businesses in manufacturing or R&D.

To date the group has made venture capital investments in Zenex Business Systems Inc. and Nanotec Ltd. Investment in another venture is currently under consideration, but details were not available.

Zenex manufactures micro-based business systems, while Nanotec (Almonte, Ont.) produces specialized computers that attach to the Telex network.

GENERAL DATACOMM INDUSTRIES CONSOLIDATES SERVICE FACILITIES

General DataComm Industries (Canada) Ltd., Ottawa, is consolidating its service facilities to simplify and improve servicing of its line of data communications products. Service facilities in Montreal are being increased, and the firm's Ottawa service facility is moving to the Montreal location at 4140 Thimens in suburban St. Laurent. The new service centre will function as a clearinghouse for all service requirements.

UNITED COMPUTING CANADA EXPANDS, PLANS DATA CENTRE HERE

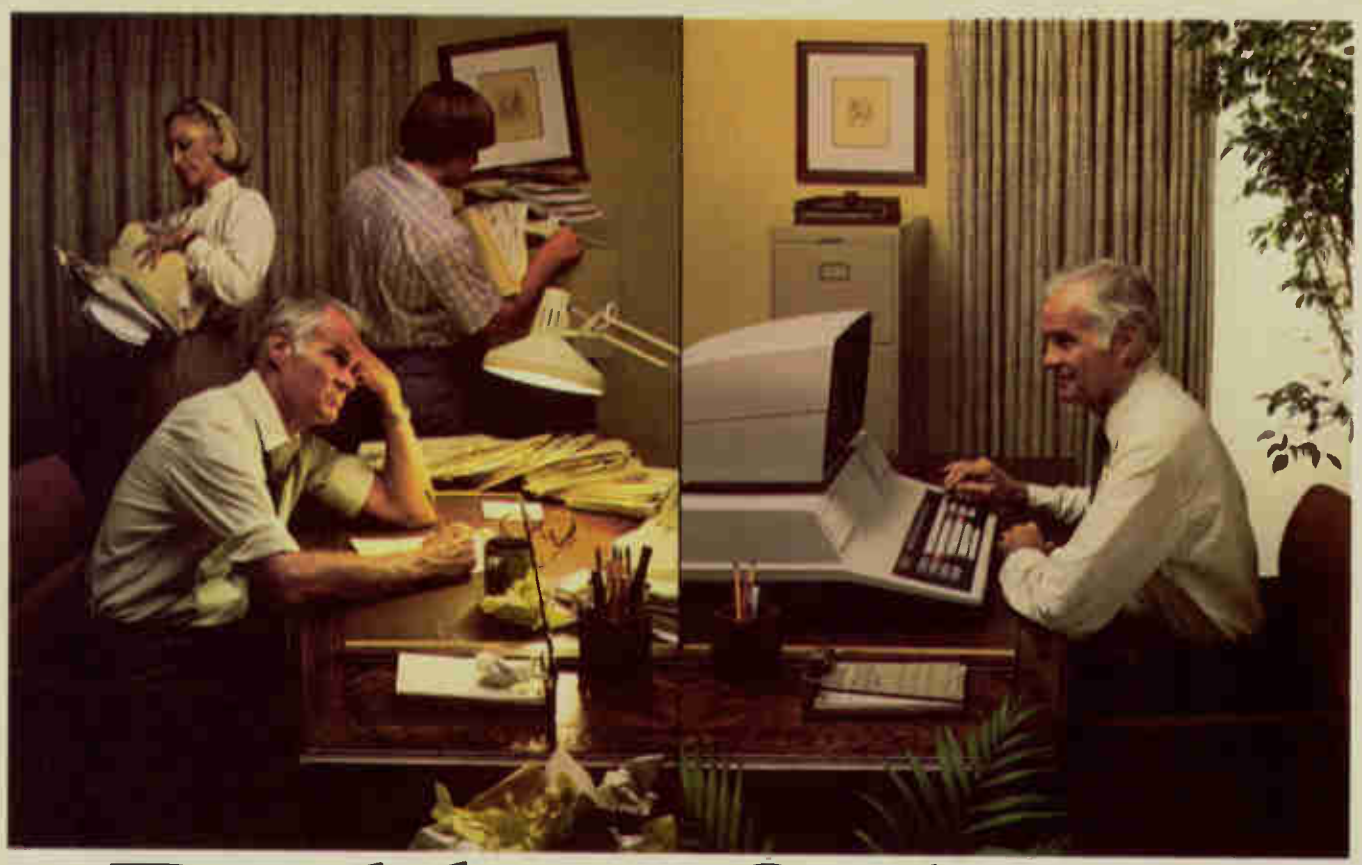
United Computing Systems of Canada, Montreal, is the newly formed Canadian business unit of United Computing Systems Inc., Kansas City, Mo. The US firm has been offering its computing services in Canada since 1975, but due to the significant growth of business here, the firm has now established a full Canadian operation. While remote computing services are being provided from four data centres in the US, the Canadian firm has plans to establish a Canadian data centre at a later time, said Mr. Christian Adsuar, Canadian country manager. The firm recently established a Toronto office as well.

The parent firm acquired a Cray-1S last year, which increased its remote batch processing capabilities. The Canadian firm currently offers applications in process, reservoir and piping analysis to the petroleum industry and services other areas, such as structural engineering, data base management and financial planning.

CII HONEYWELL BULL JOINS AMDAHL'S ACSYS COMPUTER VENTURE

CII Honeywell Bull, the French unit of Honeywell, is becoming one of the early investors in a new high-technology venture called ACSYS, being launched by Dr. Gene Amdahl. Honeywell's US operation views the investment as an opportunity for CII to acquire ACSYS technology as a supplement to other technology programs on which it is currently working.

Both Honeywell in the US and CII Honeywell Bull have every intention of maintaining their common product lines, states the company in a press announcement. Honeywell US is also understood to have an option for access to ACSYS technology and know-how.



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The Model 771 desktop computer uses single-sided, single-density diskette storage for a total of up to 500,000 characters of instantly available on-line data storage. The DS990 Model 1 stores up to 4,600,000 characters using double-sided, double-density diskette storage, making it among the most powerful small business computers available anywhere.

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TEXAS INSTRUMENTS
INCORPORATED

Reader Service Card Number 190

The competition gets hotter

Despite talk of recession, trade deficits and other assorted woes, Europe's EDP market is alive and thriving and poses new opportunities and challenges to Canadians

A mirror of that burgeoning market's vigor was the recent Hanover Fair, in West Germany, which is billed as the world's largest industrial exhibition. An integral part of it is CeBIT (World Centre for Office and Data Technology), the premier showcase for Europe's data processing industry.

While the rest of Europe's industry is very much concerned with slow economic activity, the EDP show was packed with visitors from around the world, with attendance reaching the 185,000 mark. And the mood of purveyors of EDP/WP gear was markedly ebullient. With more than 1,100 exhibitors from 28 nations, it was a major event. The multinational DP suppliers were there of course, but also a vast number of the small and mid-size firms so characteristic of European business, who are all trying to carve out a niche in the massive EDP market.

It appears that European businesses are adopting EDP technology with a vengeance. While many of the large firms are certainly no newcomers to data processing, many of the smaller firms are making their move now. In the past they may have been reluctant to experiment, but once they see their competitors in the act, the reluctance wanes fast.

This changing environment poses opportunities for Canadian suppliers. While all the big international names were at CeBIT, only a few Canadians were there. Notable exceptions were AES Data and Northern Telecom. Other Canadian producers were represented by their agents and distributors. In contrast, the fact that the European market is bullish didn't escape. The East Germans, for example, who had their display of terminals and printers well placed, hoping to cash in on a promising situation. Japan's equipment makers were there in force, and even Brazil's EDP manufacturers pushed their minis and terminals. As a Canadian visitor it would have been gratifying to see a stronger Canadian presence. Surely we have the technology and the enterprise to be more visible and to mix it up with the best of 'them'.

The CeBIT event stressed the conduct of business, rather than the display of wares. Several major equipment orders were announced at the show. To assist visitors a 66-terminal electronic information system was in place providing data on products and firms from various locations throughout the 1.5 million sq. ft. exhibit area in three large buildings. The system's terminals were in constant use, indicating serious visitor interest.

With Europe's EDP market on the upswing, equipment suppliers there are at the same time aware of slow economic activity in their own countries. Balance of trade deficits, especially in West Germany, are giving producers an incentive to push for export sales. It is in this arena that Canadian suppliers are likely to find tougher competition. The European producers, even the smaller firms are aggressive and formidable exporters, and with a history of international marketing they are likely to challenge Canadians as well as others for a share of increasingly competitive markets.

While it is recognized that observations based on a short visit are limited, the strong impression however lingers that our international competitors are bringing a vigor and resolve to the EDP marketplace that should not be underestimated. It will demand a response in kind.

The opportunities are there and some Canadian firms are demonstrating that by successfully selling abroad. But the field is attracting more challengers and it is up to us to meet the competition with aggressive marketing and new visibility in the international marketplace.

Tom Weissmann

COMPUTER VOICE RE

Making progress towards

Making computers talk is easier than making them listen. But the technology is making new strides and applications are increasing. Here's a look at current developments.

What would you prefer: to be able to talk to your computer, or to have it talk to you? Or both?

You can buy these capabilities off-the-shelf today.

As long as you don't expect sparkling conversation—at least not yet.

Speech recognition (you talk, the computer "listens") and voice response (the computer talks, you listen) are no longer dreams pursued in laboratories nor curiosities for your entertainment at computer shows. They are state of the art technology.

The most you will get a computer to say are a few hundred words or so, and none of it expressed too elegantly; the most you may expect the computer to understand is a similar vocabulary at best, provided you don't mumble.

The point has to be made that to have come that far is a major achievement. It has been made partly because of the progress in micro-electronics, and partly because of years and years of study of what speech really is, which has begun to pay off.

What you hear is not just a tape recording played back. It is a sophisticated electronic reconstruction of pre-recorded voice patterns. Similarly, when you talk to a speech recognizing computer, it does not just record what you say, but has to be able to interpret what is spoken and take action on it.

In any case, even the few hundred words of vocal intelligence these systems can now handle, whether it is input or output, have proven to be extremely useful. And one of the powerful features of voice response is that it turns any touch-tone telephone into a computer terminal capable of sending and receiving numerical data. In fact, voice response systems need a vocabulary of only a dozen or so words to do that—numbers 1 through 9, plus a few control words.

Speech recognition, on the other hand, uses the fastest, easiest-to-use and most convenient form of data input: the human voice. No encoding, no keys to punch. This makes the art of entering data into a computer accessible to almost everyone. And the technology has progressed to the point where you can do it via the telephone line—and it doesn't need to be touch-tone either.

Two technologies

Although they are related, voice responses and speech recognition are actually two distinct technologies. They have, by and large, been developed separately and, for purposes of commercialization, few companies are engaged in both. Of the two, voice response is the one furthest along and being actively marketed by perhaps a couple of dozen firms in North America. Only a half a dozen companies, on the other hand, are offering speech recognition systems.

As it has turned out, in terms of their applications each of these two technologies stand quite on their own. In many cases where, for instance, voice response is the ideal way to retrieve data, there may not be much scope at all for speech recognition within the same system, and vice versa. In fact, the instances where both are used in a single system are still rare. That could change. For, even though these technologies are not mutually interdependent, they are obviously highly compatible.

Digitized speech

There are currently two main techniques for generating the artificial voice. One, known generally as digitized speech, utilizes pre-recorded words and phrases. However, to store a digitized voice signal in its entirety would take a considerable amount of memory, so, instead, what is stored is a kind of digital shorthand. There are a number of techniques for doing this. One, which has been in common use by the telephone companies, is known as pulse code modulation, in which only intermittent digital samples of the voice signal are transmitted. Even that takes plenty of memory, and there are other techniques that do the job more efficiently. For instance, the method known as linear predictive coding, in which a voice signal is processed both in analog form and digitally, can cram 10 times as much information in the same memory as PCM. It is, incidentally, the method used by Texas Instruments Inc. for its talking game "Speak and Tell" in which the speech generation process is accomplished on a single chip, in addition, there are a couple of memory chips and a micro-processor to run the thing.

One of the limitations of this kind of approach, commonly referred to as digitized speech, is that you are

SPONSE/RECOGNITION

a difficult objective

By J. KOEKEBAKKER

limited to the words programmed into the system—no more than 200 in most cases.

No such limitation exists for the other main speech generation technique, which is based on storing, not words, but so-called phonemes. Each phoneme represents a distinctive sound, i.e. that of vowels and consonants and combinations of these. It has been found that the minimum you need for intelligible speech reproduction is only about 64 phonemes, and these are stored as data words. To reproduce speech, the appropriate data words are selected in their proper order, with pauses and in some cases, even with addition of some inflection, or pitch.

Comm capabilities

The trouble with this approach is that it doesn't sound very nice. Some people have suggested it sounds just as you would expect a machine to sound. In some systems it can be so unnatural it takes quite a bit of getting used to. However, with proper choice of phonemes, the results are apparently quite acceptable for some applications.

Either of these two synthesis techniques are used in today's commercially available voice response systems.

An example of the pre-recording approach is the Wavetek ADC 2000 communications processor. It uses a voice module with vocabulary of up to 240 words—more than most. And this vocabulary may include complete phrases. The digitized speech is stored on addressable tracks of a photo-optical disc with 240-word locations (including, Wavetek makes a point of adding, one location for silence).

The ADC 2000 is a turnkey system for interfacing with a host computer. Basic cost is about $80,000. Besides the capability of accessing a host computer by means of a touch-tone telephone and getting a voice response, you can get other communications modes as well.

A similar system is that marketed by Periphonics Corp., Bohemia, N.Y., known as the T-COMM 7 Communications Control System, it incorporates the Voicepac 20000 voice response system, which uses a high-speed, head-per-track disc for storing actual voice recordings. This system stores between 200 and 350 natural sounding words.

Several other systems use the same technology, including the Touch-Talk Order Entry Systems (TOES) from Interface Technology Inc., Maryland Heights, Mo.

IBM has a voice response unit, the 7770, capable of storing a vocabulary of up to 126 words. This unit interfaces with IBM 1401, 1440, 1460 or 1410 or 7010 data processing systems. It records the words on an interchangeable magnetic drum in analog form.

One of the developers of phoneme synthesis is Votrax, a division of Federal Screw Works, Troy, Mich. It should be mentioned, however, that Votrax also markets a digitized speech system—evidence that the two technologies are not necessarily competitive or even interchangeable. Votrax makes a point of saying of its LEM-70 and LEVM-80 systems that they can "speak" with a quality virtually indistinguishable from the original speaker.

Votrax recently announced a new device, the model VSB which is described as single-circuit board unit capable of generating an unlimited

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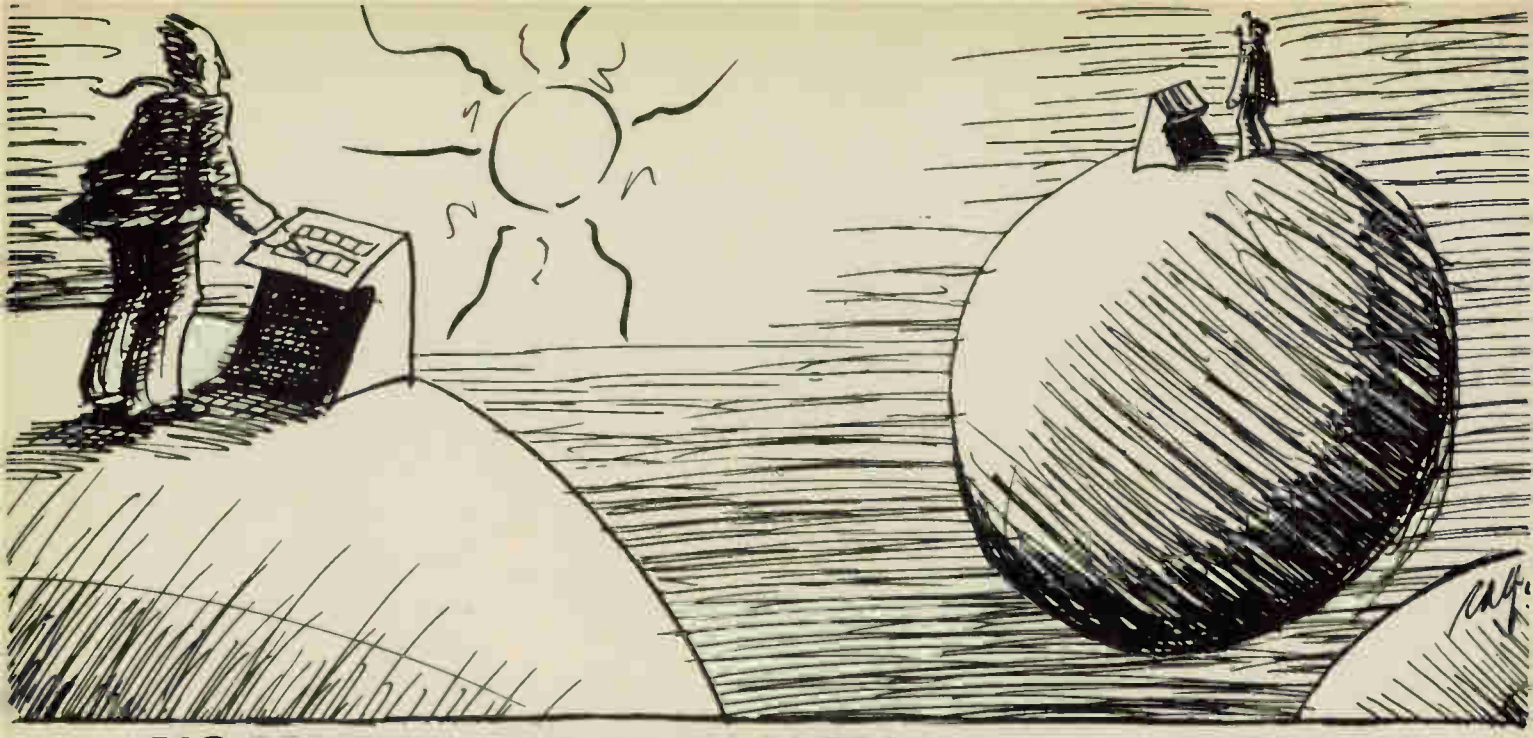
Components of a typical voice response order entry system are shown in this system from Interface Technology Inc. From left: logging printer, CRT display, Touch-Tone/Voice response subsystem, and the IBM Series/1 computer.



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COMPUTER VOICE RESPONSE / RECOGNITION

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vocabulary in seven different languages. This device requires eight parallel data bits to create each phoneme, six of which are for phoneme selection and two for inflection. Each 8-bit command selects one of 63 phonemes to generate the vocal sound desired.

Votrax also says provision is made in the VSB for natural conversational flow by a built-in clock output which indicates the time of insertion of commands into the system. The board is sold to the OEM market for as little as $280. However, you can buy the system in a cabinet as well and, with complete range of interface types and options, hook it on to virtually all computers, Votrax says.

Another phoneme system is marketed under the tradename DAVID (Digitally Activated Voice Information Device) by Interface Systems Inc., Ann Arbor, Mich. (not to be confused with Interface Technology of TOES). DAVID needs 64 phonemes. Each command is sent as two characters—one, numbered 1 to 4, indicating inflection, and the second indicating the phoneme.

DAVID sells at about $6,750 to $47,500, depending on the ancillary hardware, but that does not include the communications processor. The voice system can be interfaced with DEC PDP-11 and PDP-8, Data General NOVA, and the EIA RS-232 port.

Remote data entry

Among the numerous actual and potential applications of voice response, the one most often mentioned, and pursued by most system suppliers, is the remote order entry. In such a system, the voice response acts primarily as a prompting and verification device for the information that is entered by means of the touch-tone telephone key pad. Although the main impact will probably be in applications involving a salesman in the field, there is at least one notable installation accessible to the public, and that is Simpsons-Sears' COMP-U-SHOP catalogue order entry system in Toronto. It uses the Periphonics T-COMM 7 Communications Processor with Voicepac 2000 unit, to allow registered customers to access the main frame computer by touch-tone telephone. Order information, keyed in through the touch-tone telephone, is verified by voice and edited by the front-end processor prior to transferring of order inputs to the data base.

Other applications cited for voice response are banking by telephone and, notably, telephone bill-paying.

There are numerous applications in which the voice response system acts as an information reporting device. In the financial sphere, credit authorization and account-status reporting are examples. In commercial and industrial applications, inventory status, work in progress, and order status reporting are the outstanding examples.

For instance, take General Motors' Vehicle Order Enquiry System now known as DORIS—(Dealer Order Inquiry System). Close to 1250 GM dealers in Canada are using this service, which provides them with up-to-date information on the status of their orders—in either English or French.

GM also has a similar computerized information system called CRIS (Computer Recall Inquiry System) which provides dealers with details on vehicle recall programs.

According to Ray McAvoy, supervisor of GM's Data Centre in Oshawa, Ont., both systems are enthusiastically endorsed and used by GM dealers. One of the initial difficulties, in fact, was lagging capacity, but continuous expansion and upgrading is now keeping pace with the increased demand.

Another voice response application receiving increasing interest is that of remote monitoring and readout.

An example of this is in use by Bell Canada, which uses a DAVID system for accessing an automatic data test system (ADTS) by service personnel checking customer equipment. According to Ross Owen, a Bell Canada engineer, the system permits technicians to do routine checks automatically, using the customer's telephone to access the test board; test results are given by voice response. Owen pointed out the system, which, incidentally, is bilingual, eliminates the necessity of the serviceman carrying an expensive terminal; a $100 key pad is all he may need where no touch telephone equipment is available.

New applications

Potential users of speech recognition will have considerably more trouble locating existing applications than for voice recognition. The fact is, there aren't nearly as many. But that may not be the case for long. One example of speech recognition systems selling extremely well is a machine tool programming device by Threshold Technology Inc., Delran, N.J., the first company to get into speech recognition commercially.

Instead of preparing control tapes for machine tools by means of keyboard devices, the VNC (Voice Numerical Control) system allows the programmer to use a vocabulary of about 80 prestored words, speaking into a microphone. It is reputed to be considerably faster than the manual method, and, claims Threshold, less error prone. The company has for the past two years been selling VNCs as fast as it can build them at about $100,000 apiece. Over the past two years, sales have tripled, and are now at the $10-million-a-year level.

Speech recognition stands in ap-

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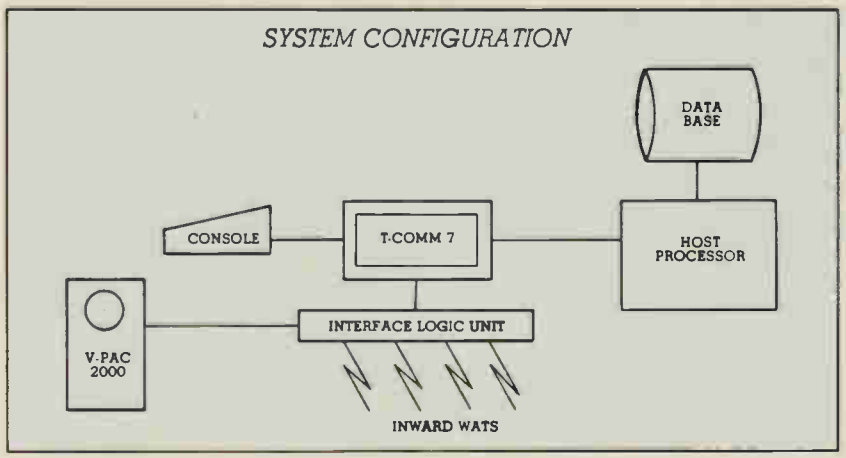

Comp-U-Shop catalog order entry system at Simpsons-Sears, Toronto, relies on Touch-Tone telephone, a communications processor, an audio response unit, a main-frame and its associated data base. The system provides automatic answering, data collection, on-line inquiry, host channel interface, and line control and monitoring.

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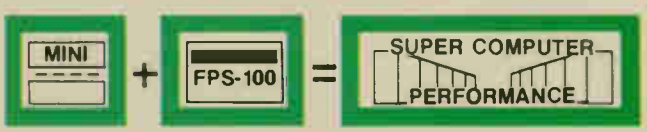

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proximately the same relation to voice response as character recognition once stood to character generation and display. In other words, the former is a lot harder to accomplish than the latter.

The state of the art in speech recognition today is still a long way from being very intelligent. For one thing, experts say the prospect for recognition of fluent, continuous speech are not promising. But there are systems on the market that can recognize, with greater or lesser accuracy, up to 200 isolated words, which, as mentioned before is quite adequate for a lot of practical applications.

Comparing patterns

The basic methodology of speech recognition is to compare the spoken word with word patterns stored in memory. The most widespread method for processing both reference and sample speech patterns is to electronically analyze the analogue voice wave form for a number of parameters, such as fundamental frequencies, intensities, and other characteristics. This is done repetitively on small segments of the wave form, of the order of ten milliseconds. When comparing a voice input, the computer calculates each of the parameters and looks for a match.

If the speaker is the same as the one whose voice pattern is stored in memory, this match can be made most easily, and one class of speech recognition systems does, in fact, operate this way; the system has to be "trained" first for each user. Such systems must use a good quality microphone.

However, it is also possible to store a more general "master" pattern, to which a much wider range of voices can be matched, without previous training. The advantage is that such a system is more tolerant as well of background noise and, in case a telephone is used, of line noise. However, this capability goes at the cost of vocabulary capacity, and the room for error is obviously greater.

Hardware offerings

Most speech recognition systems, incidentally, come equipped with verification capabilities, either in the form of an alphanumeric readout or (what else?) voice response.

Today's systems can recognize discreet, isolated words. Only a very few can handle short phrases, as well. No system outside the laboratories has yet mastered recognition of continuous speech.

You can buy an isolated 'speech word processor' for between $3,000 and $6,000, without the computer, while $20,000 to $25,000 buys you the computer as well. And $100,000 buys the whole package, including speech recognition, computer, voice response and software.

Separately and in combination, speech recognition and voice response can make for powerful data entry and retrieval, without the need for the traditional peripherals used for these tasks

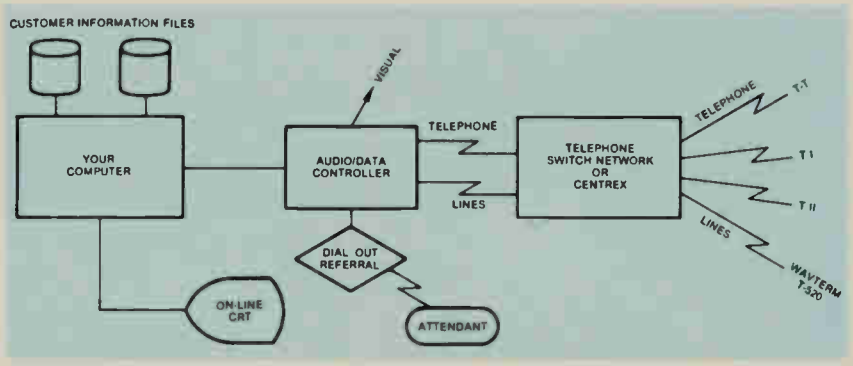
A multi user system which, while requiring no training, is capable only of a small vocabulary, is the VE series of Perception Technology, Winchester, Mass. This so-called voice entry encoder can recognize digits 0 to 9, plus the control words "enter," "cancel", "reset," and "function." You can speak to this system at 120 words a minute, with one fifth of a second pauses between words, either by microphone or via telephone. It is possible to add words to the basic vocabulary in a training mode (available literature does not say how many, though). It costs just over $6,000 without a computer and over $12,500 with a PDP-8E mini. For an additional $690 you can add an alphanumeric display, and for $1,400 you get a voice response system that can say ten digits. (The voice response unit is also sold as an OEM module separately.)

Dialog Systems Inc., Belmont, Mass., markets a multi-channel speech recognizer that can handle eight telephone calls simultaneously. It requires no training, and verifies entered information by voice response. Dialog says its system is aimed at such applications as telephone network management, information retrieval and data entry for manufacturing, retail, distribution, transportation, financial and insurance, industries, and educational institutions and government.

Good prospects

Industry observers remark that speech synthesis is in its infancy, but foresee that it could boom rapidly. As one remarked, its progress now depends not so much on technological advance as success in the field.

Separately and in combination, speech recognition and voice response can make for powerful data entry and retrieval techniques, without the peripheral equipment traditionally utilized for that purpose, and the skills required to operate them. It will be a while before either technique is sufficiently developed to permit truly conversational capability, but even with the current state of the art the possibilities are numerous enough to confidently expect a booming business in the next few years. □



Credit authorization system from Wavetek Data Communications provides audio/visual on-line credit information. System receives inquiries from terminal users and forwards inquiries to computer. The computer responds with either voice response or visual display to the terminal. The system includes automatic line switching for referral of phone calls to a credit authorization supervisor.

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THE
COMPUTER ROOM
ENVIRONMENT

Keeping your CPUs comfortable

A properly designed computer room environment is essential to the well-being of your CPU and its peripherals. Here's a review of the key elements of installation maintenance and support.

By Linde Fistell, Assistant Editor

A SUITABLE daily operating environment is important to the optimum functioning of data processing equipment. Things like air conditioning, controlled temperature and humidity, uninterrupted power, cabling, and anti-static flooring, are all vital to keeping an installation in good operating trim. Intrusion protection is another factor to be considered.

Naturally, you get what you pay for, and, conversely, what you get will be determined by what the company feels represents the best cost/performance for a particular installation. Data protection for a bank installation, for example, will obviously require greater attention than an inventory data dump that may be needed only occasionally. In this overview we provide guidelines for installing or upgrading room environment and a look at how some installations are operating.

Flooring

Equipment in a data centre draws considerable amounts of electrical power. With any installation there is associated massive wiring and cabling. These are commonly housed under a raised floor. The proper elevated flooring can eliminate many costly environmental problems later on. The most common types are rigid grid systems, removable stringer, and stringerless types.

The rigid grid flooring provides maximum stability and is suitable for the majority of applications. The rigidity makes it especially suitable for unusual heights, severe weight loads, and irregular-shaped rooms.

Datasphere Sales Ltd., Mississauga, Ont., for example, supplies a rigid grid system that incorporates an electrically conductive positive plenum seal. Removable stringers allow easy access to the cabling. A positive plenum seal provides for air conditioning and sound control.

Stringerless systems combine support strength with unrestricted access to underfloor cables. They are designed primarily for small restricted areas and minimum heights.

Static charges generated by walking across the floor with various types of shoe soles can sometimes cause problems with EDP equipment. The amount of static build-up depends on the composition of the floor covering and the type of shoes being worn by staff, as well as the relative humidity of the air.

When the relative humidity is high (over 50%) static charge is comparatively low. Dry environments (typically about 20% humidity) can cause sharp rises in static electricity. Most common floor materials are safe at 50% humidity. At 20%, most floors, especially those of nylon, polyester, and acrylic carpeting and tiles can cause problems.

According to Jim Palmer, a researcher at Univac's Roseville, Minn., facility, synthetic fiber sweaters and crepe shoe soles can create more than 40 volts of static electricity, enough to damage a computer's printed circuit boards or MOS memory. Most MOS transistors and memory devices contain wafer-thin parts that can be damaged or destroyed by as little as 30 V. Other materials such as plastic bags, and standard DP equipment including plastic magnetic tape sleeves, disc pack covers, and styrofoam packaging materials are capable of carrying charges up to 100 kV.

Certain types of anti-static carpets and conductive floor tiles have been designed to minimize this prob-

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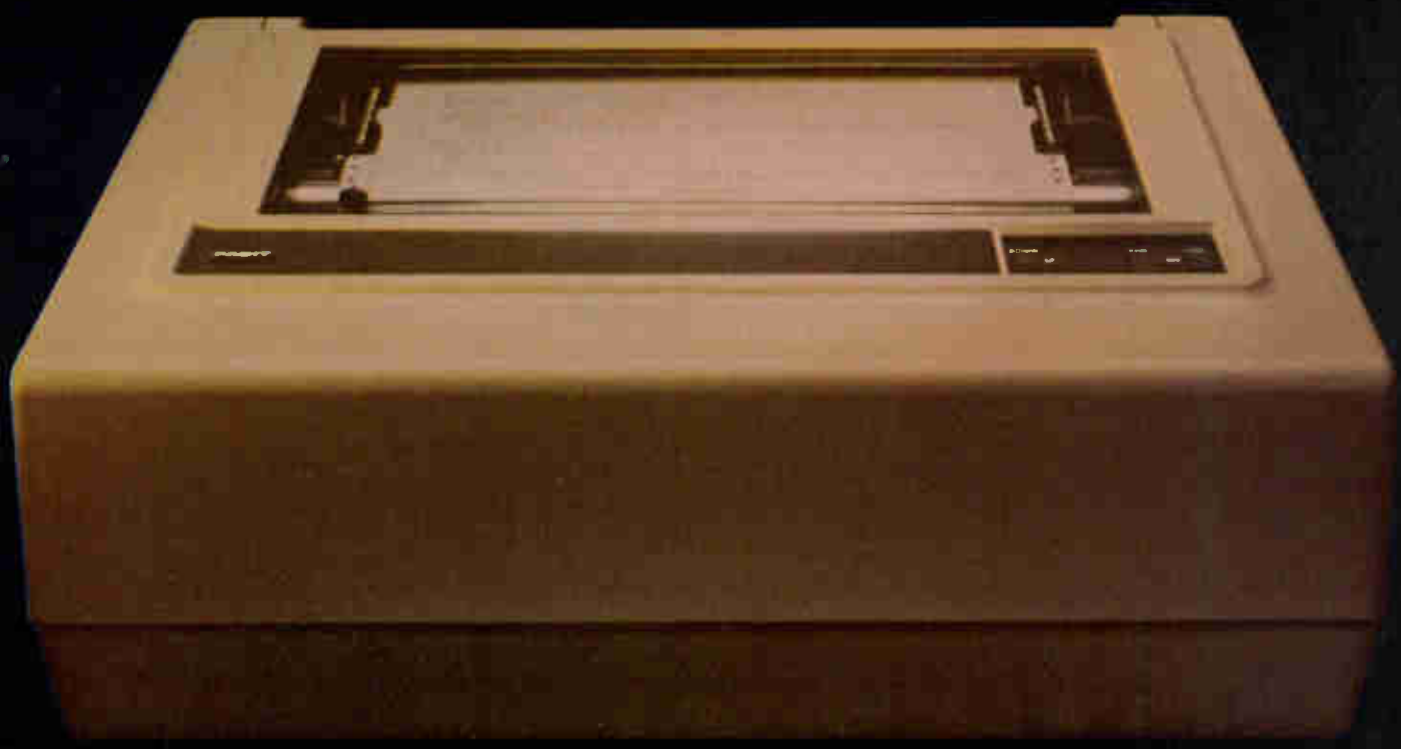

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THE COMPUTER ROOM ENVIRONMENT

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lem. An example of these is the Compu-Carpet, from United Electrical Products Inc., marketed in Canada by Bruce (EDP) Services Ltd., Toronto. According to the company, the carpeting meets IBM recommendations for computer room flooring. Its static electricity propensity is said to be less than 2.0 KV.

Air conditioning

One of the major causes of computer downtime can be the failure of the environmental control system to maintain proper ambient humidity, temperature, and air filtering.

According to one consulting company, Walter J. MacLeod & Assoc. Reg'd., Scarborough, Ont., "it is computer comfort, not human comfort, that should determine the basis of a system design."

The different types of heat output between computers and people are what determine each one's air conditioning requirements. The average human skin temperature is 80°F and comfort air conditioning systems are commonly designed around this temperature. In addition, heat given off by people contains moisture, while that from equipment is moisture-free (known as "sensible" heat).

The sensible heat ratio is typically 65% to 70% of the total load in a comfort system. The dry heat generated by EDP equipment results in a sensible heat ratio of 90% to 95%. Due to the high sensible heat ratios for computer hardware, computer rooms require 50 to 100 sq. ft./ton of cooling as compared with 250 to 300 sq. ft./ton for comfort air conditioning.

"Crepe shoe soles can create more than 40 V of static electricity, enough to damage MOS memory or circuit boards."

Air temperature is directly related to air distribution. The cooled air in comfort systems is usually distributed through overhead ducts. Computer equipment releases heated air at the top of the cabinets which

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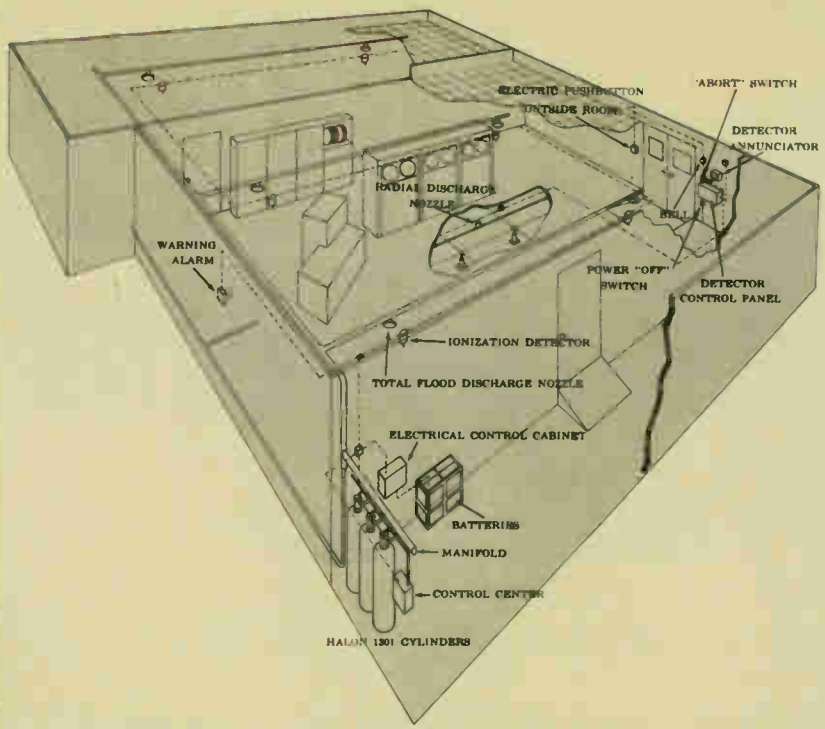

Fire protection: how a system works

An example of a possible computer room fire protection system is shown in the above diagram. In this installation, the computer room and key punch room are equipped with a total flooding Halon 1301 system designed for a 5% flooding concentration.

The Halon cylinders are located in an adjacent storage room, which contains an ionization detection system to signal an incipient fire condition. Computer tapes are stored in fire-resistant cabinets in the computer room.

The three cylinders are piped to total flood nozzles, allowing Halon discharge within 10 seconds.

A similar carbon dioxide system could be installed, and controls would be similar to the Halon system.

In the case of the Halon, each cylinder is equipped with a pressure gauge for monitoring the nitrogen pressurization and cylinder release valve. If the pressure drops below a prescribed level, a signal indicates the need to refill the nitrogen cylinder.

Two of the Halon cylinders are equipped with manual pilot operators which use the pressure in the cylinder itself to release the discharge valves and are used to operate the system manually only if the normal means of actuation should fail.

Automatic actuation is achieved by an ionization system with detectors at the ceiling and under the raised floor. Detectors are placed, after analysis of the air supply registers, in the ceiling and equipment locations.

The first detection zone sounds an alarm in the computer room allowing personnel to investigate the cause of the signal. Subsequent operation of the second detection zone initiates the discharge. Even when the second detection zone operates there is a short time delay before the Halon system actually discharges.

If, during this time, supervisory personnel determine that a discharge is not needed, an "abort" control can be operated to shut down the discharge and a reset of the detector controls restores the system to "normal."

A detector control panel identifies the detector zone that became activated and the individual detectors are tied to an annunciator.

The air conditioning system is arranged to shut down before the Halon is discharged but the power to the computer equipment is not automatically shut off. Computer power shut-off switches are located near the controls for the Halon system to allow power disconnect if necessary.

Although shut down of the air conditioning system upon gas actuation is necessary, the ventilation of the protected area should be re-instated after the gas system has discharged. □

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THE COMPUTER ROOM ENVIRONMENT

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creates turbulence when coming into contact with overhead cooling. This in turn can cause hot and cold spots and uneven distribution of humidity. These conditions can contribute to disc drive head crashes, tape expansion, condensation and silver corrosion, as well as changes in LSI chips.

Computer rooms installed over raised flooring can accommodate below-surface air cooling systems, allowing for bottom-to-top air distribution patterns. Datasphere Sales Ltd. is one of several suppliers of air conditioning systems in capacities

Power failures as small as one millisecond in duration can cause damage to computer memories.

from two to 50 tons, in water-cooled, chilled-water, and air-cooled configurations.

As well as providing controlled ambient temperatures and humidity, computer room air conditioning should be capable of holding room limits within a temperature fluctuation of ±1°F, and relative humidity within ±2.5%. There should also be a redundant refrigeration system built into the installation.

Air cleaners are also recommended to handle air pollution from paper dust from printers, sorters, and bursting machines. Filters can reduce the problem, but they cannot eliminate sub-micron size particles that pose the greatest danger to computer hardware, causing static electricity. An electronic air cleaner, for example, marketed by B.D. Wait Co. Ltd., Oakville, Ont., is said to reduce air pollution by 92% and will clean air in any space up to 10,800 cubic feet.

Power Supplies

Voltage spikes and drops, or complete power interruptions can cause serious problems of data error/loss and physical damage to electric components. Typically, a computer can tolerate no more than a millisecond duration of power failure before possible damage to the memory occurs. In the case of switching and circuit breaker reclosure, in which power lines do not clear, power failures can last for indefinite periods of time.

To prevent these fluctuations, a solid state rectifier/battery-inverter system or uninterruptable power supply (UPS) is recommended.

Basically, the UPS acts as a buffer between commercially supplied power and EDP equipment. During operation, the AC current supplied by the utility is fed to a transformer-rectifier, and converted to DC power. The DC current is channelled to an inverter where it is changed to precisely regulated AC power without interruption. This is done by drawing power from a bank of batteries. The effect is to isolate the power from the utility line, eliminating voltage and frequency variations when the power is converted to DC. The amount of power available during a breakdown is determined by the size of the battery bank.

Datasphere Sales Ltd. supplies UPS systems including rectifier charger, battery banks, and inverters providing on-line power from a micro-second to 24 hours. Systems requiring more than 15 minutes back-up can be supplied with a turbine or diesel generator.

Fire protection

Since EDP equipment draws large amounts of power it can be a potentially serious fire hazard. As well, magnetic tapes and discs are sensitive to heat and smoke particles, and the potential for both hardware and software loss is real.

Various types of fire protection are available, and determining an installation's requirements is crucial. The most common forms of protection are either hand extinguishers, automatic fire detection systems, or automatic sprinklers. These provisions, however, are often not enough for a computer facility when used alone.

Carbon dioxide hand extinguishers are useful only on small incipient fires that can be reached by the discharge nozzle of the cylinder. Deep-seated fires under raised flooring and cabling cannot be handled by small extinguishers. While automatic sprinklers are excellent back-up for general discharge, the water cannot penetrate such areas as cabinets and raised floors for full extinguishment. The sprinkler system used is not activated until a major heat source exists, by which time extensive damage may have already taken place.

Carbon dioxide or Halon 1301 gas extinguishing systems are generally recommended as superior alternatives for computer room protection. Carbon dioxide operates by reducing the oxygen content of the air to the point where it will no longer support combustion. Halon chemicals function by interrupting the combustion process itself. Halon 1301 for example extinguishes open fires with concentrations as low as 5% by volume. This percentage however, while not hazardous to people, is not sufficient to extinguish deep-seated fires, and will provide fire suppression only. At the point of deep-seated fires, CO_2 flooding should be considered.

An extinguishing system must also include a detection system. The types of detectors used primarily in computer installations are the rate-compensated fixed temperature detector, and the ionization detector.

Ionization detectors operate by ionizing an air path in the detector head, making the air electrically conductive. Unfortunately, air turbulence, gases, and dust can change

This solenoid valve releases the gas agent from the fire extinguisher cylinder.

Photographs courtesy of Safety Supply Canada, Toronto.

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air ionization, activating the detector and causing false alarms.

The rate-compensated detector contains a coil of expanding metal that is activated by sharp rises in temperatures.

It is a good idea to install a detector in the air return duct of the ventilation system, and in equipment consoles and cabinets not open to the area. Care should also be taken in maintaining a back-up power supply for the electrically-operated detectors.

Flooding systems are a common alternative to total protection systems. These systems flood only the space under the raised floor. This space, as well as housing computer equipment cabling, acts as part of the air ventilation system to cool the machines. Any fire under the floor will spread to other machines through the ventilation system. Underfloor spaces can also collect scrap paper and plastic material from work being done on the machines. Hand extinguishers often cannot reach the problem areas and CO_2 or Halon 1301 flooding is recommended by designers of fire protection systems.

To prevent hazardous conditions, no paper or plastic combustibles should be stored in the computer room except those required for that day's work. Tapes should be stored in separate fire resistant vaults. Tape reels and cases are very flammable and if ignited will help to spread the fire. Since these products are entirely surface-burning, a 5% Halon agent is sufficient. Facilities storing bulk paper materials supply the conditions for deep-seated fires and require a 65% CO_2 agent, according to Chemetron Fire Systems, Monee, Ill. (represented in Canada by Safety Supply Co., Toronto).

Safety Supply Co. and Datasphere Sales Ltd., for example, offer various types of fire suppression units. Datasphere supplies three-wire priority matrix systems with ionization detectors that warn of combustion particles before HC1 build-up changes resistance values within the computer hardware circuitry. The gas suppressor used with the system is said to achieve flooding in less than 10 seconds.

Security

Protection of an EDP room might also include intrusion protection against theft or vandalism. Protection can run from devices as simple as high-security locks to closed circuit TVs (CCTV).

Other security systems include badge identification devices, wall signs, and visual employee checks.

ADT Security, Willowdale, Ont., one of the major supplier of CCTVs, notes that such systems provide instantaneous transmission of visual data from a camera over a wire or coaxial cable to a television monitor. Because the electronic signal travels through a cable rather than over airwaves where it could be intercepted, the system is referred to as "closed." The closed circuit properties of the system provide finer quality pictures than most television broadcast pictures, says ADT, and allow a choice of what details and views will be presented.

Although many recent computer introductions are equipped with air coolers, a large number still require environmental air conditioning for smooth operation.

Most closed circuit security systems typically include several cameras connected to a single monitor, allowing simultaneous viewing of several areas. Using a video switcher each camera's views can be monitored on the screen for a selected period of time. It is also possible to route the signal from a single camera to several different monitors.

For some applications it is necessary to scan an area. Cameras can be equipped to provide motorized pan and tilt combinations as well as zoom lenses, providing close-up viewing of details. Specialized low light level cameras are available for use in almost total darkness.

Users' installations

Although each computer installation has varying requirements depending on its size and configuration, certain key elements are mandatory for smooth functioning.

The Canadian National Railways minicomputer room for yard inventory systems at the East Metro Carload Centre near Toronto is equipped with a variety of protective and maintenance measures.

According to Mr. J. Chuchara, Analyst, Industrial Engineering, CNR, one wall of the computer room has a glass panel allowing the interior to be observed from personnel outside. A Detex access control lock used with an access card provides security protection. An air conditioning unit, supplied by Hiros-Denco, Mississauga, Ont., maintains the room at a constant 72°F, and 50% relative humidity. The room air is pressurized and cleaned by fans supplied by Brunt Mfg. Co.

Dry chemical extinguishers for electrical components are also included as part of the fire protection.

The CNR computer room installations at the Macmillan Yard administration building, and the Malport and Hamilton, Ont., offices are equipped in a similar manner.

The computer room at Maclean-Hunter Ltd., Toronto, which publishes this magazine, was installed in 1973. The equipment operates on raised flooring, and is supplied with 30 tons of air conditioning. All paper supplies are kept in a stock room and include usually no more than 150 boxes of print paper and cards. One glass wall allows for interior observation. A combination lock, alarm system and security guards provide for both intrusion and fire protection.

Along with Halon extinguishers, a smoke detector is connected to the main lobby, which is attended by security personnel.

Computer hardware and stored data represent a good chunk of a business' capital investment. It is doubtful whether any company could emerge unaffected by downtime or impairment of its hardware and electronic records. Considering the central role a company's data processing department plays, it makes sense to provide an environment that will support its continued and efficient operation. □

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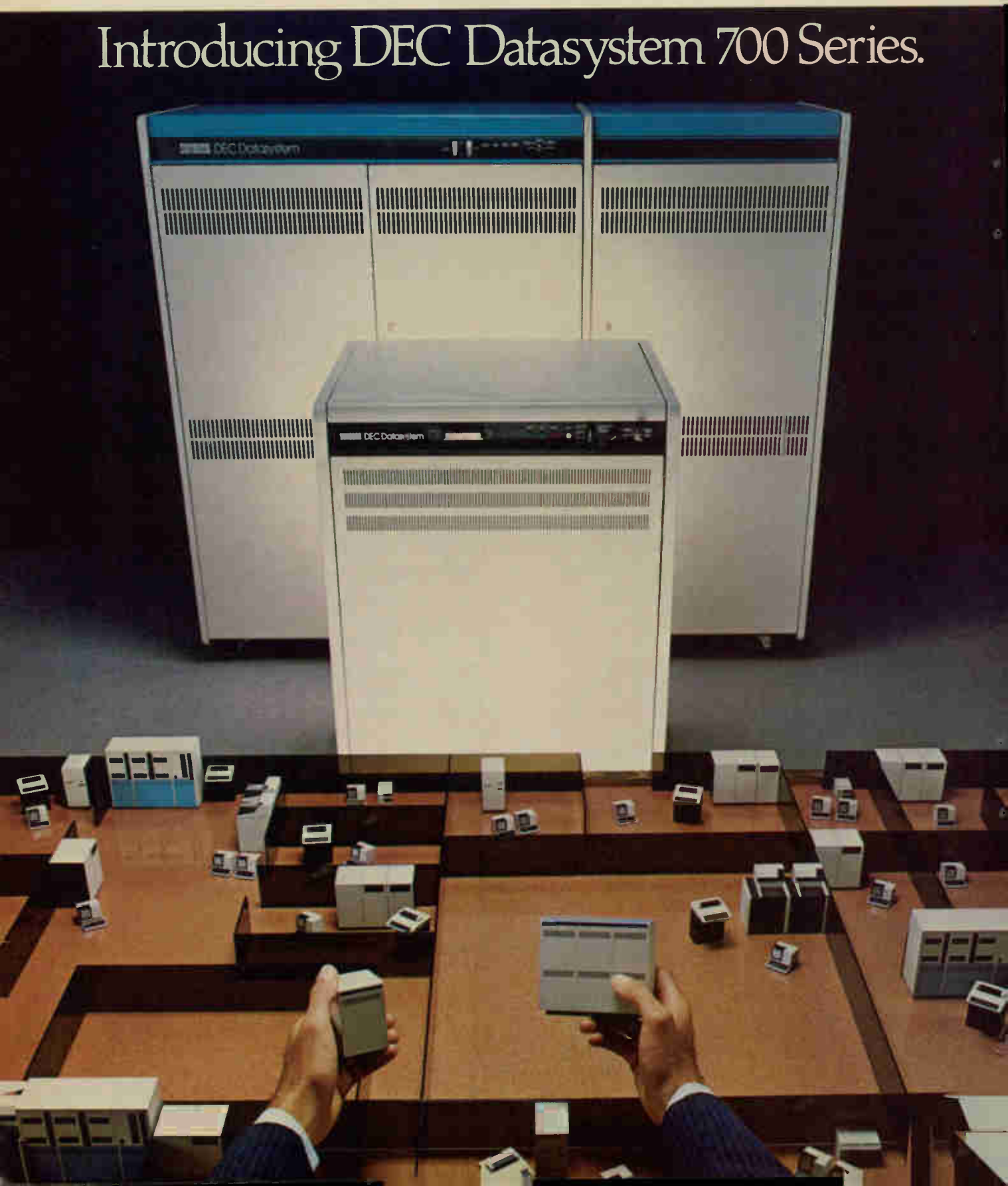

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Data centre contains $133 million worth of CPUs, including 13 large IBM and Control Data machines.

New computer centre contains tape library housing 130,000 reels.

World's largest computer centre serves 3,000 customers

New $70-million facility concentrates computing power equivalent to 23 IBM 370/168s under one roof. $133 million worth of computers and related equipment are installed.

WHAT is described as 'the world's largest computer centre' has been opened recently by McDonnell Douglas Automation Co. (MCAUTO) in St. Louis to serve some 3,000 commercial customers as well as components of McDonnell Douglas Corp.

The new $70-million, seven-building facility houses $133 million worth of computers and related equipment and employs 2,500. It has a 450-ft. long computer building with 13 large IBM and Control Data computers that are described to equal in power some 23 IBM 370/168 computers. The facility is described as the largest known concentration of computer power under one roof anywhere in the world.

In an average week the data centre processes more than 50,000 batch jobs, 30,000 time-sharing jobs and 6.5 million on-line IMS data base transactions. The computers are linked to some 16,000 terminals for use by commercial customers and McDonnell Douglas facilities throughout North America.

The centre and its computers have an annual energy use estimated at 175 million kilowatt hours, equivalent to the consumption of 5,000 homes. To ensure uninterrupted electrical power four Cummins diesel electric generators and 3,480 Exide batteries are installed to back-up power supply lines.

The new computer centre in St. Louis contains seven IBM 3033 computers in two clusters, four CDC CYBER computers in two clusters, and a standalone IBM 3033 and IBM 3031. The computer clusters are linked through a data communications network to two additional IBM 3033 clusters in Long Beach, Calif., and to some 16,000 company and customer terminals.

The IBM machines, each having from 12 to 16 megabytes of memory, run under the MVS operating system with a JES 3 scheduler on one machine in each cluster. Significant software includes IMS, TSO, CICS, APT, MRCS, PANVALET, SAS, ANS COBOL, FORTRAN H, PL/1 and ASSEMBLER H. Hundreds of application programs are supported for civil, mechanical, and structural engineering, construction, manufacturing, distribution, communications, finance and insurance, notes McDonnell Douglas.

The standalone IBM 3033 processes on-line applications under VM/CMS. The IBM 3031 is dedicated to a single client.

The IBM clusters are supported by a pool of 90 IBM 3400 series tape drivers and 530 IBM 3330 and 3350 disc drives.

The CDC computers consist of two CYBER 750s, each with 262K of 60-bit words and sharing an addi-

Seven-building $70 million data-processing complex recently opened by McDonnell Douglas. The 450 ft. long computer centre is at left.

tional one megabyte of extended core storage, in one cluster and a CYBER 175 and a CYBER 730, each with 262K of 60-bit words and sharing two megabytes of extended core storage. The CYBER tape and disc pool contains 20 CDC 669-4 and 667-4 tape drives and 117 CDC 844-41 disc drives.

Software on the CYBERS includes DAC-II, System 2000, APT, BASIC, ANSI COBOL, FORTRAN Extended and APL. Both clusters provide time sharing and batch processing.

MCAUTO's host computers in St. Louis and Long Beach are linked to customer terminals through low-speed and high-speed data communications networks. The firm's low-speed network contains five network processors and 20 statistical multiplexers in branch offices.

This equipment allows time-sharing customers to access any low-speed host service from a single local phone number. These services are DAC-II, TSO, VM/CMS and Data Dialog.

The network is based on Digital Communications Associates Inc (DCA) System 150 minicomputer processors which form a backbone network interconnecting MCAUTO's IBM and CDC host computers. DCA System 115 statistical multiplexers channel terminal traffic from nearby users into the backbone network.

The firm's IBM Batch communications network is composed of COMTEN front-end processors and remote concentrators linking hosts to hosts and terminals to hosts in a switched "multi-star" configuration.

Remote concentrators in Chicago, Houston and Florham Park, NJ, route batch data communications traffic from surrounding areas over high-speed trunk lines to the host front-end processors in St. Louis and Long Beach.

Terminal-to-concentrator communications may be over leased lines (up to 9600 bps) or dial lines (up to 4800 bps). Communications between COMTEN units is over multiple 9600 bps lines.

Data may enter the network at any concentrator node and be routed to any host. The user may route host processing results to a different terminal in the network.

A separate data communications network is maintained for batch processing on the CYBER.

MCAUTO's high-speed and low-speed networks are linked through host CPU software, allowing jobs entered low-speed to be processed in batch and jobs entered through the batch networks to be routed back to the user over the low-speed network.

The St. Louis computer centre requires 500 operations personnel on three shifts. These include machine operators, tape librarians, job schedulers, report controllers, data entry clerks and supervisors. In addition, 150 systems programmers and supervisors are needed to maintain vendor-supplied systems software and maintain system commonality on all computers of the same manufacture. □

Study is bullish on bubbles in computer applications

The bubble memory market is finally ready to start to fulfill some of the expectations its enthusiasts have been predicting for a number of years. According to a new report from Venture Development Corp., Wellesley, Mass., shipments of bubble memory devices will grow from $18.4 million in 1980 to $226.0 million in 1985, an average annual growth rate of 68 percent. The consulting firm sees bubble applications expanding from uses which specially require the ruggedness and small size of the bubble to more general applications. Initial use will be mainly in the areas of machine and process control and portable terminals, but stationary computer and word processing applications will become increasingly important.

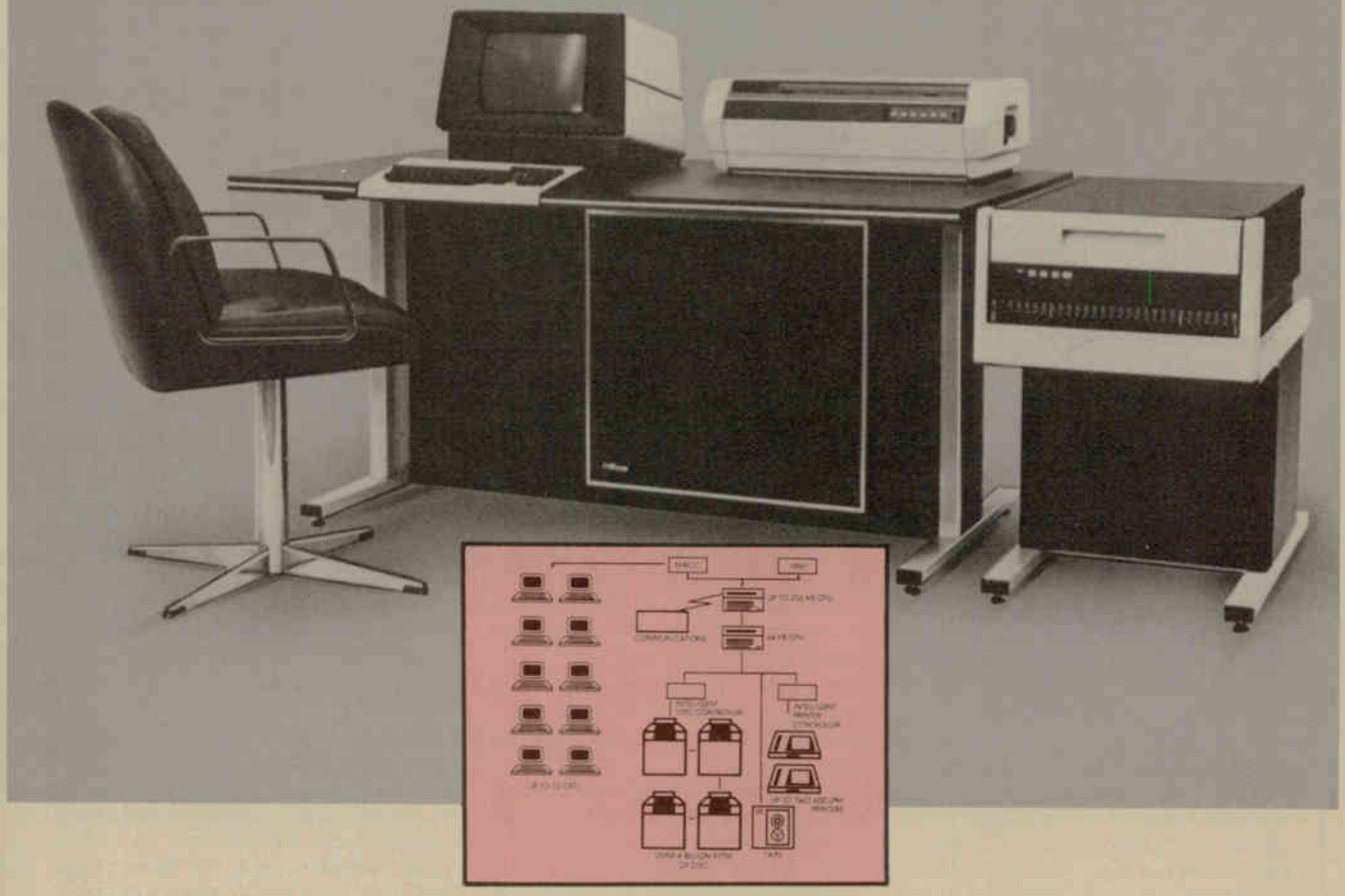
The magnetic bubble caught the fancy of the engineering community and resulted in expectations of early success which could not be fulfilled. Late in 1977, four electronic market forecasters produced studies of the bubble market. VDC said it was the least optimistic of the four, and as it developed, apparently the most accurate.

The relatively slow growth in the last three years resulted from the failure of prices to be reduced as industry leaders had predicted. Instead of dipping below RAM prices, bubble prices have stayed higher. VDC believes that bubble prices will decline over the next five years as bubble makers have now learned how to make their product in quantity.

The bubble chip requires a number of auxilliary circuit components in order to be useful. Intel has designed ancillary integrated circuits to accompany its megabit bubble memory device which will reduce the component count by a factor of ten. Although the system has been slow to get into production, VDC believes that this sort of circuit simplification is what users will require for the future.

Texas Instruments is the leading bubble memory producer at this time. Rockwell International and Intel are other leading independent producers, while IBM and AT&T continue to perform research, with the latter producing units for their own systems. National Semiconductor and Motorola are newer market entrants; Fujitsu, Hitachi, Siemens, SAGEM, and NEC are foreign bubble producers expected to compete more actively in U.S. markets.

Inside every Micos System is a bigger one trying to get out.



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PART II

Making capacity planning work

This final segment of a two-part series examines in detail the capacity planning process for your computing resources.

By ROBERT L. ZAKRISON

As each computer installation differs, so will the implementation of capacity planning. While we will be using IBM's MVS (Multiple Virtual Storage) operating system as the basis of our example, the functions of capacity planning can be applied to any operating system and hardware that provide the necessary measurement data and measurement tools.

Before any capacity planning, the operating system involved should be tuned.[1-2] This will give a more accurate representation of the system capacity for the current configuration. In order to tune a system, performance objectives and workload priorities have to be determined. The tuning may also solve some of an installation's current performance problems. However, it is not necessary to discuss system tuning here as a great deal of material is available, such as Richard M. Schardt's *An MVS Tuning Perspective* and IBM's *MVS Tuning Performance Notebook*.

Device capacities

The first step of capacity planning is to determine the service level requirements. These are defined generally in terms of response and turnaround times. Device capacities however, are measured in terms of the time they were busy servicing a request for work. Because work requests sometimes wait in queues before they are serviced, both queue time and device service time are used to calculate the service time of I/O requests.

The upper bound of the capacity of a resource or device is therefore 100 per cent. This is when the busy time is equal to the time the system is up. Driving any device at 100 per cent means that queues of work requests are long. Since service times are a total of the time spent waiting and the device service time, it is easy to see that service degrades when the queues are long. This makes 100 per cent device utilization more theoretical than practical.

The different resources of CPU, memory, and I/O will have different levels of practical utilization. The CPU can be driven effectively up to about 98 per cent utilization for short periods and an average maximum of 90 per cent for sustained periods. DASD channels may be utilized between 30 and 40 per cent depending on whether the prime application is IMS, TSO, or batch. DASD devices themselves have a more flexible rate of utilization. High device utilization for a disk drive does not necessarily indicate a problem.

But resources are not independent of each other in a computer system and must be viewed as a part of the whole, with dependencies on other resources. The main implication of this structure is that one resource will wait on another. For example, the CPU sends an I/O request to a disk drive. The CPU will then be in a wait state until the I/O request is serviced by a device (assuming there is not other work). The resource that causes the most wait time is considered the system bottleneck. Unless the computer system is underutilized there exists a specific bottleneck that can be identified. I/O contention is a problem common to many MVS installations.[3]

System capacity

Resource capacities are not the only concerns with determining system capacity. The workload or number of transactions the users require processed is also important, as well as the time the system is available. If any hardware, software, or related resource is unavailable for work, the system is unproductive. This may be for only one user if it is only a tape or file that is missing. From that user's viewpoint, though, he is not receiving any service.

System capacity, then, is measured in terms of resource capacities, workload, and availability. These factors are translated into throughput, turnaround, and response times that relate to user service levels. The next sections outline the data items that need to be measured and the measurement tools required to capture this data.

Data collection

The data elements to be collected come from both the *hard-*

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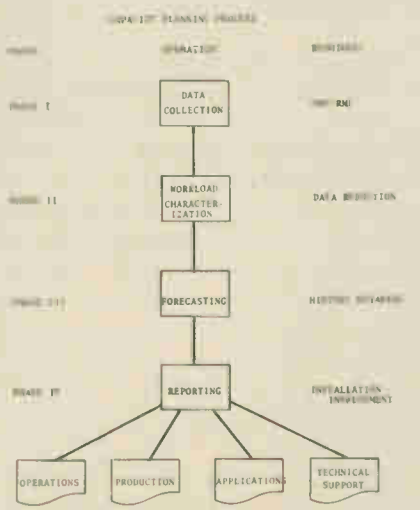

Robert Zakrison is Senior Analyst, Prism Data Services, Toronto.

Planning EDP capacity

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ware, such as CPU utilization, and the *software*, depicted as the operating system, software subsystems (i.e. batch, TSO, CICS, and IMS), and user applications. These main areas of measurement and their related data elements are:

- Hardware
  - CPU utilization
  - Channel utilizations
  - Device utilizations
- System Software
  - Workload (by performance group)
  - total transactions
  - response times
  - paging and page dataset activity
  - demand paging
  - swap paging
  - VIO paging
- Applications Software
  - CPU times (TCB, SRB)
  - Memory
  - I/O activity (Excp's device)
  - paging for the address space

This is just a basic list and is intended to indicate the main data elements required for capacity planning. Many other items could be added to this list to add a greater degree of refinement to the planning exercise. It is recommended that the categories of data be kept to the minimum required to fulfill the functions of capacity planning. As with any other application, too much detail will create an unmanageable capacity planning system.

Measurement tools

For MVS, measurements are available from RMF (Resource Measurement Facility) and SMF (System Management Facility). Additional data for started tasks such as CICS/VS and IMS/VS can be collected with CICS/VS Performance Analyzer II and the IMS/VS log tapes. Depending on the version of MVS, SMF may not collect statistics for started tasks, but with MVS Systems Extensions 2 (MVS/SE2), it can.

RMF and SMF data relate to each other in the following manner. RMF, as the resource measurement tool, collects data for the CPU, channels, I/O devices, workload, and paging activity for the whole system and all subsystems (batch, TSO, IMS, CICS) over specific time periods. Where RMF tracks utilizations as a whole, SMF measures resource consumption and activity for individual tasks and jobs.

Capture ratios

A reasonable assumption at this point would be that a total of all the SMF statistics would equal the RMF measurements. Unfortunately, for CPU times this is not accurate. SMF contains algorithms that produce consistent results but does not capture all the CPU time for a specific job or task.

The proportion of CPU time that is captured is relatively constant for various work types, ie. batch testing, production, or TSO. By dividing the total SMF CPU times by the RMF CPU time a "capture ratio" can be calculated. This capture ratio can help allocate uncollected CPU time back into the workload types and applications. In USAGE methodology, these times are referred to as "true CPU hours".[2] These "true CPU hours" are a more accurate representation of CPU utilization. These results achieve greater accuracy for the capacity planning process.

By establishing current system capacities and by measuring the workload, the efficiency of an installation can be measured.

Since SMF is basically a job accounting facility, it allows work to be grouped by application, department or account code. With proper implementation, an installation can determine the resource utilization for applications such as payroll, inventory, personnel, etc. Even with this amount of subdivision, each area of measurement would be the total of dozens of jobs and tasks.

Workload analysis

The reduction of the large volumes of monthly or weekly SMF and RMF data is required to maintain a manageable capacity planning system. Generally, data reduction programs are run to accumulate the collected detail statistics into totals that represent specific segments of the workload. This breakdown should accurately represent the total of the system for all time periods and subsystems. The process identifying the environment and workload as a function of time is referred to as the 'workload analysis' phase.

The first step of this phase is to identify daily time periods of similar activities. These profile periods are intended to group time frames that have similar resource consumption characteristics. For example, most installations have higher TSO usage by their users and programmers from 8:00 a.m. - 6:00 p.m.

During this period, there probably would be some batch jobs executing, but not to the extent there would be during the evening production period, that occurs from 8:00 p.m. on into the morning. CICS and IMS typically run during the daytime although production runs in the evening could also process the data base files.

It is possible that the personnel shifts would coincide with these profile periods, but it is not safe to assume that shifts are the same time frames. The number of profile periods defined can vary from a basic three (Day, Night, Weekends) to five or six for more complicated environments. Any more than seven tend to make the capacity planning process cumbersome.

Within each profile period the functions of an installation are categorized. Typical functions are production, production support, development, and system support. These functions also have similarities from a system and resource consumption perspective. Methodologies like USAGE also include a category for operating system work such as demand paging. These functions are defined by the installation and may include whatever work categories the installation manager considers apropos.

These functions can be broken down further into departments, applications, or accounts. This degree of detail is desirable as each user or department would then be able to review their own resource consumption by function. Whether or

Turn to page 50

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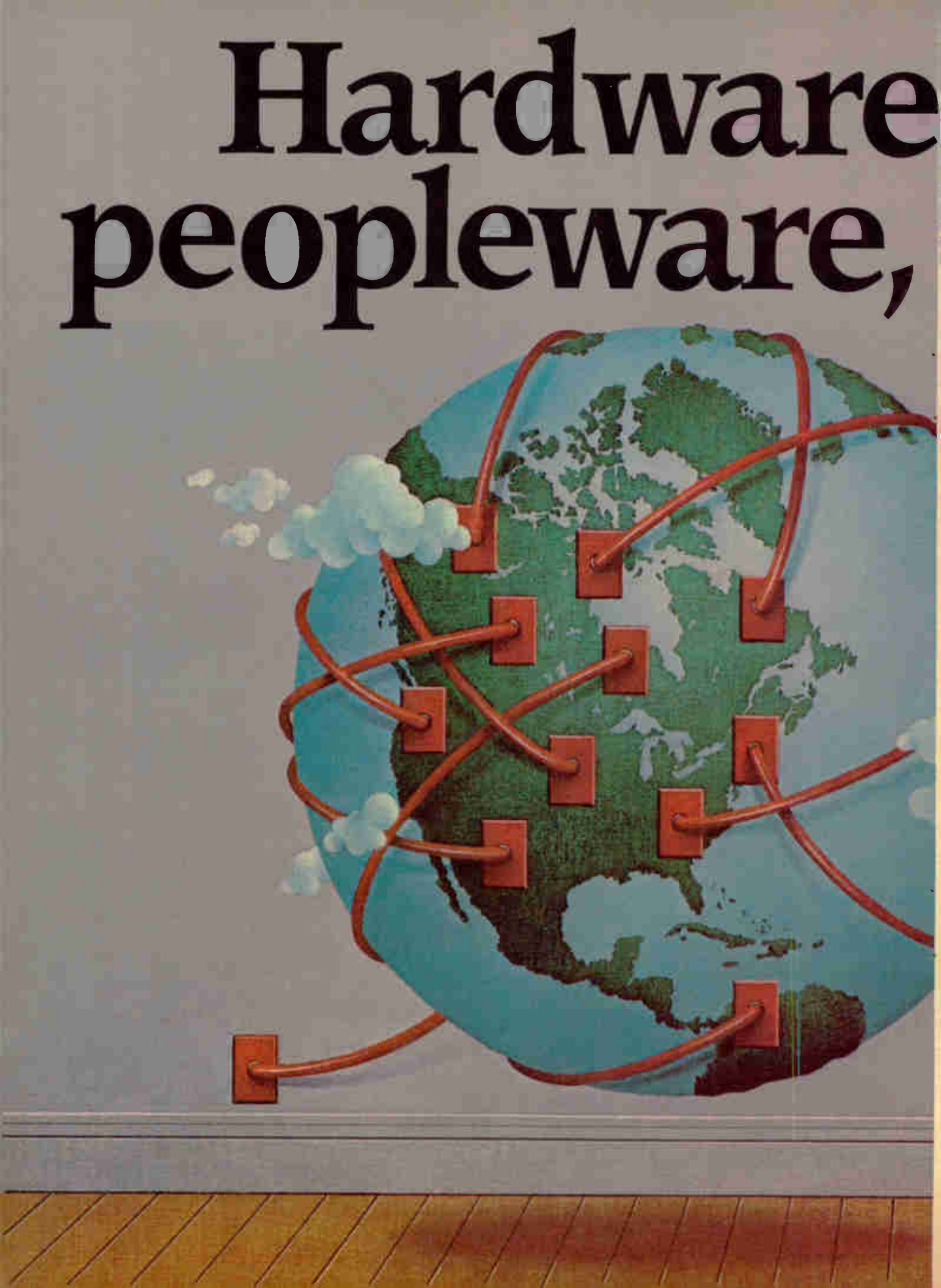

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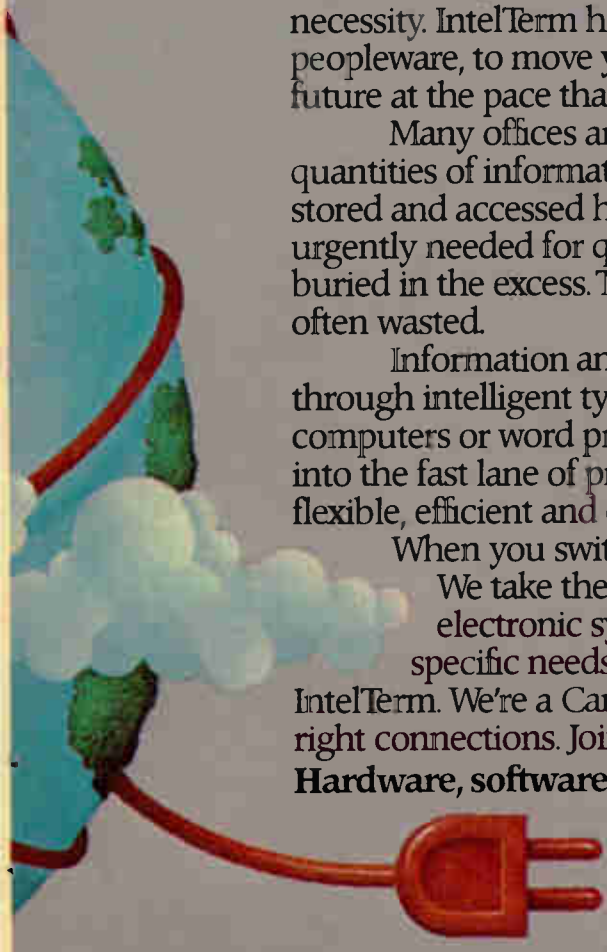

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Planning EDP capacity

From page 46

not applications are handled separately, each business function also has subdivisions for the subsystems of TSO, batch and online (CICS and IMS). Fig. 2 shows how these divisions relate overall.

The purpose of this breakdown is to isolate the areas of usage of the computer system resources. Problem areas are also easier to identify and analyze. The overview of the total system capacity becomes more clear when the components can be viewed accurately and independently.

Forecasting

At this point in the capacity planning exercise, we have identified the data requirements, installed tools to capture this data, we have characterized the workload by function and time period, and we have summarized the collected data into statistical records. This may be a manual or automated operation, but what now?

Basically, all we have produced is a summary of the workload of our system and the resource consumption for the base time period. We also know more about the individual resource utilizations and the requirements of individual applications and subsystems. But this is only a reflection of the current usage of the computer system even though it may be a more distinct picture than was ever before available.

The *strength* of capacity planning resides in the facility to forecast future resource requirements and future workload levels. This can be done after a few iterations of the initial process have produced sufficient history records to indicate the general trends associated with the installation. The past history can then be analyzed and future resource requirements extrapolated by various forecasting methods: exponential, percentage, or straight-line growth.

Current applications are the easiest to forecast, especially if they have been in production for a while and are relatively stable. New applications may be compared to previous ones to derive the expected resource requirements even while still in development. When the new applications have been implemented and actual usages measured they can be compared to the estimates to reassess the actual requirements for the application. Again, after a few periods of history have been collected for a new application more accurate forecasts can be made.

Prediction

One aspect of implementing new applications is their effect on the total system and workload. As computer systems and workloads are dynamic, a method of monitoring system performance is required. An analytic model of an installations system based on queue network theory offers an inexpensive and accurate tool for tracking system performance. Since this model would be analytic, certain proposed configurations of new hardware could be evaluated without having to configure test hardware run benchmarks.

While these models may not be totally accurate they are sufficient to provide guidelines for the acquisition of new hardware based on the predicted future requirements of an installation. □

CAPACITY PLANNING
DETAILED WORKLOAD CHARACTERIZATION
CPU UTILIZATION (IN HOURS) BY CATEGORY BY PERIOD

CATEGORY	PROFILE PERIODS			
PRODUCTION:	*DAY (SHIFT)*	*NIGHT (SHIFT)*	*WEEK-ENDS*	*TOTAL*
1. *ONLINE (CICS/IMS)*				
INVENTORY	12.75	9.08	0.76	22.59
CUSTOMER MASTER	3.45	1.43	0.09	4.97
****SUBTOTAL****	16.20	10.51	0.85	27.56
2. *TSO*				
ACCTS RECEIVABLE	0.25	0.00	0.00	0.25
GENERAL LEDGER	〃	〃	〃	〃
ACCTS PAYABLE	〃	〃	〃	〃
****SUBTOTAL****	0.25	0.00	0.00	0.25
3. *BATCH*				
ACCTS RECEIVABLE	21.50	35.46	8.75	65.71
GENERAL LEDGER	〃	〃	〃	〃
INVENTORY	〃	〃	〃	〃
PURCHASING	〃	〃	〃	〃
****SUBTOTAL****	〃	〃	〃	〃
DEVELOPMENT				
1. *ONLINE (CICS/IMS)*				
INVENTORY	5.75	1.08	0.76	7.59
CUSTOMER MASTER	0.50	0.25	0.10	0.85
****SUBTOTAL****	6.25	1.33	0.86	8.44
2. *TSO*				
ACCTS RECEIVABLE	6.25	0.00	0.00	6.25
GENERAL LEDGER	3.21	0.00	0.00	3.21
ACCTS PAYABLE	0.56	0.00	0.00	0.56
****SUBTOTAL****	10.02	0.00	0.00	10.02
3. *BATCH*				
ACCTS RECEIVABLE	21.50	35.46	8.75	〃
〃	〃	〃	〃	〃
〃	〃	〃	〃	〃
****SUBTOTAL****	〃	〃	〃	〃
OPERATIONS				
1. *TSO (SCHEDULING)*	〃	〃	〃	〃
2. *BATCH*	〃	〃	〃	〃
****SUBTOTAL****	〃	〃	〃	〃
SYSTEM SUPPORT				
1. *ONLINE*	〃	〃	〃	〃
2. *TSO*	〃	〃	〃	〃
3. *BATCH*	〃	〃	〃	〃
****SUBTOTAL****	〃	〃	〃	〃

Reporting requirements

Earlier we stated that to effectively control the total *system productivity* an integrated management philosophy was used by capacity planning. The information that results from the described procedure is relevant to many areas of an installation. Management would want to know the future requirements of the installation as a whole. Production control would need other reports that would aid in scheduling efforts. Applications users would receive data outlining their resource consumption. System support people would be able to maintain better system performance if they were aware of the system status.

Obviously, all areas would not receive the same reports. The presentation of the capacity planning result would be informational to management, indicating the status CPU usage, device utilization, jobs run, and transactions processed. All areas, though, would be aware of the relationship of their requirements to those of the other areas of the installation.

Total system productivity

Any capacity planning exercise can be conducted at several levels of detail; system, subsystem (TSO, batch, online), application (payroll, inventory, general ledger), or program. At whatever level the problem is attacked this methodology of capacity planning is a powerful tool in managing the total system productivity of an installation.

Many of the questions that a manager asks would be readily answered. The number of "surprises" encountered due to lack of communication and information would therefore be reduced. □

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Bank opts for advanced support system in new computer centre

The goals of a reliable computer-room environment are especially critical for a bank's data centre. Here's an application report.

ALTHOUGH thousands of companies rely on computers to perform a variety of functions, few organizations are as dependent on their computer systems as Canada's national banks. These firms have financial information on millions of people stored in their data banks—and a computer shutdown can bring some of their operations to a standstill, with serious consequences.

Frequent shutdowns will alienate a customer and possibly force him or her to switch to a competitor. Perhaps more ominously, an unplanned computer shutdown can damage a memory bank and lose some of the information in the system. It takes considerable time to reprogram a computer, not to mention the costs associated with lost processing ability and possible hardware damage.

The bedrock of a reliable computer operation is its support system. So, when the Bank of Nova Scotia decided to build a new computer centre, it wanted both the most advanced computer equipment available, and an elaborate mechanical and electrical support system.

Early this year, the bank's central computer centre near Toronto went into operation. The facility, called CS2, has some of the most advanced computers in the world and a support system to match. CS2's support system ensures that if almost any individual component fails, the computers will continue to receive the power and cooling they require. The system also allows for on-line maintenance and the installation of additional equipment while the computers are operating. It also can easily be restored in the unlikely event of a breakdown.

This feature was prepared by the engineering staff of H.H. Angus and Associates Ltd., Toronto.

Basic requirements

Large computers for commercial use require regulated (clean) power and extensive cooling to operate. If these conditions are not met, the computers fail. Buying expensive and elaborate computer equipment without providing sophisticated back-up support makes as much sense as buying a $20-million jetliner that has only one engine.

The Bank of Nova Scotia already knew the importance of computer support systems when it decided to build CS2, since it already had several computers in operation. The bank's primary computer centre was a modern facility with considerable back-up support, but couldn't accommodate additional computer equipment.

To design CS2, the bank's planning staff, together with its architect, Crang and Boake, and its engineer, H. H. Angus and Associates, visited various computer centres in North America to study the state of the art.

The main criteria for the design of CS2's support system were reliability, flexibility, and restorability. Reliability means the support system must continually supply the necessary power and cooling to the computers. Flexibility means the system can assume additional capabilities in the future, and also allows for additions or maintenance to be done on-line while the computers are in operation. Restorability means if the system shuts down, there is an orderly procedure for restoring it.

Experience has shown the best way to achieve reliability is to include backup support in areas prone to breakdowns. This line of defense is accomplished by inserting redundant components in the areas with the highest failure rate. The advantages are obvious: if one component fails, the redundant or extra component takes over.

One example of how redundancy enhances reliability is the three-module uninterruptible power supply (U.P.S.) specified for CS2.

'Smooths' hydro power

Many operators of sophisticated computer equipment cannot rely on commercial hydro for electrical generation. Commercial hydro often has bleeps, or interference, which can interrupt computer operations. It is also unreliable and subject to outages several times a year. The function of the U.P.S. is to take commercial hydro power, 'smooth' it, and send it to the computer. It insures that the electrical power reaching the computer is continuous and clean.

Typically, the U.P.S. consists of a rectifier, a battery pack, and an inverter, interconnected with built-in switching equipment. During normal operation, unregulated AC hydro

power is brought in by a conventional power line and fed to the rectifier. The rectifier converts the hydro supply to DC power (the type of power generated by a battery) and sends it to the inverter. The inverter converts the DC power back to AC power and feeds it to the computer. This conversion process 'launders' the electricity and ensures that any power reaching the computer is clean and 'bleep'-free.

CS2's electrical support system has several lines of defense if any of the components fail. For example, there are redundant hydro power lines; if there is a power failure on one line, the system automatically switches to an alternate line. If there is a complete power outage, two diesel generators automatically start and provide the necessary electricity. It takes about ten seconds until the generators can provide the necessary power, and during this start-up period the battery pack will provide DC power to the inverter. This entire process happens automatically, without even a momentary power delay to the computers.

If the diesel generators fail to start, the battery pack can supply DC power for approximately fifteen minutes, allowing an orderly shutdown of the computers, and transfer of the memory on the computer systems over to permanent storage.

A three-module U.P.S. was chosen, to further enhance the system's reliability and flexibility. Any one of the modules can be taken off for additions, maintenance, repairs, or testing while the remaining modules continue to meet the computers power supply needs, and still offer full redundancy.

There is also back-up if the entire U.P.S. fails. A static bypass (a solid-state switch) will automatically and instantaneously transfer the computer load from the U.P.S. to direct utility supply without disrupting the computers' operation.

Large computers require power at a frequency of 415 Hertz. Commercial hydro is supplied at 60 Hertz. To make the necessary conversion, motor generator (MG) sets have been installed at CS2. Each mainframe is fed by two MG sets, each capable of making the necessary conversion. If one motor generator fails, the other takes over. If both generator sets fail, a manual switch allows the system to bypass the failed equipment and receive 415-Hz power from a standby generator.

Temperature control

Environmental control is another critical function at CS2. Computers can only function efficiently if the required humidity, temperature, and air filtering conditions are maintained. If these conditions are not met, the computers either make errors or crash.

Computers are also energy-intensive. They generate extensive heat, and require considerable cooling to prevent overheating. A conventional heating cooling system for a computer centre operates through electrically driven chillers and condensers, and requires a considerable amount of electrical power. Given the escalating price of energy today, the costs associated with cooling and heating a computer centre are significant—and will become even more dramatic in the future.

To reduce the amount of energy required for the coolers and condensers, the cooling and heating system in CS2 utilizes the outside cold air in the winter for cooling, and uses the heat generated by the computer for space heating.

CS2 has two separate cooling systems, each capable of assuming the computer load. If one system breaks down, the other takes over. Two separate pipes ensure that if there is a problem that restricts the flow of water through one set of loops, water will continue being pumped through the alternate set without interruption of supply to the computers. Redundant loops also provide enhanced flexibility, since the systems capabilities can be expanded one loop at a time while the other loop carries the load.

Both systems have unique cooling towers. A conventional cooling tower has an outdoor sump with a heater; if the heater fails the sump water freezes making cooling impossible. Both the cooling towers in CS2 have indoor sumps with hot and cold wells. Warm water isn't pumped through the tower until required, allowing for an intermittent operation. When the warm water is required, it is pumped through at full force, which prevents the water from freezing.

CS2 also has redundant air conditioning units, so if any of the air conditioners fail, the computer room still receives the necessary cooling. To prevent any water leaking from the air conditioners from reaching the computers, the air conditioning units are in a room adjacent to the computer hardware. An added advantage is that if the air conditioners require servicing, there won't be air conditioning maintenance crews hovering around million dollar computer equipment.

Through carefully designed systems such as those outlined above, the Bank of Nova Scotia has attained the levels of protection for its EDP equipment and data that a major financial institution must demand. □

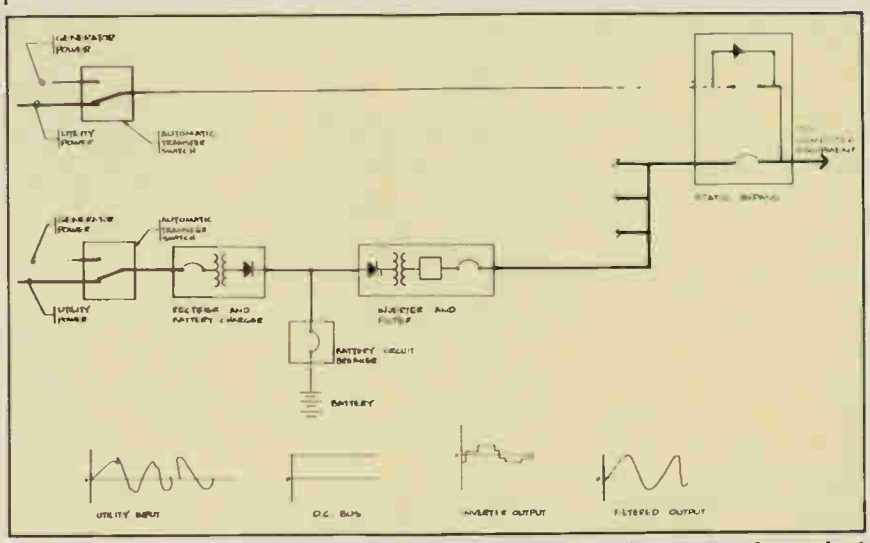

Diagram of ar uninterruptible power supply (UPS) shows the variety of ways both main and reserve electrical power can be provided to a computer room.

HP presents the ma you might have d

One of the problems manufacturers face with setting up a computer system these days is the software dilemma: the convenient, less costly off-the-shelf packages are never exactly what you need. And a start-from-scratch, do-it-yourself project means an investment in time, staff and money that could put a serious dent in your bottom line.

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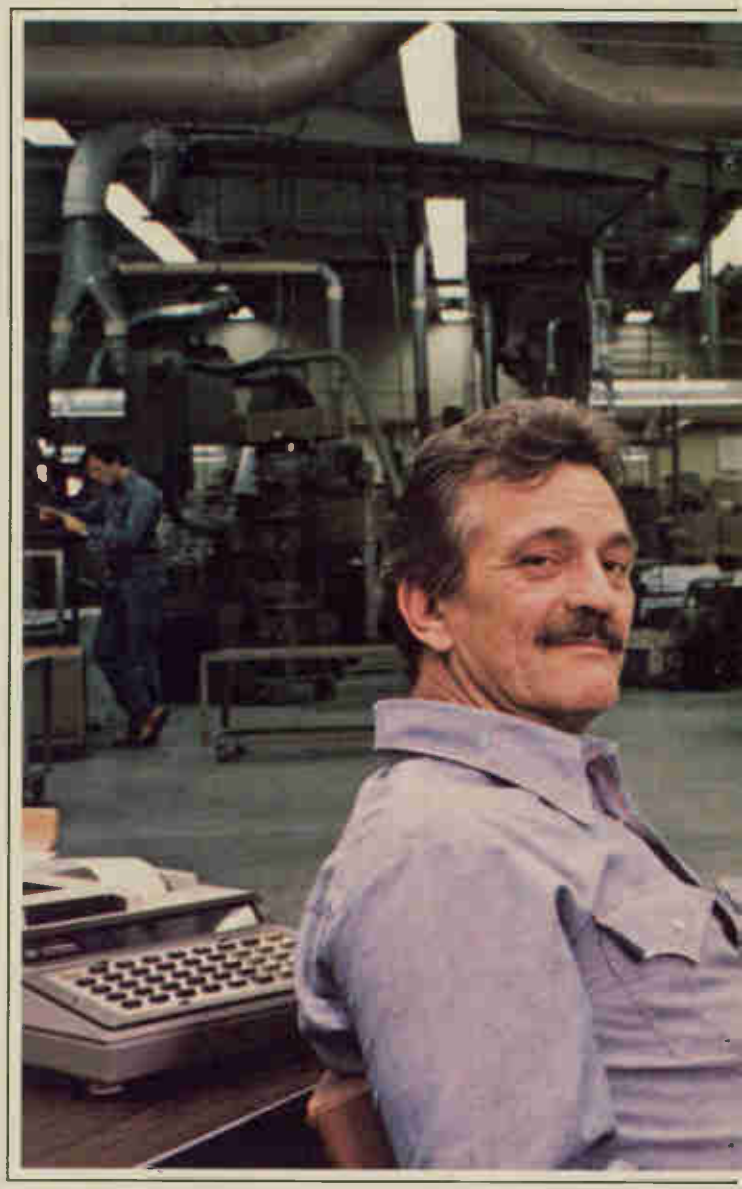

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Should the software supplier incorporate?

Few legal creations have been as resilient as the corporation, notes Lawyer Dan Mersich. And if you are in the software business, incorporation can protect against legal exposure.

By DAN MERSICH

BACK in the 1600s, when intrepid British merchant sailors began establishing a toe-hold in India that would later become a bastion of trade, there arose a need for a legal vehicle that would limit the potentially disastrous losses associated with shipping large quantities of goods half-way round the world in small ships.

Up until that time, the legal creation called a "limited company" was unknown. Industry and commerce were strictly local and the owner of a business, both in theory and in fact, was the direct overseer of his operations—therefore, the law reasoned, he should be responsible for any damage caused, without limit.

The cruel severity of such laws became apparent when huge losses in foreign trade came home to cripple surprised businessmen who had neither control nor knowledge of the events that spelled their demise. Rather than see its blooming empire wither, Britain came to the rescue with the limited company; something that would back stop the maximum potential exposure, no matter what happened.

Few legal creatures have been as resilient and enduring as the corporation, for it is more prevalent and stronger today than ever before. Also, it is (or should be) a topic of interest to anyone in the software business for exactly the same reasons—avoiding ruinous losses.

As hardware becomes cheaper and hence available to a broader user base, and as those new users come to rely on software houses to implement their systems, the potential for legal exposure increases.

In the past, small independent software suppliers did not have too much to worry about because jobs usually involved big numbers. After all, a user who suffers losses in the millions because of bad software does not waste time chasing a small software house through the courts—usually, neither the software corporation nor its owner personally has enough assets to pay, so why bother?

But, as users become smaller, and their claims for damages start to drop into say the range of $100K, then the picture changes. Perhaps the software house is not incorporated; rather, it might be run out of the basement of its proprietor who was lucky or astute enough to have bought a house in downtown Vancouver, or Calgary or Toronto five years ago. That house could now be worth a lot of money—enough to make it worthwhile for an injured customer to go after the unincorporated software house in court.

If the reader understands the above to mean that the owner of an unincorporated software business stands to lose his house or other personal assets if one of his customers successfully sues him for a breach of contract or for negligent work, then the reader understands things perfectly.

If that stick is not enough to frighten one into incorporating, then perhaps these carrots might induce him to do so.

Profits earned by the corporation can be paid out in dividends rather than salary. Dividends get much better tax treatment than salary. Furthermore, a greater degree of income splitting is possible through a corporation, hence less tax is payable.

The cost of incorporating is quite reasonable. A simple vanilla-flavored charter is obtainable through many lawyers for about $150 in fees. On top of that, expect to pay about $300 more to the government and for things such as minute books, seals and share certificate forms.

There is less paperwork with a provincial charter if you restrict operations to that province, but in terms of legal substance and cost, provincial or federal charters are the same.

Thus, to the question "Should you incorporate?", the answer is "Absolutely!" □

Dan Mersich is a Toronto lawyer whose private practice is restricted to computer-related matters.

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PREVIEW REPORT

"Solutions" is conference theme

Conference in brief

Location: Hyatt Regency Hotel (Salon A Regency), 777 University Ave., Montreal
Dates: June 3, 4, 5, 1981, from 9:00 a.m. to 12:00 noon each day.
Fees: Preregistration before May 24. Any one session $70 at the door.
Advance Registration: Industrial Trade Shows, 36 Butterick Rd., Toronto, Ont. M8W 3Z8. Tel. (416) 252-7791.

"Solutions" is the theme of this year's three-day conference to take place in conjunction with the 1981 International Computer Show, on June 3, 4, and 5 in Montreal.

Conference chairman is Victor Roy, partner in the firm Ducros, Meilleur, Roy and Associates Ltd. and the event is sponsored by the Canadian Information Processing Society.

The Conference will be held at the Hyatt Regency Hotel, Salon A Regency, while the Show will occupy the Place Bonaventure.

Session 1: Improving DP methodology

The 1980s will see technology changes and greater complexity. An organized and systematic methodology to handle the data processing challenges should lead to the establishment of a solid foundation to control and manage the data processing environment. This session deals with methods and techniques to increase success in this area by outlining a structured analysis methodology, a strategic planning technique and key components to include and evaluate when assessing office system potential.

Strategic Data Processing Planning. *Leonard H. Borysowich, Computing Centres, IBM Canada Ltd.*

In his presentation, Mr. Borysowich will discuss how to build a strategic plan for the data processing function and how the plan relates to the data processing department, to senior management, and to the corporate strategic plan. The presentation will review current methods of strategic planning and the results that have been achieved for IBM Canada's computing centres. Areas of emphasis include the management of change, technology and growth.

Principal Support Office Systems. *Doug Snyder, Data Processing Division, IBM Canada Ltd.*

The data processing division of IBM Canada has operational office systems for both word processing and for principal support. The session will examine the function of these systems in both headquarters and branch offices. The need for control and standards in planning, implementation, and operation will be reviewed along with the need for pilot systems to evaluate function and benefits.

Structured Analysis. *Rolande Dussault, Ducros, Meilleur, Roy & Associates.*

A clear communication between the user, the analyst and the technical group for project development, a lack of tools to adequately document the proceedings for analysis—these are current problems in systems analysis. This presentation will focus on an organized approach to analysis within the lifetime of a project, and the utilization of the data flow diagram in the functional segmentation of systems. Rules of evaluation will also be reviewed.

Session 2: Software alternatives

The price of hardware is declining by almost 20% per year, creating a steady stream of new applications that were not economically justifiable until recently. The average application backlog is estimated to be at least two years. Some solution must be found to keep up with hard-

Turn to page 64

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Reader Service Card Number 188

Salon International de L'Ordinateur Computer Conference

From page 62

ware advances. One answer may be that companies customize parts of their environment to fit the specifications of available standard software. Another answer suggests that, where a non-standard code must be developed, new productivity tools be used. A user, a supplier of standard software and a supplier of productivity tools will advance these issues from their respective points of view.

Software Economics. *Donald L. House, Management Science America Inc.*

After discussing the history of the software segment of the computer services industry, Mr. House will outline the software purchase decision-making process and profiles of some typical software buyers. Guidelines for objective evaluation of the choices available to the prospective buyer will be discussed. Suggestions for implementation planning and a look at the future direction of hardware and software technology will also be considered.

On-line Application Prototyping and Development. *Ken Wilson, ABA Software Industries.*

This session will examine the "architecture approach" to on-line prototyping and development and see how it can solve the major problems of development productivity and application usability. Mr. Wilson will focus on design activity as part of a revised development process based on a realistic concept of the "system cycle".

Draft for a Policy Concerning the Purchasing of DP Services by the Quebec Government. *Bertrand Croteau, Government of Canada Department of Communications.*

The use of data processing by public administration is increasing very rapidly, raising questions concerning social and economic effects. This session will outline policies for the procurement of data processing services and resources. Among other considerations will be the importance of the private sector involvement for certain services, the type of applications that could be processed by the private sector, and the acquisition process for those services.

Session 3: Users' views

Managers of large businesses, using computers in leading applications, will give their views on the present and future role of information systems technology within the planning, managing, operating and controlling functions of business.

The Computer Services Solution in a General Insurance Company. *Jean Bouchard, Le Groupe La Laurentienne.*

This session will examine the integration of a data processing program through strategic planning within the framework of general insurance administration.

Automation Prioritization and Planning. *William C. Harker, Bank of Montreal.*

The information processing function is increasingly being viewed as a valuable corporate resource. In his presentation, Mr. Harker will emphasize the need for achieving a closer integration of information processing into the corporate planning process. A working methodology for users and other executives will be detailed.

The Role of Systems in a Financial "Turnaround". *Claude Perron, CN Express.*

Mr. Perron will describe how the Express division of Canadian National Railways undertook the design and implementation of a large on-line, coast-to-coast data processing system, mechanizing its business operations and accounts receivable functions over a three-year period.

SESSION 1 Chairman: Jacques Gervais

Jacques Gervais graduated from Ecole Polytechnique of Montreal. After a few years with consulting engineering firms, he joined IBM in 1968 where he has held positions in sales, training, systems engineering, and in the banking sector. Mr. Gervais is a member of "L'Ordre des Ingénieurs du Québec" and the Canadian Information Processing Society.

SESSION 2 Chairman: Raymond Lafontaine

Raymond Lafontaine is senior partner and founder of Lafontaine, Gauthier, Shattner, Inc., consultants in management and data processing, headquartered in Montreal. A graduate of the Université de Montréal in both engineering and economics, he also holds an M.Sc. from the University of London. Prior to consulting, he spent 13 years with IBM Canada, where he held several senior positions in marketing and management.

SESSION 3 Chairman: Humberto Santos

Humberto Santos is president of Laurentide Financial, the leasing subsidiary of the National Bank of Canada. He also holds the position of Vice-President, Leasing. He was previously Vice-President, Data Processing Operations, and has had extensive experience in systems, operations and accounting in the magazine, oil and finance industries. Mr. Santos has a B.Comm. degree and an MBA from Concordia University of Montreal. He is the past president of the Canadian Information Processing Society, Montreal section.

Lafontaine

Gervais

Roy

Santos

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Vancouver, Edmonton, Calgary, Winnipeg, Montreal

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SALON INTERNATIONAL DE L'ORDINATEUR

Montreal, Place Bonaventure
June 3-5, 1981

Exhibitors & Products:

The largest computer show ever to be held in the Province of Quebec is being readied for next month. Conference and exhibits complement this major industry event.

PRESENTED on the following pages is a preview of the firms and products that will be on display at *Le Salon de l'Ordinateur*, the Montreal computer show that will open at the Place Bonaventure on Wednesday, June 3rd.

As of press time, an estimated 100 Canadian and foreign companies in the data processing industry have registered to participate in the trade show, displaying their products and services for the more than 10,000 visitors who are expected.

The information contained in the following pages has been extracted directly from questionnaires returned by the participating firms. All data is as of press time for this issue.

Show hours:

12 noon to 6 p.m., June 3 and 5, 1981
12 noon to 8 p.m., June 4, 1981

AC/DC Interference Analyst
Booth: 816

8315 Devonshire Rd., TMR,
Montreal, Que.
H4P 2L2
(514) 731-3328

Reader Service Card Number 30

Advanced Meta Intelligent Systems Inc.
Booth: 717, 718

10125 Cote de Liesse
Dorval, Que.
H9P 1H3
(514) 636-4522

Reader Service Card Number 31

AES Data Ltd.
Booth: 307

100, Alexis-Nihon
Bureau 600,
Saint-Laurent, Qué. H4M 2P2
(514) 744-6711

Exhibiting: The AES-Plus stand-alone word processing system with extended disc option will be on display, along with the AES System C20 multi-terminal word processor and a complete line of software packages. The AES optical character reader will also be exhibited.

Reader Service Card Number 32

Ahearn & Soper Inc.
Booth: 407, 506

5890 Monkland Ave., Suite 105
Montreal, Que. H4A 1G2
(514) 487-7243

Exhibiting: Norpak Micro Video processor graphics terminals; Trilog COLORPLOT 100 color plotter; the new Versatec V-80 electrostatic plotter; Printronix 300 and 600-LPM line printers; PDP-11 compatible tape and disc subsystems.

Multiwriter letter-quality terminals, "Paper Tiger" line printers, Volker-Craig video terminals, intermec bar code printers and readers, and DY-4 graphic terminals.

Personnel: A. Larocque, J. Ledoux, J. Paul, V. Campbell, P. Fedak, M. Houston, H. Reich, A. Wallenius, G. Beaton.

Reader Service Card Number 33

American Superior Electric
Booth: 820

38 Torlake Cres.,
Toronto, Ont.
M8Z 1B3
(416) 255-2318

Exhibiting: Voltage-conditioning equipment designed to protect sensitive computers, micro-processors and other electronic devices from damaging power line disturbances.

These include extremely rapid automatic voltage regulators, transient suppressors and isolation transformers which when used singly or in combination can provide trouble-free operation.

Personnel: Bob Stone, Hazen Scott, Gail Danks.

Reader Service Card Number 34

Anderson Jacobson Canada
Booth: 233, 235

500 Chemin du Golf, Montreal, Que.
H3E 1A9
(514) 879-1419

Exhibiting: 300-1200-baud acoustic couplers and modems, inexpensive dot matrix printing terminals, high-speed

dot matrix printing terminals, letter-quality printing/plotting terminals, CRT terminals and standalone RS232 floppy diskette units.

Personnel: Greg Richardson.

Reader Service Card Number 35

Apple Canada Inc.
Booth: 633

875 Don Mills Rd.,
Don Mills, Ontario M3C 1V9
(416) 444-2531

Exhibiting: Apple II and Apple II plus—developed with expansion in mind; has an extended Basic language built in, operates as a turnkey system and operates in different languages (i.e. Pascal, Integer Basic, Applesoft II Basic). Both Apple II and Apple II Plus provide fifteen-color standard graphics, high-resolution graphics, sound capability and accessory expansion slots to enable the system to grow with your needs.

Apple III—A more powerful personal computer—incorporates new Apple-designed operating system and central

processor; up to 128 kilobytes of main memory, built-in disk drive, communications facilities, color graphics, a digital-to analog data converter, audio capability and new application software. It supports high-level programming languages (i.e. Basic, Fortran, Pascal) and can accommodate a large range of peripherals, including three additional disc drives and a variety of printers.
Personnel: David J. Killins, Peter Jones, Lynn Schofield.

Reader Service Card Number 36

Ashworth Automation Ltd.
Booth: 132

315 Steelcase Rd. East,
Markham, Ont. L3R 2R5
(416) 495-0222
Exhibiting: The new Dataproducts M-100 graphics matrix printer. This is an extension of the Dataproducts M-200, 340 CPS high-speed matrix printer Family. Also on display will be the first production unit of the new Dataproducts B-900 Printer. The 900 LPM B-900 is an extension of the Dataproducts B-Series Band Printer product line.
Personnel: John Ashworth, Steve Chorny.

Reader Service Card Number 37

ATELCO (Associated Test Equipment Ltd.)
Booth: 640

2545 Cavendish Blvd. # 125
Montreal, Que.
H4B 2Y9
(514) 481-7733
Exhibiting: (Graphics Division): Benson Varian—Pen Plotters, Electrostatic Plotters; Summagraphics—Digitizers, Computer Aided Drafting Systems; HMW—High Resolution Colour CRT's; Watanabe—Low cost Digital Plotters. (Telecommunications Division): Anritsu—Communications Test Sets, Spectrum Analyzers; Dranetz—Power Line Disturbance Analyzers; Dynatech—Datascopes, Tech Control Systems, A/B Switching & Patching; Micom—Time Division and Statistical, Multiplexers, Modems, Data Switching Systems; Navtel—Bit and Block Error Test Sets, Breakout Boxes; KMW—Protocol Converters.
Personnel: Jim Summerville, Joe Sutherland, Paul Graziadei, Martin Adcock, Vic Whitmore, Jerry Osborne.

Reader Service Card Number 38

Auerbach Reports
Booth: 719

1450 Don Mills Rd.
Don Mills, Ont.
M3B 2X7
(416) 445-6641

Reader Service Card Number 39

Bell & Howell Ltd.
Booth: 314, 316, 318

230 Barmac Dr.,
Weston, Ont. M9L 2X5
(416) 746-2200
Exhibiting: The 3900 COM System is the most powerful and versatile COM system available. New hardware and

SALON DE L'ORDINATEUR

software features give users superior price/performance benefits through increased throughput and ease of operation. Additional features include concurrent job setup and COM production, software-generated forms capability, and an optional 6250 bpi tape drive.

Bell & Howell's new Data Search-1000 Automated Document Filing And Retrieval System provides immediate access to active business information. Data Search-1000 files source documents randomly on 16 mm roll microfilm which provides file integrity and security through the virtual elimination of lost or misfiled information. The integrated minicomputer maintains control of the complete system including the index to the microfilm location.

Personnel: Ron Trowbridge, Malcolm Maclennan, J.P. Cote, Graeme Bell, Claude Bureau, Grenville Priest.

Reader Service Card Number 40

Bolt, Beranek & Newman
Booth: 707

50 Moulton St.
Cambridge, Mass. 02238
(617) 491-1850

Reader Service Card Number 41

Caleq Inc.
Booth: 535

P O Box 58
Brossard, Que
J4S 3J1
(514) 861-4615

Reader Service Card Number 42

Canada Dactylographe Inc.
Booth: 518 & 520

7035 avenue du Parc
Montreal, Que
H3N 1X7
(514) 270-1141

Reader Service Card Number 43

Canadian Association for Production and Inventory Control
Booth: 512

Simavon Asparian, 2097 Grenet,
St-Laurent, Que H4L 2R8
(514) 341-5680 (ext. 346)

Exhibiting: CAPIC—is a group of professionals who come from various industries as experts in production and inventory control, to participate with their members the exchange of ideas and experiences within their professions and to continuously upgrade their knowledge on materials management within the latest techniques. As a visitor to their booth, you will be exposed to their own educational publications, and will be informed of their achievements in their joint educational programs with Dawson and Champlain Colleges.

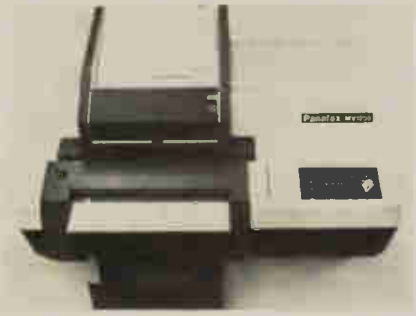
Personnel: Simavon Asparian, Roger Tetreault, Pierre Dupras, Donald Roberge, Clark Weddell, Mike Cregan, John Meaker, Jean Noel, Leslie Prehoda, Donald Atkinson.

Reader Service Card Number 44

Canadian General Electric (Data Communication Products)
Booth: 308-312

2020 University St.,
Ste. 1724, Montreal,
Que. H3A 2A5
(514) 849-9491

Exhibiting: New versions of the "Workhorse" TermiNet 200 printer, the



APL/ASCII, the forms access and the split-platten will be shown, together

Continued on p. 70

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Omnimux 40 is a low cost 4 and 8 channel Asynchronous Statistical Multiplexer with aggregate link speed to 9600 bps. The Omnimux 40 complements the Omnimux 80/160/320 and features the same statistical multiplexing algorithm and link frame protocol, allowing the entire series to communicate with each other.

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SALON DE L'ORDINATEUR

with the lightweight table-top TermiNet 2030.
As the Canadian distributor of C. Itoh products, CGE will be showing the low-cost Comet matrix printer. The C. Itoh, Starwriter daisy wheel printer together with the TermiNet 510 Corresponder provide a range of printing speeds from 25 to 510 characters per second for word processing systems.
Canadian General Electric has recently entered the facsimile market as Canadian distributor for Panafax. The versatile Panafax MV1200 will be shown, this unit meets CCITT specifications and can send to and receive from most other existing models of facsimile transceivers.
As the longtime Canadian distributor of Applied Digital Data Systems (ADDS) CRT terminals, CGE will show the new low cost Viewpoint conversational unit with separate keyboard.
Personnel: Pierre Daneau, Susan Aboud, Tom Cooper, John Hajj, Bill Packham, Rob Uttamsingh.

Reader Service Card Number 45

Canadian Information Processing Society
Booth: 703

243 College St
Toronto, Ont.
M5T 9Z9
(416) 593-4040

Reader Service Card Number 46

Centurion Computer Corp.
Booth: 525 & 624

21 Progress Crt.
Suite # 15
Scarborough, Ont.
M1G 2V4
(416) 439-9472

Reader Service Card Number 47

C-E-S Ltd.
Booth: 124

4 Farnham, B.P. 523 Place Bonaventure, Montreal, Que. H5A 1C3
(514) 861-7552
Exhibiting: A full line of terminals as well as the NorthStar computer system. Terminals will include the Digital Equipment VT100, VT132, LA120 and LA34; the new C.I.T. 101 from C. Itoh Electronics, Black and White and color graphics CRT's (plot 10 compatible), Centronic printers (including the new 6080 quiet line printer), IBM 3101 CRT, NEC Letter Quality Printers, Televideo CRT's, T1745 portables, acoustic couplers, modems and accessories.
All equipment supplied by C-E-S Ltd. may be purchased, leased, or rented on a short or long term basis.
Personnel: Nicole Larente, Colin Bayley, Roy Hood, Barbara Davis and Jim McGowan.

Reader Service Card Number 48

Cincom Systems of Canada, Ltd.
Booth: 128

130 Dundas St. E., Suite 201,
Mississauga, Ont. L5A 3V8
(416) 279-4220
Exhibiting: A completely new application development system that provides complete beginning-to-end on-line application development, without the need for any batch processes. Series 80 Mantis, a member of the Cincom family of DB/DC products, enables the programmer to create screens and files, write programs, test and debug applications, document systems, put systems on security menus and release applications for production. The entire application can be implemented interactively, all in one sitting.
Personnel: Michael Farrell, Mario Chartrand, Andre Noiseux, Bill McIntosh, Dick Collins, Jenny Tetzel, John Rattray, Jim Butts.

Reader Service Card Number 49

C-I-L Inc.
Booth: 433

2900 Jean Baptiste
Deschamps Blvd.,
Lachine, Que.
H8T 1C8
(514) 636-9230
Exhibiting: "BCF" Halon 1211: "BCF" is a liquified gas fire extinguishant manufactured by ICI Americas Inc. and marketed in Canada by C-I-L Inc. The product has been in use on a world-wide basis since 1960.
Information and literature will be available regarding the properties and application of "BCF," as well a list of Canadian and American fire equipment manufacturers producing ULC & ULI rated and approved hand portable extinguishers charged with "BCF."
"BCF" Halon 1211 used in lightweight, easy-to-use, hand-portable equipment is the optimum agent for the fire protection of delicate high-value equipment and materials.
Personnel: Tony Merleau, James Davis, Dunbar Cooper, Brian Maxwell, Ian Smith.

Reader Service Card Number 50

The Computer Communications Group, TransCanada Telephone System
Booth: 907

160 Elgin St., Room 1250,
Ottawa, Ont. K1G 3J4
Zenith 33000
Exhibiting: CCG's digital network—Dataroute; packet switching network—Datapac; messaging service—Envoy 100; maintenance service—Dataforce; dollar-a-day-terminal—Vutran.
Personnel: Yolande Hachez, Randy Sullivan, Bob Levasseur, Denis Pelletier, Louise Chauvet, Bob Dobro.

Reader Service Card Number 51

CNCP Telecommunications
Booth: 623, 625, 922, 924

740 rue Notre Dame Ouest,
Montreal, Que. H3C 3X6
(514) 866-3644
Exhibiting: Focus will be on the Infotex Service which will be offered publicly later this year. Infotex is a network of communicating typewriters and word processors which will have such features as the electronic mailbox, electronic filing, managers' terminals, store-and-forward host computer access and access to the Telex network.
Also to be displayed will be our new generation of electronic telex terminals under the product name 'Telemode'. These offer a variety of new features of Telex customers such as automatic dialing, electronic memory and visual

displays. Through these terminals we will demonstrate such new Telex services as Telenews and SAFT (a computer store-and-forward facility).
The Infoswitch packet-switching service will be demonstrated through our latest Infomode data terminals. Also interconnection with the telephone network will be exhibited through a commonly available data terminal.
Personnel: Yvon Galarneau, Denis Charron, Robert Verville, Claude Raymond, Marcel Dufort, Rolland Couture, Domenico Proia, Jean-Guy Dubuc, Claudette Boivin, Jean Monarque, Andre Brunet, Patricia Fitzpatrick, Marcel LeFrancois.

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Reader Service Card Number 177 →

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Toronto, Ontario M5H 3R7, 416/863-6696

SALON DE L'ORDINATEUR

Compucentre
Booth: 527

9200 Claveau St.,
Montreal, Que. H1J 1Z4
(514) 354-3810

Exhibiting: A complete range of professional and small business computers including the Apple II and Apple III; Commodore models 4032, 8032 and VIC; Cromemco Z2H; and Hewlett Packard 85 series. The exhibit will highlight special applications on these systems, including Visicalc, DBMS, accounting applications and other special purpose applications. Also on exhibit will be a variety of disc drives and printers including the Centronics 737 and Essna MX 80. Industry specialists will be available at the booth to discuss the various needs of software developers, educators, business, professionals as well as technicians. The Compucentre store in Place Bonaventure will be holding an open house during the period of the show.

Personnel: Yves Robert, Dave Taylor, Howard Diller, Bernard Cohen, Bernard Rousseau, Jerry Tarasofsky.

Reader Service Card Number 53

Communications Canfax
Booth: 237

8180 Devonshire Rd.,
Suite 6,
Town of Mount Royal,
Que. H4P 2K3
(514) 737-8696

Exhibiting: Telcon Industries Inc., manufacturers of the Ambassador portable text-editing terminal product line. The Ambassador I, the only terminal of its kind to incorporate a 7" diagonal display, 144K of storage on one mini-cassette, and a 40-column printer, all in a light-weight portable case. The Ambassador IV allows the user to literally take his office to any remote area. The terminal works in both page or character mode, has ASCII protocol, conversational or time sharing, comes with a 300 baud acoustic coupler and can be hand carried anywhere. All this, and more, from Telcon Industries, the "Datamax" people.

Personnel: Lorne Schecter, Dianne Blanchet, Henri Spitzer.

Reader Service Card Number 54

Computing Canada
Booth: 701 & 702

211 Consumers Rd.
Suite # 302
Willowdale, Ont.
M2J 4G8
(416) 497-9562

Reader Service Card Number 55

Comterm
Booth: 435, 437

545 Delmar Ave.,
Pointe Claire,
P.Q. H9R 4A7
(514) 694-3030

Exhibiting: The recently introduced Series 4270 CRT terminal product line, offering full compatibility with the IBM 3270 CRT series. These units are available in either BSC or SNA/SDLC with full SCS printer command support. A wide choice of printers are available, 60 CPS to 600 CPS.

The Model 341 offering bilingual Arabic/English script-handling capability will be on display. This unit is of particular interest to OEM suppliers and system-houses dealing in the middle east market. Also on exhibit will be Comterm's multidropped approach to cabling.

Personnel: Richard Shirley, Michel Deschenes, Ken Johnson, Ron Valle, Guy Senecal.

Reader Service Card Number 56

COS Information Inc.
Booth: 704

6272 Ouest Rue Notre Dame
Montreal, Que.
H4C 1V4
(514) 935-4222

Reader Service Card Number 57

CTS Computer Systems Inc. (Qantel)
Booth: 339

204 Amber St.
Markham, Ont.
L3R 3A3
(416) 495-3450

Reader Service Card Number 58

Cullinane Corp.
Booth: 541

20 William St.
Wellesley, Mass 02181
(617) 237-6600

Reader Service Card Number 59

Dasco Data Products
Booth: 503, 505, 507

421 Carlingview Dr.
Rexdale, Ont.
M9W 5C7
(416) 675-7222

Reader Service Card Number 60

Datamex Ltd.
Booth: 324

7005, Kildare Rd., Suite 06,
Côte St. Luc, Que. H4W 1C1
(514) 481-1116

Exhibiting: Document-quality standalone KSR printing terminals with extensive graphics capability. Dual-head KSR printing terminals, acoustic couplers, originate and answer.

Also at this booth will be terminal, printer, and other products of these firms:

Computer Devices Inc., Datamedia Corp., Datasouth Corp., Intelligent Systems Corp., Interface Systems Inc., Printa Color Corp., Qume Corp., Sykes Datatronics Inc., Teletype Corp., and TeleVideo Inc.

Personnel: Sam Luks, Robert Montpetit, Michel Roy, Don Haruni, Bob Arthur, Tony Katz.

Reader Service Card Number 61

Data General (Canada)
Booth: 121

2155 Leanne Blvd.,
Mississauga, Ont L5K 2K8
(416) 823-7830

Reader Service Card Number 62

Data Products Canada
Booth: 605-607

2780 Paulus St.,
St. Laurent, P.Q.
H4S 1G1
(514) 337-8401

Exhibiting: A complete range of word/data processing supplies and accessories, with direct representation of Wabash magnetic tape and diskettes; Nashua Canada disc packs and diskettes; Qume and Diablo ribbons and printwheels; Dennison-National's complete line of data binders and storage systems; Acco Canada's new "Accodata" retention systems; Accoustic Sound enclosures for all equipment; and "Wordtext" word and data processing ribbons.

Personnel: Alexander Ballou, Jacques Brabant, Luc Benson, France Dupont, Yvon Caron.

Reader Service Card Number 63

Data Processing Management Assn.
Booth: 537

1155 Metcalfe St
Montreal, Que.
H3B 2V6
(514) 866-6411 ext: 437

Reader Service Card Number 64

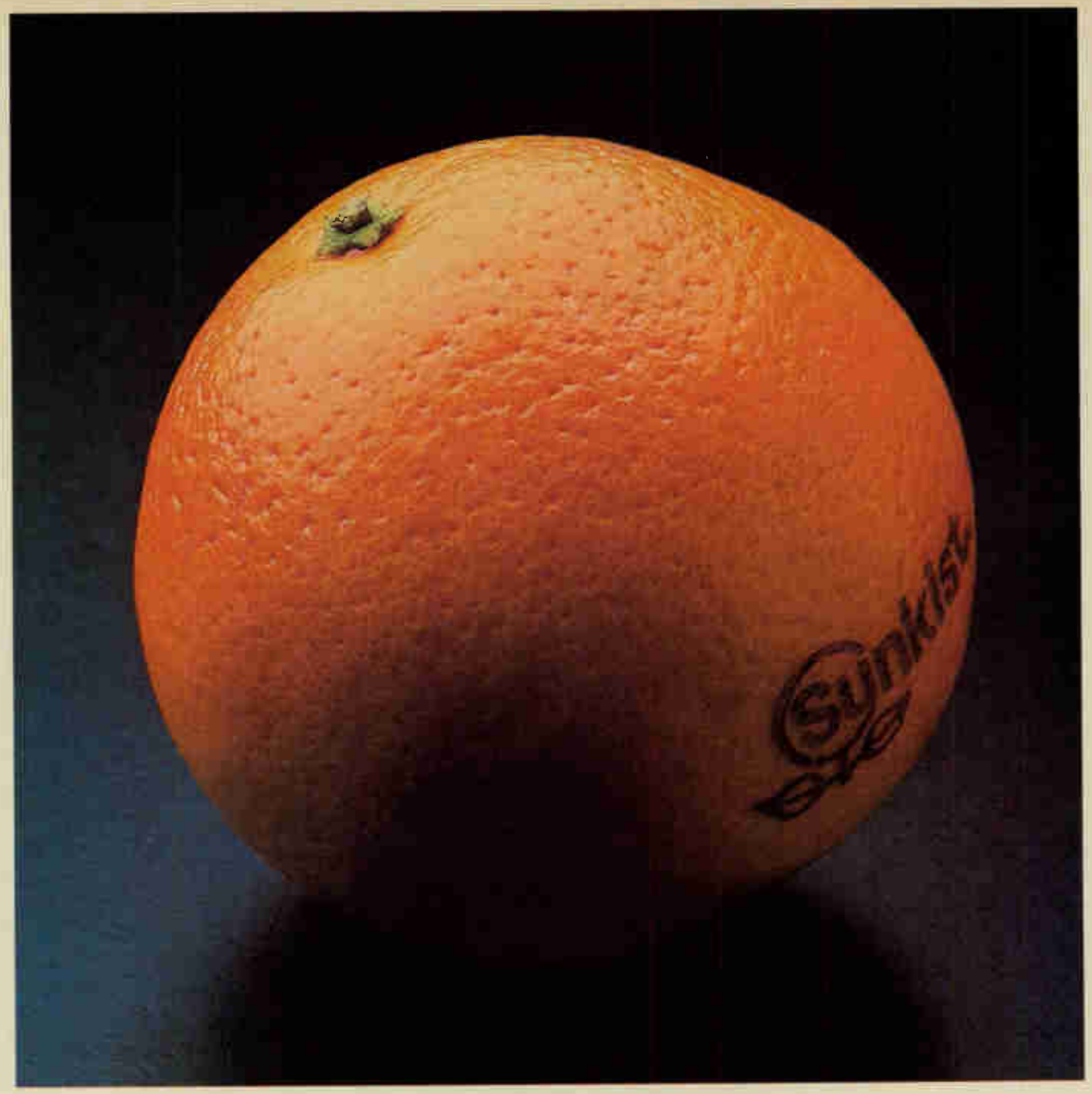
Delta Data Products
Booth: 419-421

189 Rockland Rd.,
Montreal, Que.
H3P 2W2
(514) 731-3513

Exhibiting: The Karl Gutmann line of modular workstations for minicomputer and word processing systems. Work station components are human-engineered for maximum operator comfort and productivity, and feature electronic storage accommodation that complements both operational and service requirements. We will also display Monarch Computer Accessory products and our Datafile color-coded filing system.

Personnel: K. Naylor, C. David, G. Dufour.

Reader Service Card Number 65



Sunkist picked Nixdorf.

As one of America's leading citrus marketers, Sunkist Growers, Inc. knows the importance of being selective. When it came to picking computers for data entry, Sunkist picked Nixdorf.

Why Nixdorf? Because of our unique user-oriented commitment to simplicity that results in the smoothest, most productive man/machine interface in the industry.

User-orientation. It was our philosophy more than a quarter of a century ago when we pioneered the workstation computer. And it's our philosophy today.

In the design and production of complete systems for either stand-alone or distributed data processing and word processing applications, Nixdorf is dedicated to one simple idea: People who use computers should have computers they can use. Maybe that's why Sunkist and so many other major companies pick Nixdorf.

Nixdorf Canada Ltd., Suite 102, 505 Consumers Rd., Willowdale, Ontario, M2J 4V8.

NIXDORF
COMPUTER

Reader Service Card Number 178

WE HAVE 3,973 PROFESSIONAL JOB OPENINGS RIGHT NOW.*

Big? Yes, T.S.C. is Canada's biggest professional placement service. But, equally important, it is an industry-sponsored organization with only one reason for existing: to see that this country's professionals find the right job... in the right place... at the right time. Naturally, complete confidentiality is assured at all times.

Over 1300 Canadian companies are behind the Technical Service Council's efforts to provide them with professionals to fill the 3,973 jobs which are open right now.

Specialists most in demand are experienced Accountants, Computer Programmers, Systems Analysts and Engineers (Chemical, Mechanical, Structural and Sales).

*Vacancies listed with T.S.C. as of January 1, 1981.

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Industry's own
placement service for professionals

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Reader Service Card Number 187

A few lines on increasing the productivity of your computer.

You'd find it hard to be productive, too, if you were right in the middle of manipulating important data, and you suddenly received a request for information you hadn't thought about for nanoseconds.

Yet, your very expensive, highly advanced CPU has to put up with interruptions like that all day long.

If your company had a Kodak IMT-150 microimage terminal, however, your computer could spend much more of its valuable time manipulating data. And a lot less time searching for it.

That's because the IMT-150 terminal has its own intelligence – a built-in microprocessor that enables it to perform on-line lookups in seconds. At the touch of a button. Without tying up your mainframe.

The IMT-150 terminal helps your people be more productive, too. They can find needed data quicker and easier, resulting in more lookups per hour/day.

And because source information stored in superdense microimages can be linked to complementary indexes in your on-line data base, you can reduce the cost of keeping non-dynamic information in a dynamic state.

The choice, then, is yours.

You can increase the productivity of your computer with additional Data Processing Storage Equipment that is sophisticated but expensive.

Or handle your growing information demands with the *alternative*–a KODAK IMT-150 Microimage Terminal.

KODAK CANADA
Business Systems Markets Division
3500 Eglinton Avenue West
Toronto, Ontario M6M 1V3

☐ Please send me more information about the Kodak IMT-150 microimage terminal.
☐ Please have a Kodak representative contact me.

CDS-5-5

Name _____

Position _____

Company _____

Address _____

Postal Code _____ Phone _____

City _____

Province _____

Reader Service Card Number 165

SALON DE L'ORDINATEUR

Datagram Inc.
Booth: 508
2412 de la Province
Longueuil, Que.
J4G 1G1
(514) 651-3310

Reader Service Card Number 66

Decision Data Computer (Canada)
Booth: 710
70A Brunswick Blvd.,
Dollard des Ormeaux, Que.
H9B 2C5
(514) 683-2632

Exhibiting: A range of products including: line printers ranging in speed from 300 to 1500 LPM (including a 650 LPM model, field upgradable to 800 and 1000 LPM); 150 CPS serial (matrix) printers, IBM 3270 compatible, and System 34/38 5256-compatible; work station (CRT) for System 34/38, 5251-compatible.

Also, communication controllers, bi-sync 2780/3780 compatible for remote batch or job entry applications; and a full line of 80 and 96-column card equipment for on-line or off-line applications

Personnel: Robert M. Chypchar, Gordon Steele, David L. Desjardins, Françoise Suddaby, Michelle Kehoe, Frank Posavad, Joe Artibello.

Reader Service Card Number 67

Digital Equipment Canada
Booth: 111
100 Herzberg Rd.
Kanata, Ont.
K2K 2A6
(613) 592-5111

Reader Service Card Number 68

Dec-Micro Inc.
Booth: 531 & 533
207 Place Frontenac,
Pointe-Claire, Que. H9R 4Z7
(514) 695-5931

Exhibiting: Formerly K.O. Mair Associés Ltée. in Montréal, we sell the same equipment, software support and services for DEC LSI-11 products. We are glad to present our multiplexer DHK11 (8 lines asynchronous), DMA output on a double dual size for the Q-Buss, and soon will be supporting modems. As well, we will demonstrate our well-proven Winchester disc drive and a compact 1600 BPI mag-tape data streamer and their controllers. Also, we are pleased to show the famous TSX-PLUS which makes your DEC RT11 operating system a fast time-sharing system for up to 20 concurrent users.

Personnel: Gilles Meloche, Tim Fitzsimonds, Dave Dexter, Alain Champagne.

Reader Service Card Number 69

DGS Datagraphics Ltd.
Booth: 708, 709
18H Enterprise Ave.,
Ottawa, Ont.
K2G 0A6
(613) 225-0411

Exhibiting: The G.T.C.O. Corp. IGD System, comprising of a micro-digitizer, a user-programmable raster scan graphics display terminal (with dual microprocessors CPM operating system), dual floppy disc drives, a microprocessor-controlled drum plotter, and graphic application software (in source form allowing the user to develop his own software). The Logic System L-37 four-pen 36-inch digital plotter with microcomputer-based intelligent controller providing RS 232, GPIB and parallel interfaces, features software language independence and unique curvelinear motion that draws true curved lines at maximum plotting speeds. Rianada Electronics embedded controllers for DEC and Data General minicomputers provide end users and OEM a viable second source for input/output and mass storage requirements that are software-transparent and hardware-compatible to that offered by the mainframe manufacturer.

Personnel: Greg Philliban, P. J. Philliban, Don Scendarian, Dean Coe, Jack MacDonald, George Helser.

Reader Service Card Number 70

Dresser Controlled Power
Booth: 818
877 Walker Road,
Windsor, Ont. N8Y 2N4
(519) 256-8254

Exhibiting: This booth will feature power systems for computers. The display will include the series 500 power line regulator for use where line voltage varies above and below nominal levels and requires automatic correction. Also included is the Series 600 ultra-isolation transformer which provides low capacitive coupling between input and output circuits. It is used to protect sensitive electronic equipment from power line noise and transients. The Series 800 power purification system is a resonant regulation and isolation transformer and the Series 900 electronic line voltage regulator is designed for regulating line voltage within a very narrow regulation band. The Series 7000 purified power distribution center is for efficient distribution of power in a computer room.

Personnel: John Mollon, Henry Tazzia.

Reader Service Card Number 71

Dynamedia Computer Products Ltd.
Booth: 926, 928
5000 Buchan St., Suite 304,
Montreal, Que. H3C 2M8
(514) 739-3183

Exhibiting: A wide range of data processing and word processing products, including the Verbatim line of diskettes, cassettes, and data cartridges. Also on display will be the Monarch line of multimedia storage cabinets, workstations, terminal and printer stands, tape racks, binder and document storage cabinets, tape and disc carrying cases.

Other products include magnetic computer tape, disc packs, disc cartridges, printer ribbons, acoustic covers, labels, diskette storage, stock tab and anti-static mats, as well as the CPS computer power distribution system.

Personnel: Harvey Beitchman, Gabriel Simovitch, Louis Vachon, A. Santini, Syd Bernstein.

Reader Service Card Number 72

Electralert Ltd.
Booth: 801
160 Gibson Dr., Unit 6,
Markham, Ont. L3R 3K1
(416) 495-6730

Exhibiting: Color raster graphics, generation, and hard-copy, disc drives for floppies; 5-, 8-, and 14-inch Winchesters; removable-platter drives up to 600 megabytes; CRTs and printers.

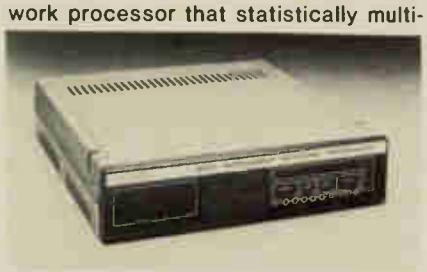
Personnel: Ken Oag, Don Dale, Joyce Oag, Oscar Thomas, Dave Hucksford.

Reader Service Card Number 73

ESE Ltd.
Booth: 209
1780 Albion Rd.
Rexdale, Ont. M9V 1C1
(416) 749-2271

Exhibiting: Modems, multiplexers, network support products, diagnostic equipment and intelligent network processors.

New products shown for the first time: the Codex 6001 intelligent network processor that statistically multi-



plexes data for clusters of up to 8 asynchronous terminals; Universal Data Systems line-powered modems, new auto-answer models; and the Codex LC 3600 loop controller, which allows Codex modems and multiplexers to interface with the IBM 3600 financial communications system.

Personnel: R.C. Willcocks, George Grumbles, Charles Murphy, Joe Farquhar, Sharron Elliott

Reader Service Card Number 74

OUR SMART TERMINAL IS ONE TOUGH COMPETITOR.

It's not easy buying a terminal today. There's a lot of names to choose from. So consider the facts, then make your decision.

THE AMPEX DIALOGUE 80™ TAKES THE COMPETITION ON.

The Dialogue 80 is one tough competitor. Comparing our interactive, desk-top editing terminal to most other terminals costing hundreds of dollars more is very revealing.

For instance, most do not offer a detached keyboard. We do! Most do not offer a self test. We do!

And most do not offer a status line. Ours comes with a continuous display of current operating modes, functions, error/fault conditions and more!

The list continues with third and fourth memory pages. We have it! Most of the others do not.

And truly programmable function keys? Once again, we have it. Most of the others do not.

For hundreds of dollars less, the Dialogue 80 gives you a host of standard features the others do not. When you take a closer look, the Dialogue 80 is the smart terminal buy!

ENGINEERED FOR TODAY.

With everything the Dialogue 80 has going for it, you'd expect it to be designed for today's needs. And it is. With a long list of "friendly" features that make operation easy and comfortable.

That means machine and man interact successfully. And it also means the Dialogue 80 contributes to a productive environment.

CALL US TODAY. WE HAVE THE ANSWERS.

We're confident we have the right terminal. From our Dialogue 80 to our Dialogue 30, one of the best priced terminals on the market today.

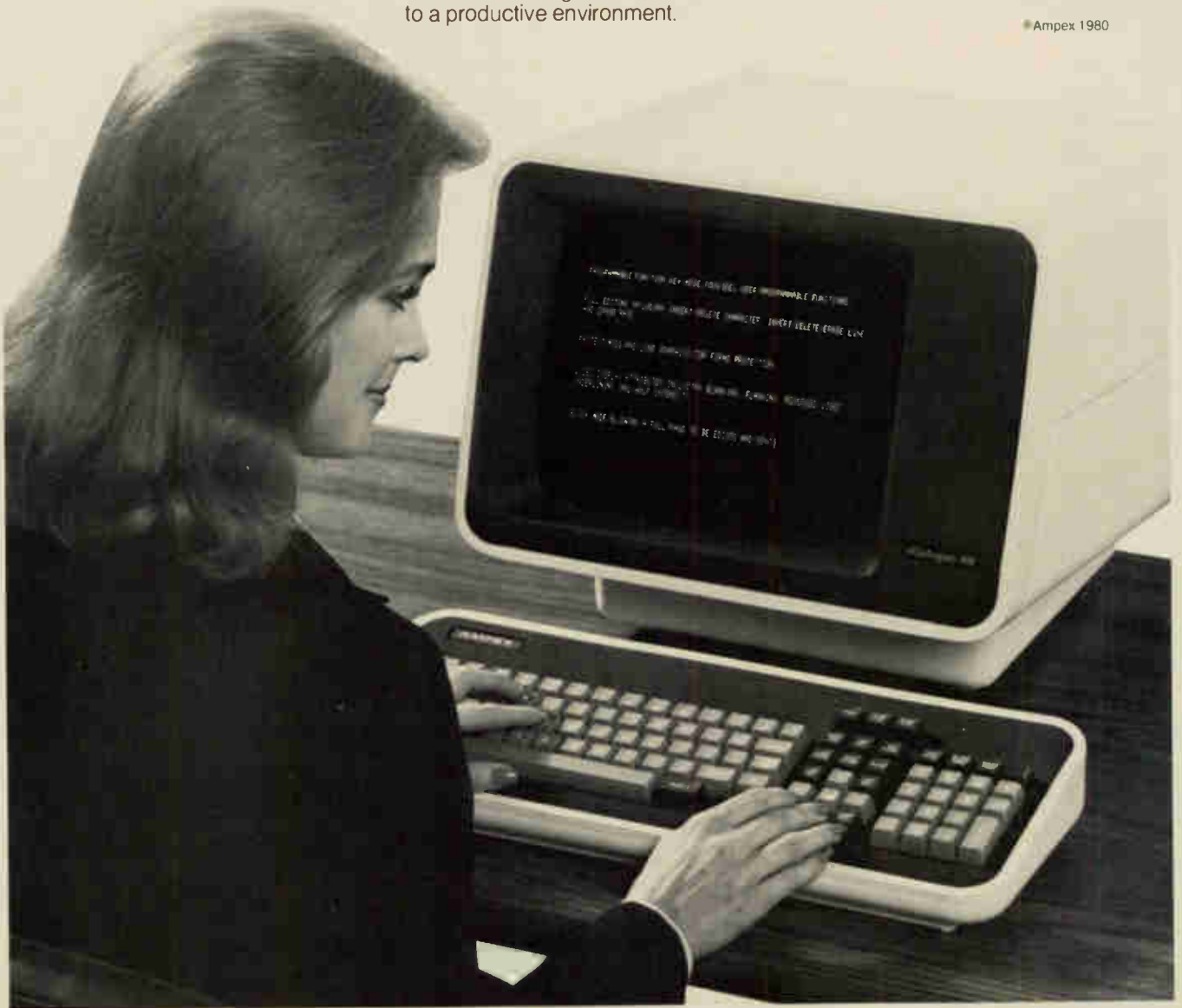
So, if you still have questions on which is the best terminal buy, call us. Ampex has the answers with the Dialogue 80 designed and priced for the OEM and systems house.

AMPEX CANADA INC.
132 East Drive, Bramalea,
Ontario, L6T 3T9
(416) 791-3100

AMPEX

MAKES THE DIFFERENCE.

*Ampex 1980



Ottawa: (613) 225-5358 Montreal: (514) 636-4840 Calgary: (403) 275-3444 Vancouver: (604) 525-2846

Reader Service Card Number 114

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We are pleased to announce that we have been appointed a Texas Instruments national distributor for their fine line of terminals. That's a big plus for us. It's a big plus for TI. And it's a big plus for you because it means a continuation of our commitment . . . we deliver the best every time. The best in word and data processing hardware, software and related services — the best in data communications systems, and now the best in terminals.

MLPI can deliver Texas Instruments' Silent 700's, Omni 800's and Opti 900's — nothing but the best. Look for the plus from MLPI.

MLPI + TI = the best.

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- Cesco Electronics Ltd. 416/661-0220
- Data Terminal Mart 416/245-4780
- Hamilton Rentals 416/251-1166
- Lesasmetric 416/676-1897
- MLPI 416/494-3600

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- MLPI 514/337-6040

Quebec
- Cesco Electronics Ltd. 418/687-4231

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- MLPI 403/451-3314

BRITISH COLUMBIA

Vancouver
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- MLPI 604/682-7541

TEXAS INSTRUMENTS INCORPORATED

Reader Service Card Number 176

Sales Assistants.

Sales Managers are sold on TI's Portable Data Terminals.

When it comes to reducing costs and improving sales productivity, TI's Portable Data Terminals can help fill the quotas. That's because TI's *Silent 700** Models 745, 765, 785 and 787 Portable Data Terminals are designed to help salesmen work smarter, not harder.

TI's family of portables are ideal for on-site sales demonstrations. Using the Model 745, 765 or 785's built-in acoustic coupler or the 787's direct-connect internal modem connected to a standard telephone line, salesmen can access information on the spot for more professional and innovative presentations. They can show their product selection, provide pricing information, analyze cost of ownership and even give competitive overviews. And virtually silent thermal printing at 30 or 120 characters-per-second keeps things quiet while closing the sale quickly.

For entering orders instantly, these lightweight traveling companions put the needed information close at hand. For instance, part number information can be entered into the host computer and within seconds salesmen can receive hardcopy printouts of inventory status. When salesmen use the 765 with its built-in nonvolatile bubble memory, order entry information can be retained for future reference even after the power is turned off. These compact portables can also double as electronic mail carriers to increase communications and response times between the sales force and the home office.

By using TI's Portable Data Terminals, sales managers across the country have found they can increase sales productivity levels and customer service, reduce order processing costs and improve turnaround time. That's why TI's reliable portables are the lightweight solution for all your sales application needs. TI is dedicated to producing quality, innovative products like the *Silent 700* Portable Data Terminals. And TI's hundreds of thousands of data terminals shipped worldwide are backed by the technology and reliability that come from 50 years of experience.

Supporting TI's data terminals is the technical expertise of our factory-trained sales and service representatives, and TI-CARE†, our nationwide automated service dispatching and field service management information system.

For more information on how TI's Family of Portable Data Terminals could improve your sales productivity, contact the TI sales office nearest you: Richmond Hill, Ontario, (416) 884-9181; Richmond, B.C. (604) 278-4871; or Ville Saint-Laurent, P.Q. (514) 334-3511.

We put computing within everyone's reach.

TEXAS INSTRUMENTS
INCORPORATED

Reader Service Card Number 189

SALON DE L'ORDINATEUR

Electronetic Systems Ltd.
Booth: 241

62 Alness Street,
Downsview, Ont. M3J 2H1
(416) 661-3673

Exhibiting: Advanced statistical multiplexers with network monitoring and test features; high-speed selectable rate multichannel modems; data encryption devices; IBM environment computer/peripheral switches; asynchronous keyboard stored auto dial modems; 3270 BSC/SDLC network analyzer; compact data line monitor with diskette mass storage unit; compact dot matrix and high speed/graphics printers; fibre optic modems and multiplexers.

Personnel: Harvey L. Pollock, Robert F. Cripps, Larry Tannenbaum, Don J. Lee.

Reader Service Card Number 75

Epic Data Sales
Booth: 900

7280 River Rd.,
Richmond, B.C.
V6X 1X5
(604) 273-9146

Exhibiting: Micro-processor-based data collection systems including controllers, data entry terminals and associated peripheral devices. The terminals accept data from punched badge, punched card, magnetic stripe, bar-code and keyboard and use both LEDs and a 32-character alphanumeric display for promoting. The controllers poll terminals, edit and assemble transactions and output them to peripheral devices such as cassettes, mag tapes or disc drives.

Alternatively, data may be output on-line interactively to a host computer in a variety of asynchronous or synchronous formats. Due to its micro-processor-based software, Epic has interfaced successfully with most major main frame manufacturers.

Personnel: Jan Genders, Barry Dalziel

Reader Service Card Number 76

Futur Byte Inc.
Booth: 601, 603

1189 Pl. Phillips
Montreal, Que. H3B 3C9
(514) 861-4741

Exhibiting: Commodore vic 20 personal microcomputer and commodore full microcomputer system for the small company.

Personnel: P.H. Faure, J. Bron

Reader Service Card Number 77

Extra Ordinateur Inc.
Booth: 425

55 Boulevard Montpelier
St-Laurent, Que.
H4N 2G3
(514) 748-6197

Reader Service Card Number 78

Facit Canada Inc.
Booth: 705-706.

161 Norfinch Dr.
Downsview, Ont. M3N 1Y3
(416) 663-8360

Exhibiting: A full line of matrix printers including the new 4542 graphics version of the 4540 along with the Dataroyal IPS 7000 and 5000 label, bar code and text printers. The new low cost Facit 4520 matrix printer with self contained paper roll will also be on exhibit. The DEI (Data Electronics Inc.) magnetic tape cartridge drives for Winchester disc back-up, Facit magnetic tape cassette units and its line of paper tape readers and punches are also on view.

Personnel: Don Berger, Wayne Holstenson, Ron Gostick, Liz Stockdale, George Bouchard

Reader Service Card Number 79

Florida Dept. of Commerce
Booth: 814

Bureau of International Trade & Dev.
107 West Gaines St.
The Collins Building
Room G-26
Tallahassee, Fla. 32301
(904) 488-9553

Reader Service Card Number 80

Floating Point Systems
Booth: 819

P O Box 23489
Portland, Ore. 97223
(503) 620-9350

Reader Service Card Number 81

Gandalf Data Communications Ltd.
Booth: 221-225

Gandalf Plaza
9 Slack Rd.
Ottawa, Ont. K2G 0B7
(613) 225-0565

Exhibiting: PACX IV, TTS 400c and the GLM 504. PACX IV is a microprocessor-controlled Private Automatic Computer exchange system designed to automatically connect a number of terminals having service requirements to a number of computer ports capable of supporting these requirements.

Gandalf's new TTS 400C combines a data generator and receiver/error detector in a rugged lightweight test set capable of operating in both synchronous and asynchronous modes. Configured as DTE, the unit provides the test functions most often required during installation or trouble-shooting of modems, multiplexors and other data communications equipment.

The GLM504, synchronous time-division multiplexor, permits up to four channels of synchronous data to share a common transmission facility. Individual channel speeds are switch selectable fractions of the composite link rate.

Personnel: Gilles St. Hilaire, Francois Tessier, George Arkeveld, Karen Doyle, Wade Frembd

Reader Service Card Number 82

Gentian Electronics Ltd.
Booth: 806

Box 1240,
Stittsville, Ont. K0A 3G0
(613) 836-3987

Exhibiting: Hi-State Precision Coordinate Digitizer: high precision—Bonded grid; high resolution—.001" high accuracy to —±.003"; high stability—No moving parts; high speed—to 100 points/sec.; high-intensity backlighting.

Standard features include microprocessor versatility; full alphanumeric keyboard; X-Y display; RS232C output; point and stream digitizing modes; single-button cursor; Axis presets; Scaling; ±.005" accuracy; Fixed format; Floating origin

Personnel: Victor D. Popovich

Reader Service Card Number 83

G.E.O. Inc
Booth: 627 & 629

2810 De Miniac
St. Laurent, Que.
H4S 1K9
(514) 337-7721

Reader Service Card Number 34

Graphic Controls Canada
Booth: 320

Herbert St.
Gananoque, Ont. K7G 2Y7
(613) 382-4733

Exhibiting: Data recording products for printer/plotters, computer terminals, and other non-impact printers. These include: electrostatic paper and toners to fit Gould, Varian, and Versatec printer/plotters; thermal-sensitive papers for computer terminals, data loggers, mini-computers and other non-impact printers; paper to fit Calcomp, Houston, and Zeta plotters; and plotter pens to fit Tektronix, Hewlett-Packard, and Wang Tabletop plotters.

Personnel: Cam Allan, Robert Faguy

Reader Service Card Number 85

Volker-Craig.

Data Terminals for today and the future.

Volker-Craig terminals have established a reputation around the world for value and reliability.

Each is the product of years of thorough research, technological innovation and careful study of user needs. Volker-Craig terminals are ready to meet your most demanding requirements today — and as your needs change, in the years ahead.

From the economical VC404, to the first of our new generation of display terminals, the VC2100, there's a Volker-Craig terminal to suit virtually every application. For APL users there's the VC415APL. For applications where buffered line editing and split screen capabilities are necessary, there's the VC410.

And where VT52 or Hazeltine emulation is required there's the VC4152 and the VC414H.

To find out more about our complete line of terminals and computer peripherals, call or write today.

volker-craig limited

266 Marsland Drive, Waterloo, Ontario N2J 3Z1
Tel: (519) 884-9300 Toronto: (416) 456-2070
Telex: 069 55327

Offices: Volker-Craig Inc., U.S.A. (716) 473-1221, Volker-Craig (UK) Limited, England 09277-71378. Distributors in: Austria, Australia, Belgium, Canada, Denmark, England, Finland, France, Germany, Greece, Hong Kong, Ireland, Israel, Italy, Japan, Korea, Mexico, The Netherlands, New Zealand, Norway, Singapore, Spain, Sweden, Switzerland, U.S.A., Taiwan.

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In a recent DATAMATION software survey conducted by Data Decisions and Beta Research, 2,373 users rated more than 100 software packages.

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These discerning users judged our features-vs-cost comparable or better than other General Ledgers. That doesn't surprise us, because we've sold more General Ledger packages than any other vendor. Our existing customers continue to order and install Software International's other outstanding financial and manufacturing packages in record numbers. That's because they need the performance only we can deliver.

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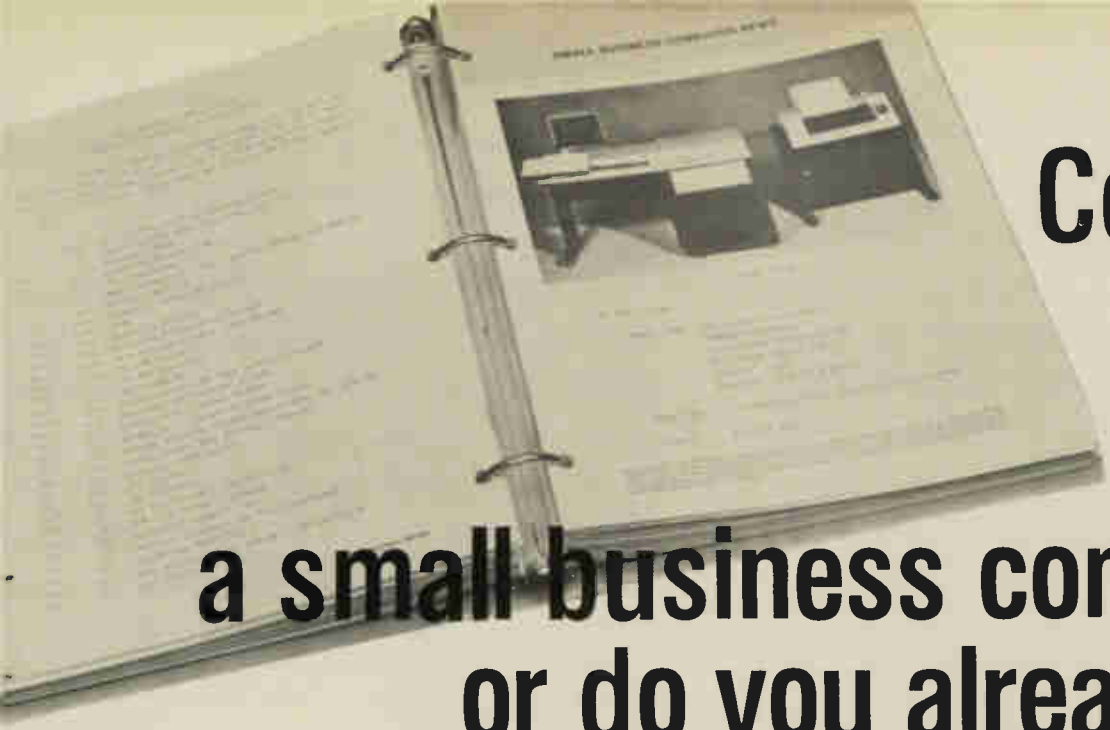

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Selecting a small business computer from among the hundreds available is no simple task. Buyers must weigh cost, reliability, performance, capacity, upgradability, and a host of other factors in order to decide what system is most appropriate for their business. **Small Business Computer News,** an MIC monthly subscription service, can provide you with objective evaluations of micro- and mini-computer systems.

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Title _____

Company _____

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City _____ Province _____

Postal Code _____ Telephone (_____) _____

Signature _____

Reader Service Card Number 140

Hamilton Avnet Electronics
Booth: 626
3688 Nashua Dr.
Mississauga, Ont.
L4V 1M5
(416) 677-7432
Reader Service Card Number 86

Hewlett-Packard (Canada)
Booth: 107
6877 Goreway Drive
Mississauga, Ont. L4V 1M8
(416) 678-9430
Exhibiting: Hewlett-Packard computers, terminals and peripherals for commercial and technical applications. Featuring: HP 250, and HP 9845C desktop computer with colorgraphics capability, and the HP85.
Personnel: Phil Wajs, Raymond Gauvin, Jean-Marc Bilodeau, Harley MacCaull, Gilles Bruneau, Bernard Tessier, Francois Angrignon, Fernand Lemay, Jackie Sharp
Reader Service Card Number 87

Hill Security Van Lines
Booth: 417
40 Ridgetop Rd.
Scarborough, Ont.
M1R 4G3
(416) 291-5565
Reader Service Card Number 88

IBM Canada Ltd.
Booth: 129
General Business Group
101 Valleybrook Dr.
Don Mills, Ont
M3B 3H1
(416) 443-6602
Reader Service Card Number 89

ICL Inc.
Booth: 311
415 East Airport Freeway
Irving, Texas 75062
(214) 258-8525
Reader Service Card Number 90

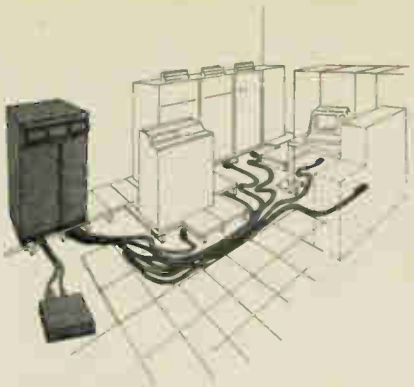
Informatique Et Bureautique
Booth: 330
7045 av. du Parc
Suite # 100
Montreal, Que.
H3N 1X7
(514) 276-4211
Reader Service Card Number 91

International Information/Word Processing Assn.
Booth: 636
P.O. Box 1439
Place Bonaventure,
Montreal, Que. H5A 1H4
(514) 845-1008
Exhibiting: IWP's purpose is to develop and disseminate information/word processing ideas, methods and techniques and to enhance the recognition and professional status of those engaged in the fields.

IWP currently has more than 13,000 members, and the association is growing rapidly. Over 85 chapters are located in the United States, Canada, England, Australia and Germany. IWP membership is restricted to those people actively involved in information processing management, consulting, education, research and marketing.
Personnel: Board of directors of the Montreal chapter.
Reader Service Card Number 92

Infobox Microsystems Ltee.
Booth: 336
11000 Rue St. Denis
Montreal, Que.
H3L 2J9
(514) 388-0620
Reader Service Card Number 93

Jo-Ad Industries Ltd.
Booth: 326
76 Hymus Blvd.
Pointe Claire, Que. H9R 1E3
(514) 695-0660
Exhibiting: "Precision Power Center", a new concept for supplying, conditioning, monitoring and distributing electric power. The self-contained "PPC" eliminates the requirement of on site instal-



lation of transformers, circuit-breakers, cables, shunt relays, etc.

Available in sizes from 15 KVA to 225 KVA, a "PPC" can be moved should it be necessary to relocate the computer.

Personnel: J.B. McCann, J.A.M. Boulet, B.C. Neill, R. Lefebvre, M. Carrière, B. McKinnon, J.W. Bentley

Reader Service Card Number 94

Kodak Canada Inc.
Booth: 807, 808, 809

2 Place du Commerce
Ile des Soeurs,
Montreal, P.Q. H3E 1A1
(514) 761-3481

Exhibiting: Kodak IMT 150 microimage terminal; Kodak Oracle microimage terminal; Kodak Reliant 750 microfilmer.

Personnel: Marc Arsenault, Perry Safford, Serge Panneton

Reader Service Card Number 95

J.L. Ordinateur-Minicom
Booth: 534, 536

133 St. Germain Ru O.
Rimouski, Que.
G5L 4B6
(418) 724-6800

Reader Service Card Number 96

Les Publications Informatique Quebec
Booth: 136

254 Avenue Bloomfield
Outremont, Que.
H2V 3R4
(514) 270-5481

Reader Service Card Number 97

Les Systems Microp Ltee.
Booth: 803

700 O. Cremazie
3 Etage
Montreal, Que.
H3N 1A1
(514) 273-1551

Reader Service Card Number 98

Leasametric Canada Inc.
Booth: 332

7040 Torbram Rd.
Unit # 17
Mississauga, Ont.
L4T 3Z4
(416) 676-1897

Reader Service Card Number 99

SALON DE L'ORDINATEUR

Lanpar Ltd.
Booth: 207

5690 Royalmount Ave.
Town of Mount Royal
Qué. H4P 1K4
(514) 482-4773

Exhibiting: The GDC212A modem; DECwriter III LA-120 (capacity 120-180 cps), in environments such as DEC, HP, Data General, Basic IV, MAI and many others; The XT series CRTs: the XT-100 (VT-100 emulator), XT-80 (ideal for OEM's), the XT-50 (Hazeltine 1410 and ADM3A emulator).

Demonstration of the VT-100 DECscope printer port which will be attached to the DECwriter III LA-120 equipped with the 4K expanded memory to allow data exchange at a speed of 9600 bps.

Personnel: Rene Pardo, Rene Auger, Alex Delisle, Julien Maziade, Réjean Guilbeault, Pierre Giguère, Jean-Claude Carufel

Reader Service Card Number 100

SALON DE L'ORDINATEUR

Lumacell Inc.
Booth: 821
4460 Joseph Dubreuil Ru
Lachine, Que
H8T 3C4
(514) 636-6140
Reader Service Card Number 201

Louis Albert Associates
Booth: 711
Box 8526, 2264 Sevenage Dr.,
Ottawa, Ont.
K1G 3H9
(613) 737-5941
Exhibiting: Async, Sync limited distance data sets; 2C2, 212 compatible modems, line-powered C3-2C2 modems, subscriber-oriented data switching systems; data network management tech control systems; intelligent data communication system monitor and simulator; statistical multiplexers, Burroughs interface box; cassette recorders, intelligent floppy disc systems; and EIA cables switches and custom assemblies.
Personnel: Louis Albert, Mike Sabourin, Mark Albert, Robert Boivin, Marc Aubin, Jean Depelteau, Amil Choronobrywy.
Reader Service Card Number 202

Memorex Canada Ltd.
Booth: 810, 811
230 Lesmill Rd.
Don Mills,
M3B 2T5
(416) 449-9940
Exhibiting: The 2078 family of communications products, including the 2078 Display Station, 2076 Remote Cluster Controller and the recently introduced 2087 Matrix Screen Printer.

Also on display will be Memorex media products.
Personnel: Maurice Jolicoeur, Gilles Sanscartier, Jean Lortie, Lynda Laviolette, Bruce Grimble, Larry Boucher.
Reader Service Card Number 203

Megatronix Ltd.
Booth: 427, 431
100 Penn Drive,
Weston, Ont. M9L 2A9
(416) 742-8015
Exhibiting: Megatronix Limited will exhibit computer-based equipment for data acquisition, graphics equipment including a range of digital plotters, digitizers, graphics display terminals, and color graphics cameras. Data communications test equipment will include line analyzers, data analyzers and simulators, and data monitors, and cable fault locators.
Personnel: Daniel Antz, Bill Kingsbury, Alan Rosenthal, Doug Aitken
Reader Service Card Number 204

Memotec—a division of International Systcans
Booth: 904, 906
4940 Fisher St.
Montreal, Que.
(514) 738-4781
Exhibiting: The asynchronous MPAC-2000 and the synchronous MPAC-4000 packet-switching network interface devices are certified for use on North American Telenet, Tymnet, Datapac, and European Euronet, French Transpac, German datex-p, British PSS networks and are scheduled for use on the Japanese network. They offer transcontinental and intercontinental data transmission at network access speeds from 1200 to 9600 B.P.S. supporting up to 16 devices.
Personnel: Dan Gresox, Gord Fincham
Reader Service Card Number 205

McCormack & Dodge Corp.
Booth: 716
560 Hillside Ave.
Needham Heights, Mass 02194
(617) 449-4012
Reader Service Card Number 206

Micom Co.
Booth: 321
5250 Ferrier
Montreal, Que
H4P 1L4
(514) 341-5680 ext 212
Reader Service Card Number 207

MICOS Computer Systems,
Booth: 139
1, Place du Commerce,
Suite 400
Ile Des Soeurs, Qué. H3E 1A2
(514) 769-9618
Exhibiting: MICOS and its network of distributors have installed and currently support over 300 MICOS systems. A wide selection of turnkey and packaged application software is available in areas such as: word processing, hotel and restaurant accounting, automotive parts retailing, property management, municipal accounting, etc.

The MICOS booth will feature à medium-sized configuration with multiple screens, printers, and 32-MB drives.
Personnel: Jean-Jacques Belliard
Reader Service Card Number 208

Ministere De L'Expansion Economique Regionale
Booth: 540
800 Place Victoria
Suite #4328
C.P. #247
Montreal, Que.
H4Z 1E8
(514) 283-6668
Reader Service Card Number 209

NCR Canada Ltd.
Booth: 511, 514, 516
6865 Century Ave.
Mississauga, Ont.
L5N 2E2
(416) 826-9000
Reader Service Card Number 210

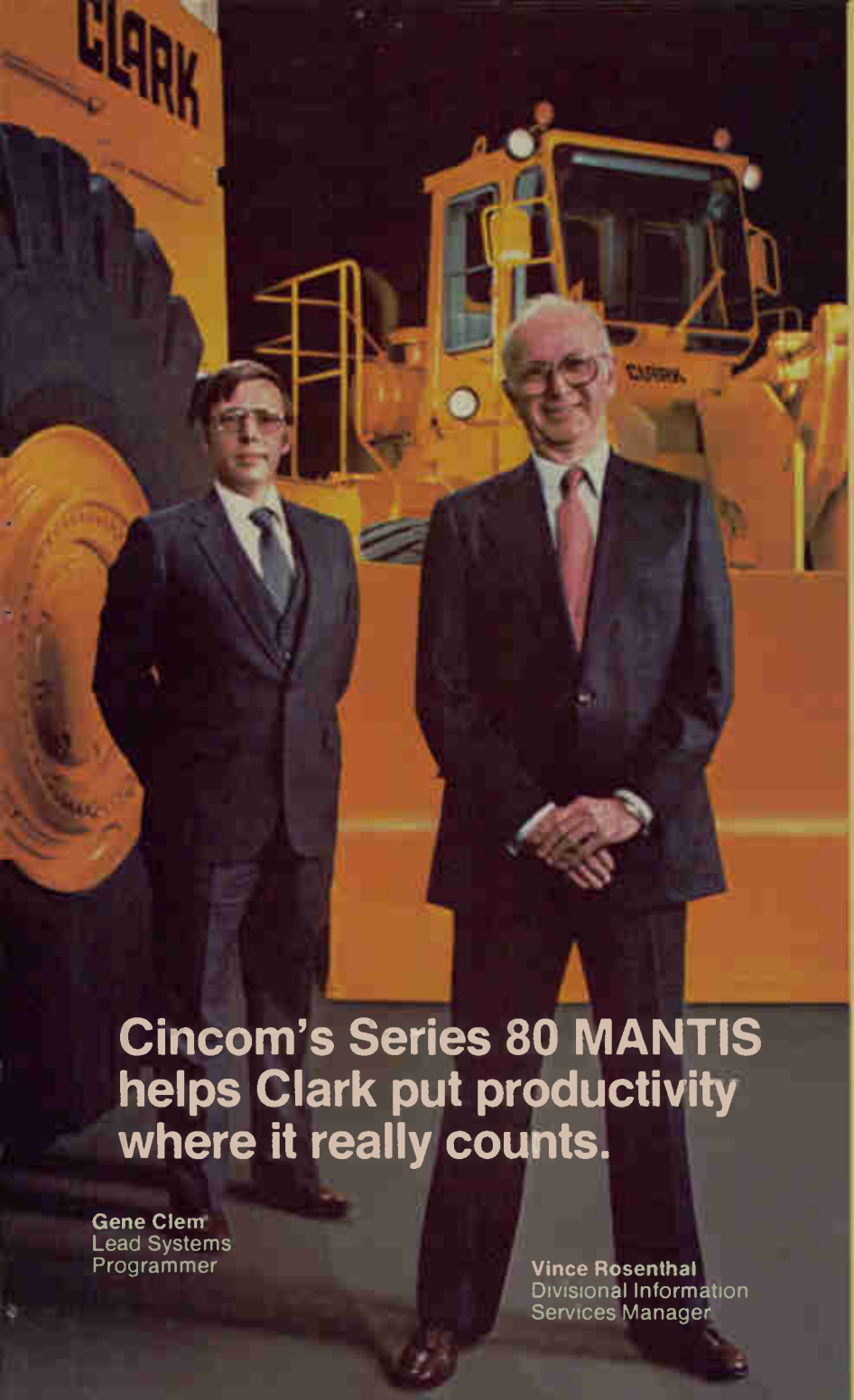
Northern Telecom
Booth: 921, 923, 925, 1020, 1022, 1024
Department # 1078
304 The East Mall
Islington, Ont.
M9B 6E4
(416) 232-2000
Reader Service Card Number 211

Norris Computer Systems
Booth: 817
Thorncliffe Market Place
45 Overlea Blvd.
Suite #5
Toronto, Ont.
M4H 1C3
(416) 421-6718
Reader Service Card Number 212

Olivetti Canada Ltd.
Booth: 929, 931, 933, 1028, 1030, 1032
1390 Don Mills Rd.
Don Mills, Ont.
M3B 2X3
(416) 447-3351
Reader Service Card Number 213

Prime Computer of Canada
Booth: 639, 641, 938, 940
130 Skyway Ave.
Rexdale, Ont.
M9W 4Y9
(416) 675-7870
Reader Service Card Number 214

Plessey Peripheral Systems
Booth: 815
6291 Dorman Rd.
Unit 20A, Mississauga, Ont.
L4V 1H2
(416) 677-5410
Exhibiting: A full range of DEC-compatible add-on memory and communication adapters, and various peripheral devices such as the PT100.
Personnel: M. A. Conlin, Ron Avery, Ron Pizante.
Reader Service Card Number 215



Cincom's Series 80 MANTIS helps Clark put productivity where it really counts.

Gene Clem
Lead Systems Programmer

Vince Rosenthal
Divisional Information Services Manager

Clark Equipment Company is a diversified, worldwide producer of construction machinery, material handling equipment, axles and transmissions.

Series 80 MANTIS offers application development facilities unmatched by any other system.

- Integrated directory
- Full DOS/OS Compatibility
- High level procedural language
- Conversational debugging
- Runs under CICS or ENVIRON/1
- Menu driven
- On-line documentation
- Oriented to both DP *and* end users
- Dynamic file generation
- Logical view access to files

50 sophisticated on-line applications developed in just nine months.

The Construction Machinery Division of Clark Equipment Company has used Series 80 MANTIS, the most advanced application development system, to put productivity where it really counts—at the bottom line.

"In our first four years of on-line processing we built only 150 applications. But, more and more, our ability to build new on-line applications to meet increasing demand was diminished by the never-ending requirement to maintain existing systems.

"After installing Series 80 MANTIS, our ability to build applications increased 180%, resulting in 50 new applications in nine short months. Today, we're not only keeping pace with demand, but seeking new cost saving on-line applications to build for the future. For any corporation, this is where data processing can improve productivity."

Series 80 MANTIS is Cincom's dramatic breakthrough in application development technology. Only MANTIS provides complete beginning-to-end on-line application development, without the need for batch processes.

For many companies like Clark Equipment, application backlogs are becoming a thing of the past. Programmer morale is up. End-users are happier. And most important, data processing productivity is helping the corporation where it counts most—at the bottom line.

MANTIS is an integral component of Cincom's Series 80 family of data base/data communications products. To see how MANTIS can help improve your productivity, contact our Marketing Services Dept. for a demonstration. At your site or at a Cincom Service Center.

User Information Hotline:
416-279-4220.

Visit us at Booth #128, Montreal International Computer Show.

Cincom Systems of Canada, Ltd.
130 Dundas Street, East Suite 201
Mississauga, Ontario L5A 3V8

Centronics

DATA PRODUCTS

Heuristics Inc.
Lear Siegler Inc.

N.E.C.
Memorex

digital

A Printer for Every Application

700 Series
The popular 700 Series offers printing speeds from 60 CPS to 150 CPS, most with bi-directional logic seeking capabilities. 701 with 9 x 7 Dot matrix, 702, 703, 704 with 9 x 9 Dot matrix full 96 character ASCII set. Models available with standard Centronics parallel interface or RS232C.

730 Dot Matrix Printer
730, 100CPS, 7 x 7 Dot matrix 80 column printer with standard capabilities of printing 132 columns at 16.7 CPI. Available with Centronics parallel or RS232C interface.

737 Dot Matrix Printer
737, 80CPS, N x 9 Dot matrix in proportional spacing mode, 3 paper handling systems, full 96 character ASCII set complete with Centronics parallel interface.

6081 Line Printer
6081 pedestal mounted band line printer. It offers field upgradability from 300 to 600 LPM with 100% parts commonality in full 132 column format using a mobius loop cartridge ribbon. The 6081 has the operator controls and options that are right for your application.
6080 has the same features as the 6081 and is also accoustically enclosed providing printing speeds up to 600 LPM at only 60dba.

LEAR SIEGLER INC
DATA PRODUCTS DIVISION

A WESTBURNE COMPANY

HALIFAX
30 SIMMONDS DR. UNIT B
DARTMOUTH, N.S.
B3B 1R3
(902) 463-8411

WATERLOO
564/10 WEBER ST. N.
WATERLOO, ONTARIO
N2L 5C6
(519) 884-5700

CALGARY
3651 21st STREET N.E.
CALGARY, ALBERTA
T2E 6T5
(403) 230-1422

EDMONTON
9224 27th AVENUE
EDMONTON, ALBERTA
T6N 1B2
(403) 463-3014

OTTAWA
141 CATHERINE ST.
OTTAWA, ONTARIO
K2P 1C3
(613) 238-6411

GROUP . . .

Teletype Corp.
Centronics
Digital

zentronics

Where Standards Demand Quality

LA34 Family
LA34 family of receive only & KSR printers are members of the DECwriter IV 300 baud family. Their forms and paper handling flexibility combined with a true 30 CPS throughput and the well known DECwriter reliability make the LA34 printers ideal for a wide range of communication and computer console applications.

LA120 Family
LA120 family of receive only & KSR printers provide exceptional performance in high speed communication environments. The LA120 is a 1200 Baud bi-directional printer with improved operator convenience, reliability that you have been accustomed to with the Digital product line, not to mention the available options that make the LA120 the right printer for your 1200 Baud applications.

VT100
VT100 Digital's high performance video display terminal provides maximum video display flexibility and portability. Operator oriented features on the VT100 include double width/double size characters, 80 and 132 column lines, a detachable keyboard, smooth scrolling, a split screen and composite video output allows users to customize the video terminal to suit specific application needs.

VT132
VT132 Digital's high performance buffered video display terminal, offers for the first time Digital's proven VT100 functionality to block-mode applications. The VT132 is the extension of VT100 functionality into the smart, local editing terminal class. It is designed to fill the requirements of the block-mode environment by including local editing, protected fields, and protected field/space suppression in addition to all of the VT100 functions. It is human engineered to allow fast data entry, local data correction, and clean data transmission to the host.

Where Reliability is a Tradition

ADM3A
ADM3A, the ever popular "Dumb" terminal with a 14 month MTBF, direct cursor addressing, 11 selectable baud rates up to and including 19,200, complete with RS232C and 20Ma current loop interfaces.

ADM3AG
ADM3AG, with all the features of the ADM3A, including Tektronix® PLOT 10,® 4010 Software compatible, operates in point Vector, 4010 alpha or ADM3A alpha modes with a 512 x 250 plotting resolution, selective erase and displayable graphics Memory.

ADM5
ADM5, the newest addition to our CRT family features the reliability that you have been accustomed to with the ADM3A, with these added extras, 3 visual attributes, numeric keypad, upper & lower case, true 2 dot descenders, & gated printer port.

ADM31
ADM31, the intermediate terminal, with 2 pages of memory, full editing capabilities, visual attributes include protected fields, reverse video, half intensity, blink, underline with blank, tabbing and many more. The ADM31 has a personality that allows customer or Zentronics' application Engineering to modify CRT operation to customer specialized applications.

See us at the Montreal Show Booth 441

A WESTBURNE COMPANY

MONTREAL
5010 RUE PARE
MONTREAL, QUÉBEC
H4P 1P3
(514) 735-5361 TELEX 05-827535

TORONTO
1355 MEYERSIDE DR.
MISSISSAUGA, ONTARIO
L5T 1C9
(416) 676-9000 TELEX 06-983657

VANCOUVER
550 CAMBIE ST
VANCOUVER, B C.
V6B 2N7
(604) 688-2533 TELEX 04-507789

WINNIPEG
590 BERRY ST
WINNIPEG, MANITOBA
R3H 0S1
(204) 775-8661

Reader Service Card Number 194

SALON DE L'ORDINATEUR

Paradyne Canada Ltd.
Booth: 615, 617, 619, 914, 916, 918

207 Place Frontenac
Pointe Claire, Que.
(514) 695-1301

Exhibiting: Modems—a full line of LSI technology and intelligent microprocessor based modems including the first 14,400 bps modem. Paradyne also offers line sharing devices and modem sharing devices to complement the modem product line.

Analysis—An automatic network management system that provides constant monitoring of the network and permits the user to initiate restorative action from the central site.

Pixnet—Combines the flexibility of an SNA network and the benefits of a "local" environment without the overhead of remote teleprocessing software in the host computer.

Response—An innovative approach to distributed data processing, adding processing power to the networking capabilities of Pixnet resulting in a truly "Coordinated Network Architecture"

Personnel: Mike Dranfield, George Lalonde, William Gibson, Rob Price, Richard MacPherson, Rob Morgan, Bob Scaff.

Reader Service Card Number 216

Revac Supply Co.
Booth: 415

1500 Sherbrooke Street W.
Montreal, Que.
H3G 1L4
(514) 935-7463

Reader Service Card Number 217

R-O-R Associates Ltd.
Booth: 231

21 Rolark Dr.
Scarborough, Ont.
M1R 2S7
(416) 291-7121

Reader Service Card Number 218

Sealed Air of Canada
Booth: 804, 805

95 Glidden Rd.,
Brampton, Ont.
L6T 2H8
(416) 496-0701

Exhibiting: Instapak, a revolutionary packaging method for achieving increased packaging economy, efficiency, and speed.

Basically, Instapaking is a remarkably unique procedure for packaging many commodities in reusable, semi-rigid, or rigid polyurethane foam. The process has been successfully utilized with such diverse items as industrial components, art objects, communications devices, and electronic assemblies.

Personnel: Steve Mallett, Norm O'Brien, Serge Brady, Allain Bourelle.

Reader Service Card Number 219

S.A.I. Inc.
Booth: 217, 219

1198 de la Montagne
Montreal, Que.
H3G 1Z1

Reader Service Card Number 220

SDI Systems Informatique

Booth: 712, 713

12 Edison
C.P. 1149, Place Bonaventure
Montreal, Que.
H5A 1G5
(514) 875-0570

Reader Service Card Number 221

Sogecom Inc.
Booth: 213, 215

4480 Cote de Liesse
Montreal, Que
H4N 2R1
(514) 735-5187

Reader Service Card Number 222

Sola Basic Ltd.
Booth: 602, 604, 606

125 East Drive
Brampton, Ont.
L6T 1B8
(416) 791-3223

Reader Service Card Number 223

Re-Gi Inc.
Booth: 530 & 532

1630-J Boul. Provencher
Brossard, Que. J4W 2V6
(514) 672-1003

Exhibiting: Data Stations: A multitude of enclosure designs & sizes; A combi-

nation of fabric, acoustical, vinyl and plexiglas panel finishes; Electrical raceways for the concealment of unsightly wires; Special ambient lighting; Space savings of up to 30%.

Personnel: M. Armand J. Amann, M. Guy Leroux

Reader Service Card Number 224

Spectra Colour Ltd.
Booth: 413

4180 de Courtrai
Room # 292
Montreal, Que.
H3S 1C3
(514) 739-2153

Reader Service Card Number 225

Spectra Electronic Services

Booth: 526

329-8th Avenue S.W.
Calgary, Alta.
T2P 1C4
(403) 264-7270

Reader Service Card Number 226

Sperry Univac
Booth: 939-941, 1038-1040

55 City Centre Dr.,
Mississauga, Ont.
L5B 1M4
(416) 270-3030

Exhibiting: System 80, an interactive computer system that includes ease-of-use and ease-of-programming features that make it ideal for people who are

non-computer experts. System 80 utilizes OS/3, the powerful operating system which supports multiprogramming, I/O spooling, automatic job scheduling, automatic main storage management and a comprehensive data management system.

Up to 18 separate microprocessors offload the central processor providing not only greater productivity, but also up-to-date reliable technology. Sperry Univac also provides application software packages for most major industry segments for use on System 80.

Reader Service Card Number 227

Syscan Electronique Ltee
Booth: 714, 715

625 President Kennedy Ave.
Suite # 400
Montreal, Que.
H3A 1K2
(514) 288-3905

Reader Service Card Number 228

Pertec's XL40 Distributed System now enables real estate people to "carry their office with them"...

says Robert White of Teelatron Corporation, Manager of Data Processing

Teelatron has achieved a remarkable improvement in the data entry work for over 30 real estate boards by installing a Pertec® XL40 Distributed System, to handle properties for sale on multiple listings. The system generates new listings and keeps them up to date.

With Pertec's XL40, the boards now enjoy quick turnaround of complete books with latest updated listings. This enables the real estate people to "carry their office with them" thus selling faster and more efficiently without constant referral back to office listings. Using the powerful multitasking and Remote On-Line (ROLS) Keystation capabilities of the XL40, Teelatron can now also offer the same interactive systems features to the Ottawa Real Estate Board, some 260 miles away, without interrupting locally active job functions.

XL40 is a product of Pertec Computer Corporation, a major international company that designs, manufactures and services computers and computer equipment.

For more information on how the XL40 can serve you, call or write Pertec Computer Corporation (Canada) Ltd., 2 Lansing Square, Willowdale, Ontario M2J 4P8 (416) 498-9540

PERTEC CANADA

Reader Service Card Number 179

SALON DE L'ORDINATEUR

Tektronix Canada Inc.
Booth: 340

50 Alliance Blvd.,
P.O. Box 6500, Barrie, Ont.
L4M 4V3
(705) 737-2700
from Toronto (416) 868-6390

Exhibiting: A selection of desktop computers, graphic terminals and peripheral products. This show will feature the new 4112, 4114 series of intelligent terminals. Other equipment on display will be the 4054, a 19" desktop with option 30 Dynamic Graphics; the 4663 Digital C-size plotter, the 4662 B-size plotter, the 4611 hard copy unit and the impressive 4027 full color graphics terminal.

Personnel: Fred O'Donnell, Aurele Theriault, Rene Bastien, Guy Dion, Bob Snell, Frank Garland, Cecil MacDonald.

Reader Service Card Number 229

Technodata Ltee
Booth: 630, 632, 634

147 Boul. Laurier
St. Basile-le-Grand, Que.
J0L 1S0
(514) 653-7834

Reader Service Card Number 230

Telxon Canada Corp. Inc.
Booth: 000

2651 John St.
Unit 1A
Markham, Ont. L3R 2W5
(416) 498-1344

Exhibiting: Portable data entry terminals for recording and transmitting via voice grade lines, orders, inventories, sales statistics and other types of data.

Telxon will display a complete family of hand held, C-MOS-technology, battery-operated devices with battery life of 40-60 hours and data retention of over one year. The terminals offer degrees of sophistication from the low cost 716 with 4-16K memory to the 718 with up to 32K, partitioning, and editing to the "Micro Computer in the Hand" 787 with complete programability and options of printers, two way communication, and 'Multiple Keyboard Program Selection'. Prices range from $500.00 to $5,000.00.

Personnel: Dwain Kinsinger, Claude Fortin, Robert Moroz

Reader Service Card Number 231

Volker-Craig Ltd.
Booth: 822, 823

266 Marsland Dr.
Waterloo, Ont.
N2J 3Z1
(519) 884-9300

Reader Service Card Number 232

3M Canada Inc.
Booth: 409

P.O. Box 5757
London, Ont. N6A 4T1
(519) 451-2500

Exhibiting: 3M will be displaying its complete line of magnetic media (diskettes, disc cartridges, computer tape, disc packs and data cartridges). 3M's new 'Scotch' 8" and 5¼" headcleaning diskettes will also be featured along with Velostat anti-static mats and several types of CRT screens including contrast, security and anti-glare.

The company will feature its new high capacity HCD-75 data cartridge drive as well as standard DCD-1 and DCD-3 cartridge drives.

Personnel: Doug Fraser, Pierre Campeau, René Lagace, Tom Tipping

Reader Service Card Number 233

Wabash Tape (Canada) Ltd.
Booth: 227

3135 Universal Dr.
Mississauga, Ont.
L4X 6C8
(416) 625-9533

Exhibiting: Wabash will exhibit its complete line of 8" and 5¼" diskettes. In addition, they will display their line of ½" computer tape in both the premium grade Quadronix 1 and super premium grade G tape.

Personnel: Burt C. Baum, Claude Pilon, Dennis Kiang, Kimberly Wilks.

Reader Service Card Number 234

Wang Canada Ltd.
Booth: Island 329

225 Duncan Mill Road,
Don Mills, Ont. M3B 3K9
Phone: (416) 449-2175

Exhibiting: The Wangwriter, the firm's newest entry in their ever-growing array of systems for increased office productivity. Introduced into the market in December 1980, this will be the first showing of this product in the Montreal area. Also displayed will be Office Information Systems, the Word Processing Systems adaptable to both small and large business applications. In the computer line, the VS family of computers with both computer and word processing capabilities, will be demonstrated.

Personnel: Bob Laurence, Wally Martin, Lorraine Zocchi, Arthur Gavard, Robert Giroux, Jean Gilby, Gisele Parent, John Vegh

Reader Service Card Number 235

Wrightline Du Canada Ltee
Booth: 524

2095 Boul. Charest 0
Suite #211
Ste. Foy, Que.
G1N 4L8
(418) 527-6845

Reader Service Card Number 236

Zentronics, (Div. Westburne Industrial Enterprises)
Booth: 441

1355 Meyerside Drive
Mississauga, Ont. L5T 1C9
(416) 676-9000

Exhibiting: Zentronics Data Products will be exhibiting the full line of Lear Seigler CRTs and printers, and announcing for the first time the ADM5 dumb terminal with smart features, and the ADM32, an intermediate CRT with a detachable keyboard. Also exhibited will be the full line of NEC letter quality

printers with various form handling options.

As a newly appointed Canadian distributor, Zentronics will exhibit the complete line of Centronics matrix printers including the famous 737 and 730 printers. Other products exhibited will be Memorex computer media, Teletype 30CPS printers, and Heuristics voice recognition interface.

Personnel: Steve Mosek, Reed Oldershaw, Ed Livingston, Angelo Teoli, Andre Beauchamp

Reader Service Card Number 237

Xerox of Canada
Booth: 812, 813

800 Place Victoria
Bureau 4700
Tour de la Bourse
C.P. 393
Montreal, Que.
H4Z 1J2
(514) 866-3944

Reader Service Card Number 238

□ The recent opening of **Develcon Electronics Ltd.** plant facilities in Saskatoon, Sask., was attended by representatives from federal, provincial, and municipal governments, as well as personnel from Altel Data, Sask. Tel, Lawrence Berkely Labs, Ca., and General Electric, Ohio. In addition to the new plant, the company has expanded with sales offices in Ottawa, Toronto, and Vancouver.

PCC 2000
Your
silent professional partner

Pertec Computer Corporation and its Authorized Dealers invite you to see how you can put this partner to work performing tasks such as Order Processing, Inventory Control, A/C Payable, A/C Receivable, Billing, Bookkeeping, General Ledger, Costing, Asset Management, pertinent to your business or Profession.

The PCC 2000 system is totally contained in one unit which includes the central processor, keyboard, memory and video display screen. Printers, hard discs, and additional memory are optionally available. The PCC 2000 requires no special air conditioning or power outlets. It runs quietly and reliably, providing years of dependable service.

Features: • 8085 CPU • 64K bytes Random Access Memory (expandable to 256 K bytes) • Four channel DMA • Vectored interrupt handling • 1.2 megabytes of floppy disc storage • Built-in CRT • Detached, typewriter-like keyboard

The PCC 2000 is a product of Pertec©, a major international company that designs, manufactures and services computers and computer equipment.

For more information on how the PCC 2000 can serve you, call or write Pertec Computer Corporation (Canada) Ltd., 2 Lansing Square, Willowdale, Ontario M2J 4P8 (416) 498-9540.

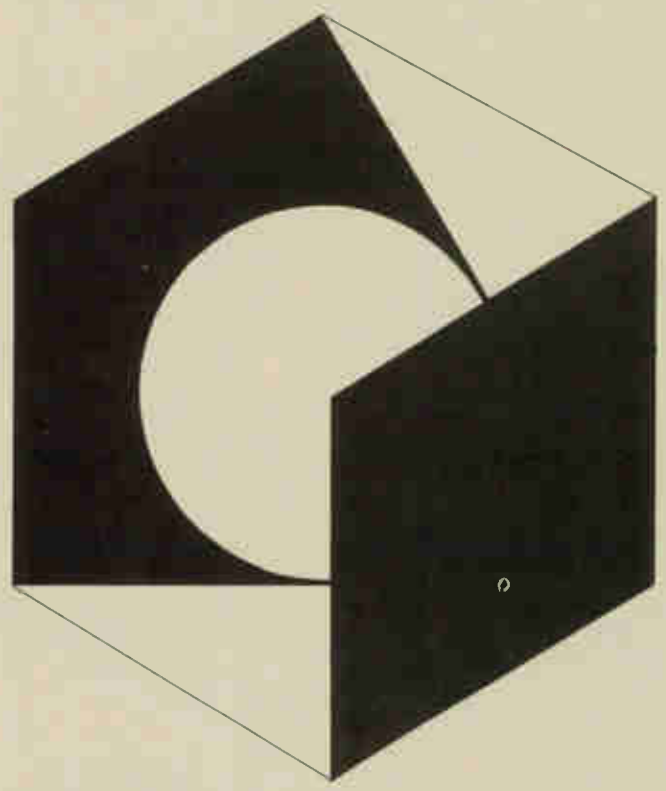
Dealer inquiries invited
Phone toll-free 1-800-268-3101

PERTEC
CANADA

Built and backed by Pertec Computer Corporation, one of the world's leading producers of computer peripheral equipment and distributed processing and data entry systems

Reader Service Card Number 180

INTERNATIONAL COMPUTER SHOW



If you're faced with the question of having to buy, lease or operate a computer for a business operation of any size

VISIT THE INTERNATIONAL COMPUTER SHOW

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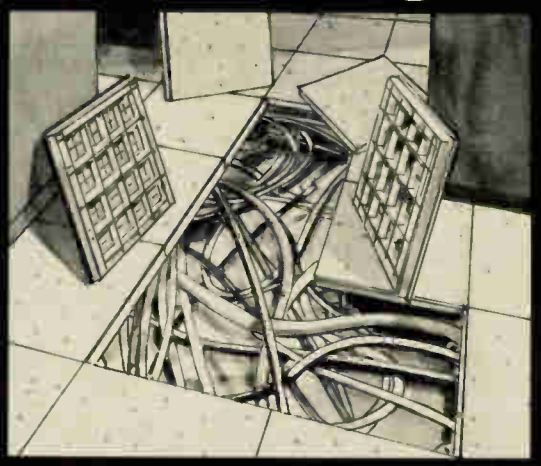
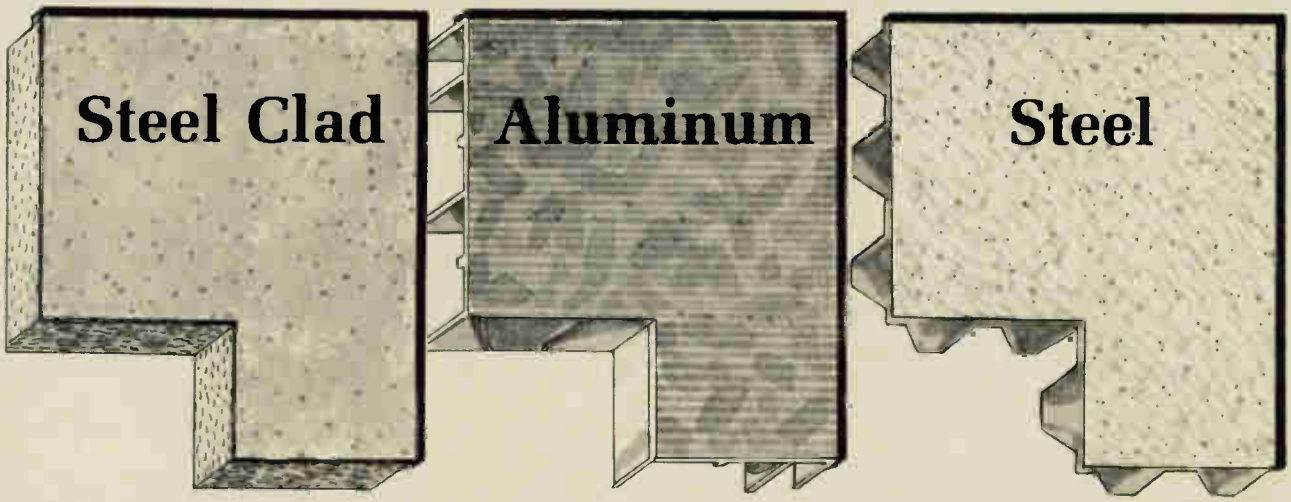


3 Choices



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CDS-5-81

Reader Service Card Number 119

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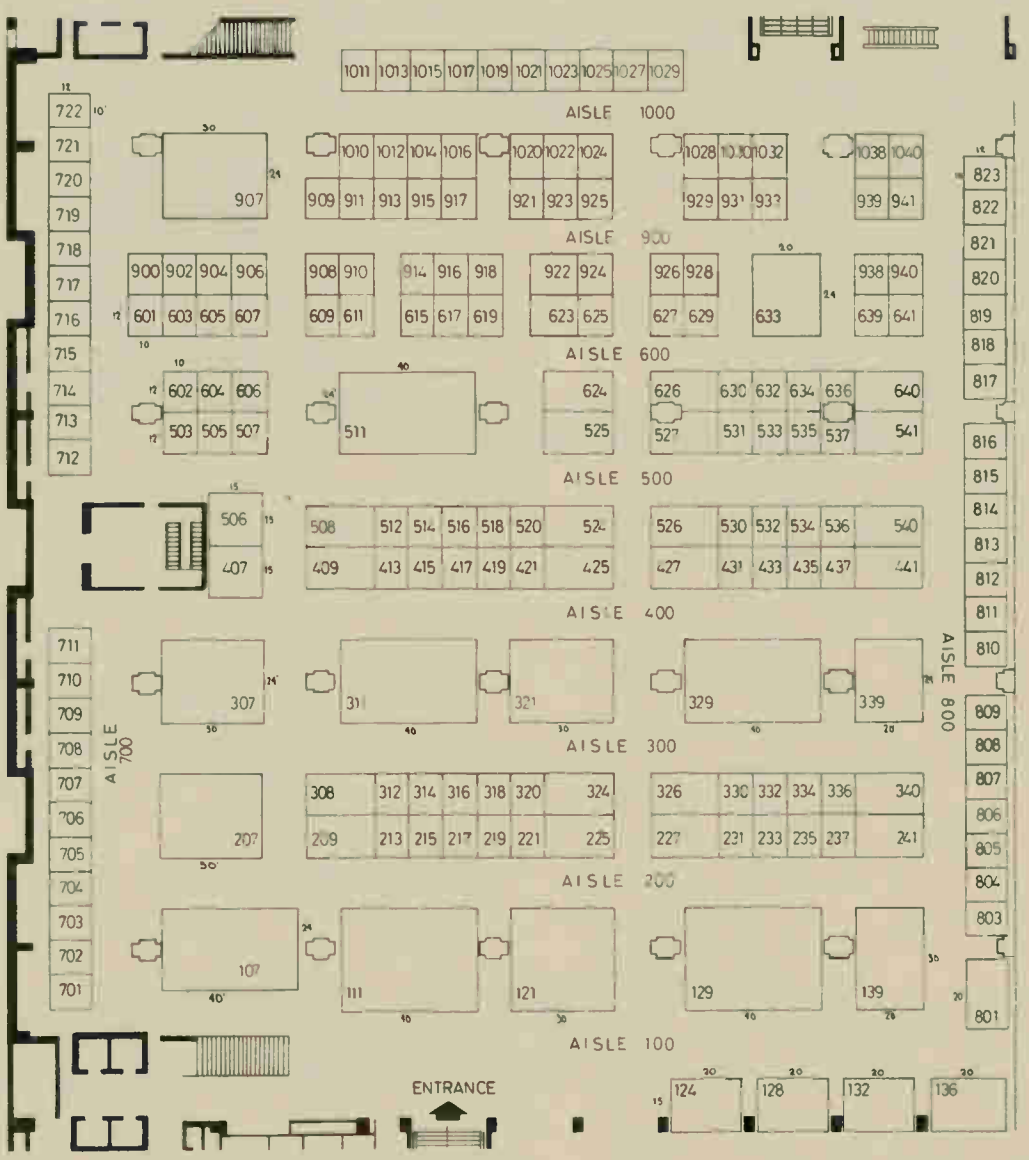
FLOOR PLAN



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Reader Service Card Number 161

Systemhouse awarded $225K Teleglobe contract

Systemhouse Ltd., Ottawa, was recently awarded a contract worth $225,000 to develop and implement a fixed assets management system for Teleglobe Canada.

The new system, completed in March, 1981, permits immediate access, through display terminals, to data on Teleglobe's fixed assets, valued at about $280 million. The system is also integrated into all the major Teleglobe accounting functions and procedures.

FPP option added to Data General MV/8000

A Floating Point Processor (FPP) that is claimed to make the Eclipse MV/8000 the fastest 32-bit virtual memory system has been announced by Data General (Canada) Ltd.

Designated Model 8704, it is priced at $11,800 with delivery 120 days after receipt of order. Users with installed MV/8000 systems can upgrade to include the FPP without reprogramming.

"By using a data path that is 64-bits wide, the FPP gives double precision whetstone value of 875K," said Ken Brandt, National Sales Manager for Data General. "The single-precision whetstone value is 1150K. We believe these to be the fastest whetstone values of any 32-bit virtual memory computer."

The single board option is expected to significantly increase the speed of calculations for engineering and scientific users, noted Mr. Brandt, particularly in applications such as digital image processing, speech analysis, x-ray scanning analysis, simulation studies and experimental data reduction.

Floating point instruction formats for the FPP are identical to the previous MV/8000 microcode formats, notes the company.

Both single and double-precision arithmetic can be performed by the FPP. Single precision (32-bit) gives six to seven significant decimal digits, while double precision (64 bits) gives 14 to 15 significant digits.

U.S. report predicts 12% increase in EDP budgets

A 12% increase in budgets for 1981 is expected for data centres in industry, finance and government, according to a survey published by Input, a U.S. consulting firm.

Entitled "User Planning Service 1980 Annual Report," the survey polled nearly 1,000 data centre managers and provides information on EDP budgets, growth, and objectives. It also analyzes computer and communications vendor activities, major technical issues and related trends.

EDP managers reported that the shortage of personnel remains the most important problem. Installation of on-line applications and more intensive use of data base management systems was ranked as the most important objective for the next several years, followed by improving programmer productivity.

Managers are faced with balancing the increased demand for complex, on-line systems with shortages of development staff. At the same time, the amount of programmer time available for such new development has shrunk for the third consecutive year, the report adds.

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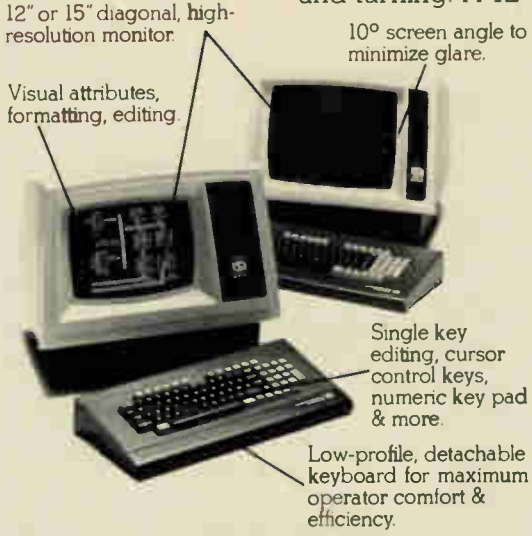

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Commercial voice processing to become reality this decade

Human speech as input to computers and computer speech as output to humans will come to the forefront during the first half of this decade in assembly line manufacture, financial transactions, order entry, quality control and inspection, and education and, during the decade's second half in office systems and consumer products.

That is the assessment of a new market report from Frost & Sullivan the New York market research firm.

The "naturalness" of using voice in man/computer interaction, coupled with the freeing of hands and eyes to do other work, will serve to boost voice processing product sales at $61 million in 1980 to $137 million in 1985 and $266 million by 1990, says the company. The report projects cumulative sales through the decade will total $1.5 billion.

Voice processing encompasses two different computer functions:

Voice data entry, an input technology that converts the human voice into digital form. Persistent problems, however, are high price, vocabulary limitation, and speed constraint on speech rate. So-called independent systems recognize the voice of different operators, but such systems are in the minority.

Most systems, on the contrary, are "dependent," i.e. they must be trained to understand each operator's voice. In addition, systems typically accept discrete commands, not continuous speech.

F&S expects that it is only "a matter of a few years" before a sufficiently low-cost, large vocabulary system will appear that can accept continuous speech. Among the improvements in such systems sought by computer users are better tolerance of extraneous environmental noise; more simplified interfacing; greater speed; improved accuracy; and better performance over phone lines.

Voice response, an output technology that converts computer-generated digital data into human or synthetic speech, with the vocabulary either taped or electronically synthesized. The simplest equipment employs prerecorded speech. Other playback techniques use random-access audio discs, digitally-constructed speech, or digitally-recorded, compressed speech. With all of these however, an annoying robot-like tone and a certain choppiness remain the chief defects in the output.

The technology is not without its problems, F&S concedes. The novelty of the field, lack of familiarity with the technology, and performance limitations in current equipment are all drawbacks according to an F&S user survey. Nevertheless, 55 per cent of those polled do plan to "become involved" with voice processing, and 85 per cent anticipate using such equipment within five years, particularly in data capture, order entry, telephone answering, and the like.

While the field's leading manufacturers are now relatively unknown, and none is a computer-maker, by the second half of the 1980s, F&S expects all major data processing and office automation companies will be offering voice data entry. Some "big" names—IBM, NEC, Exxon, and Xerox, for example—will appear on the scene, and this will boost user confidence.

Within a year, Texas Instruments, for example, is expected to introduce a speech synthesizer having a 2000-word vocaulary. As for the low-profile manufacturers, such as Threshold Technology, which now enjoys a 75 per cent market share in voice response equipment, these are expected to survive "in some form," F &S adds. □

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CDS-5/81

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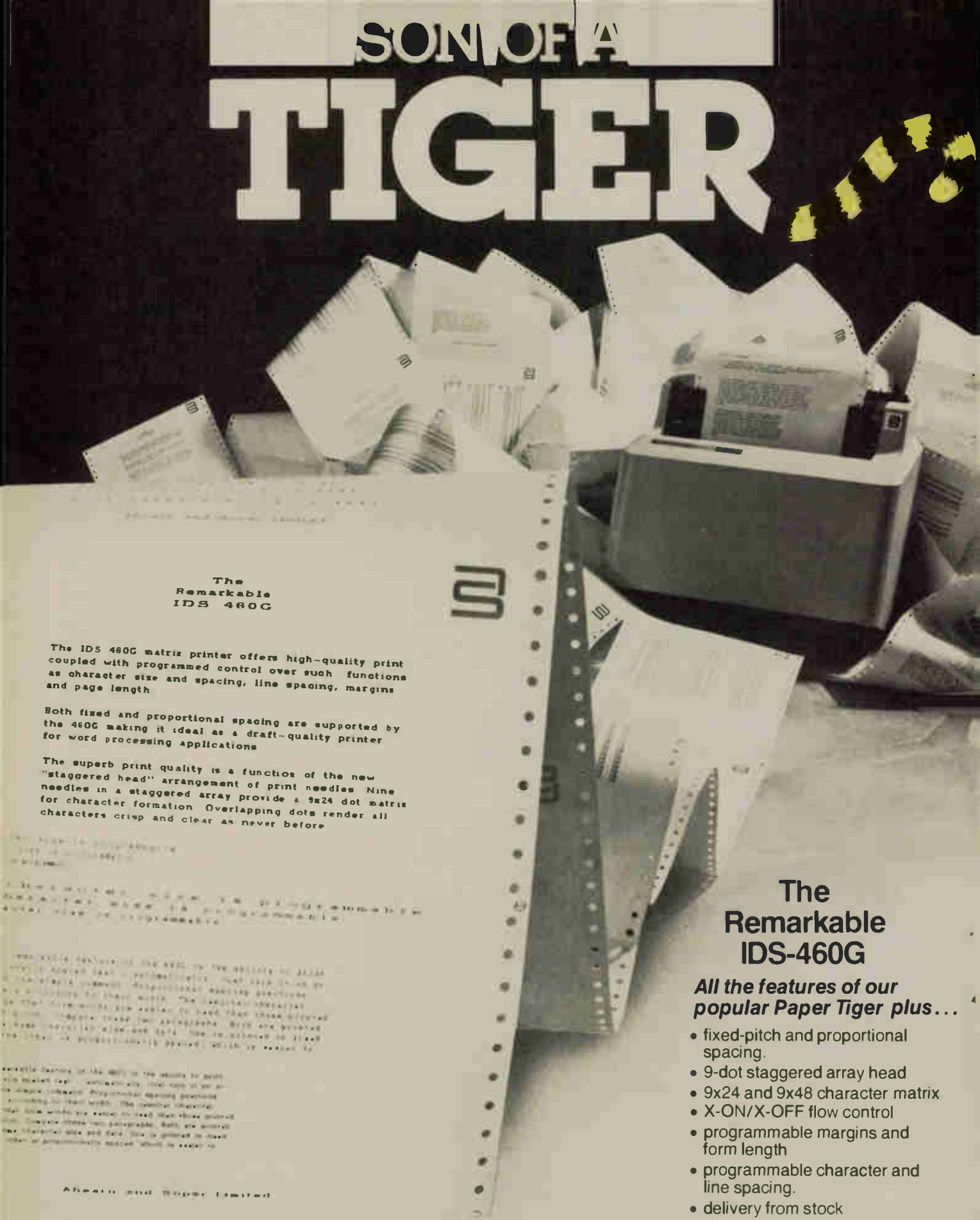

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Reader Service Card Number 110

Saskatchewan prepares for the future

Saskatchewan's Minister of Telephones Don Cody takes a look at the province's move to meet future datacom needs.

By DON CODY

The rapid change in information handling technology has led to many opportunities for new communications services. Sask Tel, in conjunction with other Canadian telephone companies, has been studying possible new services for its business and residential market. These could include environmental management systems, security and alarm services, protection services, entertainment and educational services, information transfer and future office services.

In anticipation of a need to build a communications network which would be capable of providing these services, Sask Tel recently undertook a study of the various technologies available to meet these needs. The result? A province-wide fibre optic broadband communications network with the capacity and the capability of meeting the voice, video and data needs of Saskatchewan residents into the 1980s and beyond. This system will be the foundation for a total digital network anticipated by the year 2000.

Sask Tel is now proceeding with the construction of a 3,200 kilometre broadband fibre optic network which will lay the groundwork for a multipurpose communications system. The first leg of this network will connect Regina with Yorkton and is expected to be in service in the fall of 1981.

The fibre optic decision was motivated by a goal to build an integrated provincial telecommunications system that will deliver all forms of signals and services (including telephone, television, business information and educational service) to as many people as possible at a reasonable cost to all users.

Digital Technology

The $56-million, 12-fibre broadband system will be completed by 1984 and will connect Saskatchewan's 10 cities and 41 larger towns. It will operate in a digital mode at 45 bps and will carry voice, video and data signals. The optical fibre system will serve as the backbone portion of a future province-wide integrated digital network. The 51 centres to be served by the BBN have been selected to correspond to future digital cluster centres. This factor, plus a proper design of the network itself, allows for integration of the video, voice and data requirements over the next 20 years. Fibre optics will serve as the backbone for inter-urban transmission. Beginning in the mid-1980s, fibre optics will be used instead of coaxial cable for local distribution in new subdivisions. By the 1990s Sask Tel will begin to replace coaxial and copper wires with optical fibre to eventually lead to a totally integrated inter-urban and local fibre optic transmission network.

The first phase of the broadband system will include the extension of services presently available in the major centres in Saskatchewan to the other communities on the broadband network. These services will include one-way cable television distribution, flat-rated pay television, network television broadcast signals, educational television, and occasional audio and video programming. It will also be used to carry telephone message traffic in heavy usage areas.

The potential of this integrated network will not have been achieved however, without the development of the intelligent devices necessary to deliver the services of the future. By building intelligent control into the telecommunications network in the form of computers in the central offices and microprocessors in the subscribers' homes and offices, more services with added value will be offered.

Electronic office systems

Sask Tel will strive to be a major provincial supplier for the office of the future. We are now developing products and strategies to enable us to meet this objective. Just recently. Sask Tel has begun offering a communicating word processor system. This product, presently based on Wang equipment, offers features such as background communications concurrent with foreground word processing, and data processing and record manipulating capabilities. It also offers modular and expandable software and hardware which can be configured to meet individual customer requirements. This service offering has been readily accepted by both business and government.

One element of the Office of the Future which is implied in many services such as electronic mail is data communications. The Computer Communications Group of Sask Tel and TCTS already have a broad range of network services. These services include Dataroute, a nationwide digital data network, and Datapac, a packet switching network.

Sask Tel will, in the future as in the past, continue to be a supplier to the data market of a complete line of terminals and communication services. The potential in the data processing marketplace will permit the corporation to carry out its plans for expansion of the provincial data network to bring low cost data communications to all sectors of the business community, large or small. The Broadband fibre optic network will be the basis for this expansion. □

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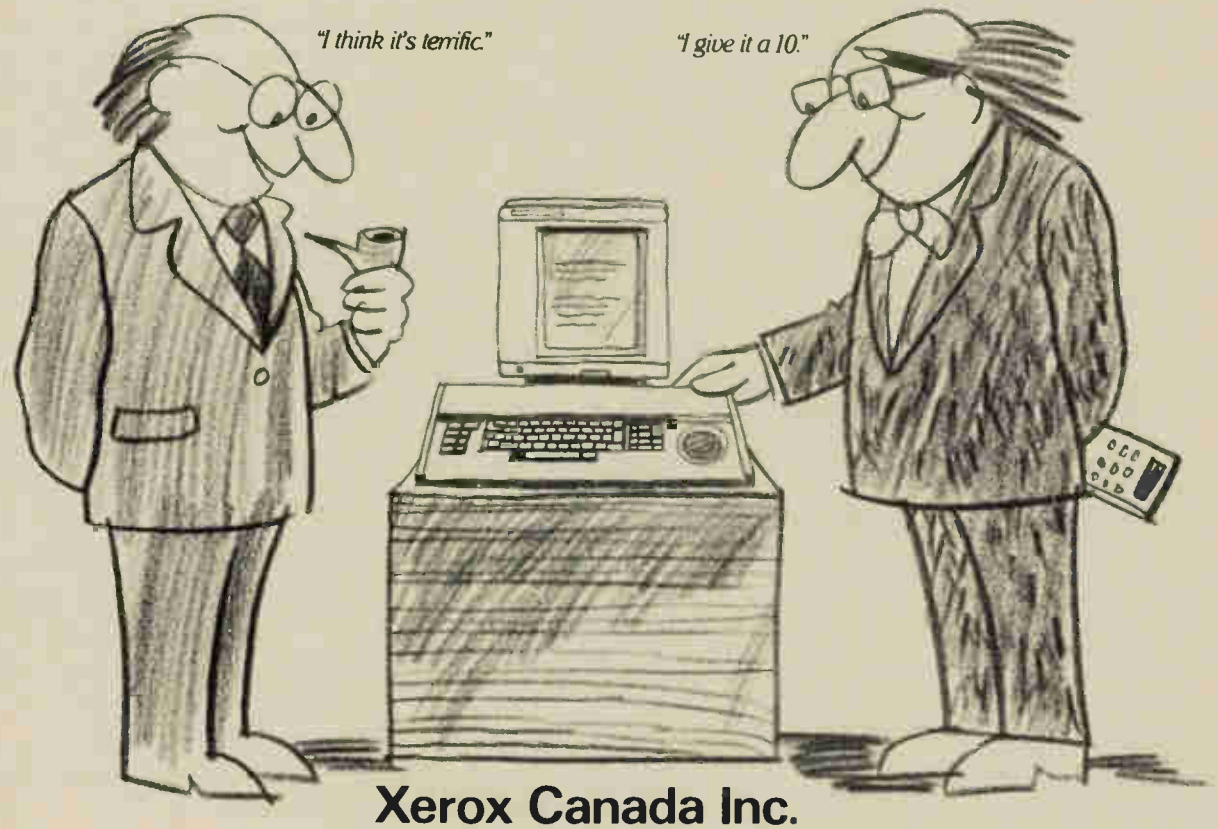
And everyone, but everyone, has to manage information.



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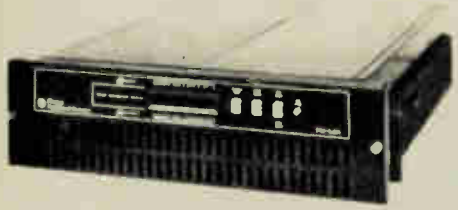
PLESSEY PERIPHERAL SYSTEMS

Product Summary.



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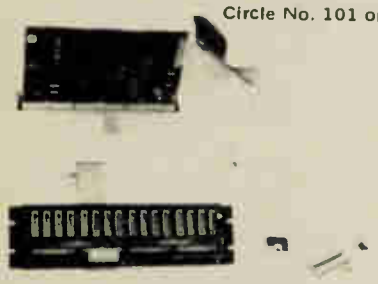

2. PM · DZ11A
Asynchronous 8 line multiplexer for EIA/CCITT terminals or lines.

Circle No. 102 on reader service card

3. PM · DSA 11/80
Pedestal mount 67 MB formatted disc drive and single board controller for unibus - 11

Circle No. 103 on reader service card

4. PM · TS11/B · 45, 75, 125
Tape Transport and Control Unit 800/1600 BPI, 10.5" reel speeds of 45, 75 and 125 IPS for the PDP11.

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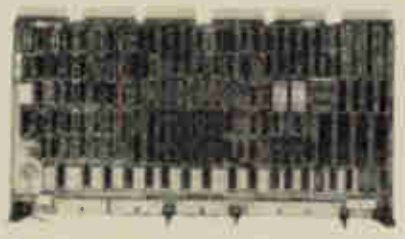

5. PM · DC1100
Disc controller RP02/RP03 compatible designed for use with the CDC 9762 or CDC 9766 disc drives.

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news and events in the Canadian computing industry

'Contact 81' exhibitions aimed at gov't suppliers

The federal department of supply and services is currently conducting a six-city series of two-day shows called 'Contact 81', where Canadian small and medium-sized industrial firms can meet with the larger firms that serve as major suppliers to the Canadian government.

The intent, as described by the Hon. Jean-Jacques Blais, Minister of Supply and Services, is to let the Canadian firms who might well be able to serve as sub-contractors on large government orders meet with the firms that typically win these overall jobs. It has been found in the past that sometimes when multinational firms in Canada win federal contracts, large portions are sub-contracted to companies outside of Canada, which does not help the Canadian economy.

"In our own area of government procurement, which amounts to about $3 billion annually," the minister notes, "we are doing all we can to increase the quantity and quality of Canadian content in federal government purchases. We are now starting a procurement review mechanism as well as the Canadian business sub-contracting opportunities program in support of these efforts."

The Contact 81 series ends in Calgary on June 9 and 10. Among the EDP-industry firms participating in the recent Toronto show were: AES Data Ltd., Burroughs Inc., Computing Devices Co., Canadian General Electric, Xerox Canada Honeywell Ltd., IBM Canada Ltd., and Philips Electronics Ltd.

Systemhouse announces buy of business MIS package

Systemhouse Ltd., Ottawa, has purchased the GMS-3000 business management information system software package from Process Kinetics Ltd., Ottawa, and Gothic Northeast Inc., Boston, Mass. Purchase price was $1.2 million.

The GMS-3000 package is already operating in 16 Canadian locations, including six divisions of Hawker Siddeley Canada Ltd., K-Tel International, and two divisions of Domtar Fine Papers. It was developed and marketed in Canada by Process Kinetics, and sold in the U.S. by Gothic Northeast.

"This package uniquely integrates manufacturing, distribution, and financial information requirements," Systemhouse president Jack Davies says. "It takes full advantage of state-of-the-art database and data comm technology that instantly reflects each transaction to all appropriate departments in the organization."

He adds that Canadian sales alone, through Systemhouse's nine branch offices, of GMS-3000 and its associated hardware and services will likely exceed $20 million over the next 2½ years.

Control Data Cyber-170 notches 200th shipment

Control Data Canada, Mississauga, Ont., recently had a special 'Italian Day' celebration in honor of the fact that the 200th sale of its Canadian-designed and -built Cyber-170 large-scale computer system went to the National Research Council of Italy, Genoa. Roughly 80% of CDC's production is exported.

The unit, a Model 720, will be used for the data-processing services of the Council in the Genoa region, and will also be used by the University of Genoa.

Control Data held a special reception, with Italian food and music, to honor the occasion. Among the guests were officials of the Canadian federal and Ontario provincial governments, Mississauga municipal officials, and the Italian Trade Commissioner.

Northern Telecom, Korea sign $60 million contract

Northern Telecom Canada Ltd., Islington, Ont., has contracted a sale of $60 million of telecommunications equipment to the Republic of Korea for the improvement and expansion of South Korea's telephone network. Deliveries are expected to span an 18-month period, starting before the end of 1981.

The digital transmission equipment will be manufactured by Northern Telecom Canada in its Aylmer, Que., and Winnipeg, Man., plants. The contract calls for the provision of over 200,000 voice circuit channels of DE-4 pulse code modulation equipment, and associated digital repeater line equipment.

The contract is the first phase of a larger program of network development.

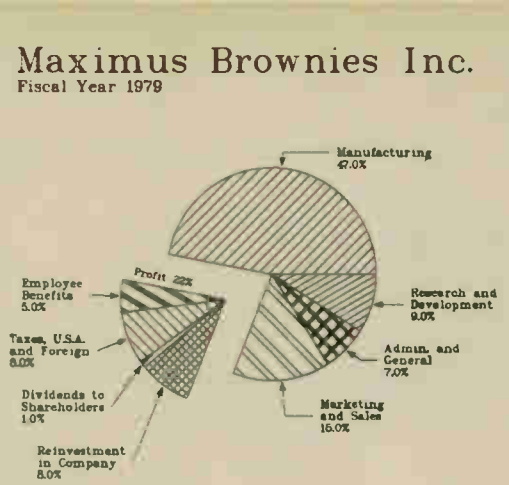
Production testing of complex large scale integrated circuits gets a boost with chip tester developed at Bell-Northern Research. Unit performs 1.5 million measurements in 45 seconds, approaching the limits of the laws of physics. New system is more accurate than any other in existence and is used at the Northern Telecom semiconductor manufacturing plant in Ottawa.

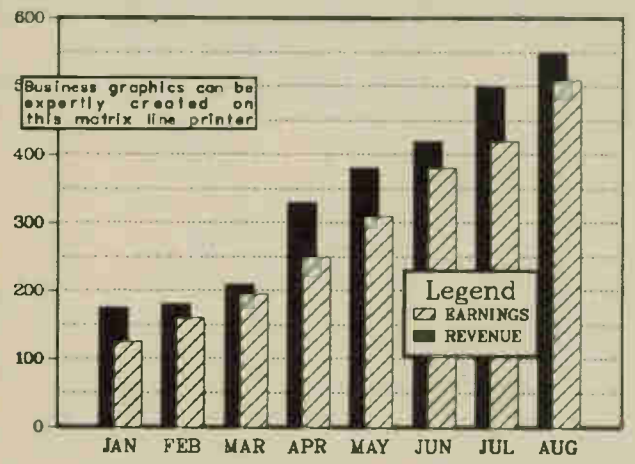
Winnipeg computer system allows multiple users

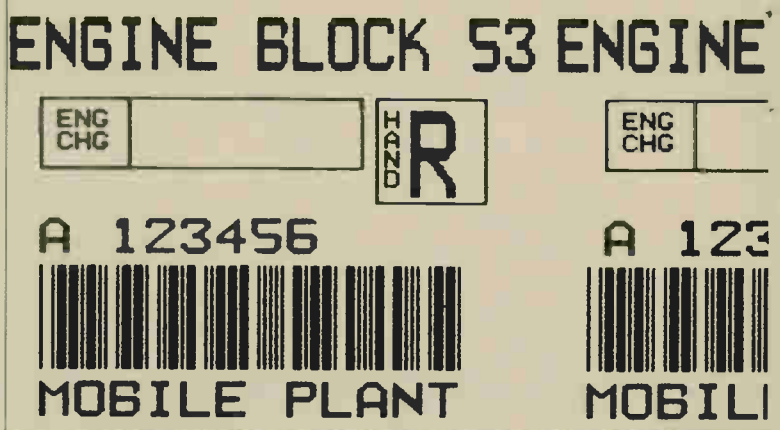
Patrick Computer Systems Inc., Winnipeg, has announced its third-generation office computer, the iC 436. The unit is described as being specifically designed to meet the growing demands for computer products by small- and medium-sized businesses.

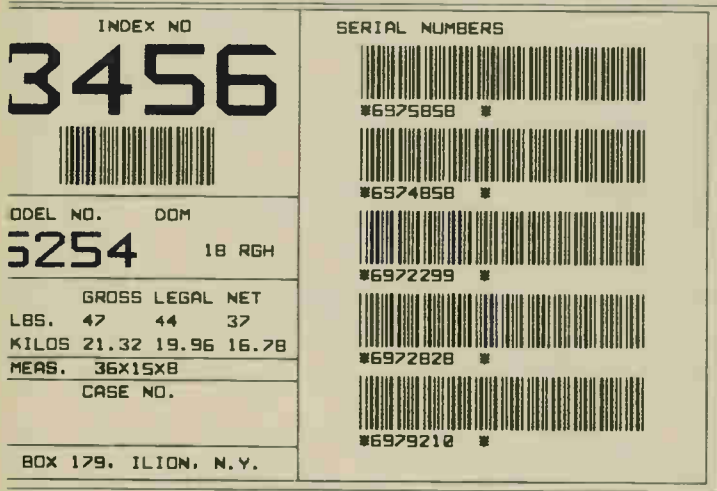
"We've been able to virtually eliminate that annoying hesitation in operations caused by requiring one microprocessor to handle not only computations, but also tasks like storing information on disc, controlling printers, and displaying information on a CRT," according to Patrick Computer president Bob Sutherland. "We did this by building *five* complete computers into the iC 436, each with its own CPU, 16K of memory, and a software operating system."

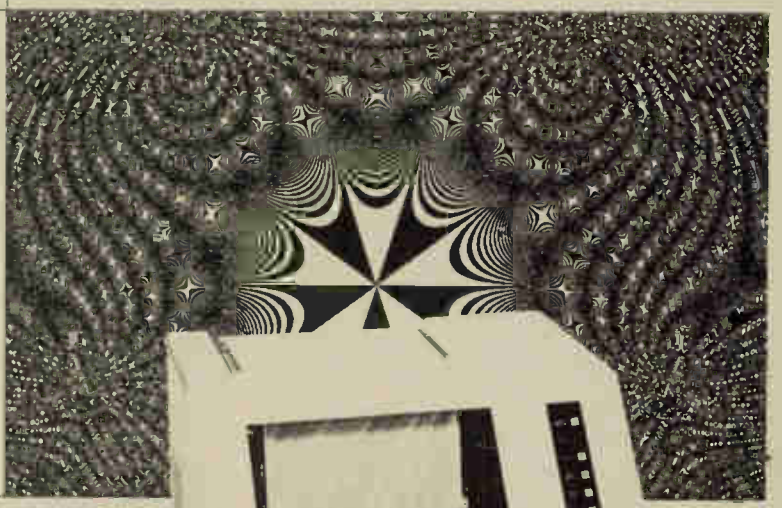
Up to five users can work from a single iC 436, it is claimed, each doing a separate task, such as word processing, data processing, software-writing in Fortran, Cobol, RPG, or Basic, or retrieving information. A real-time operating system supports all five users. Extra line printers, inter-terminal and terminal-to-computer communications, and disc memory up to 96 megabytes are also offered.

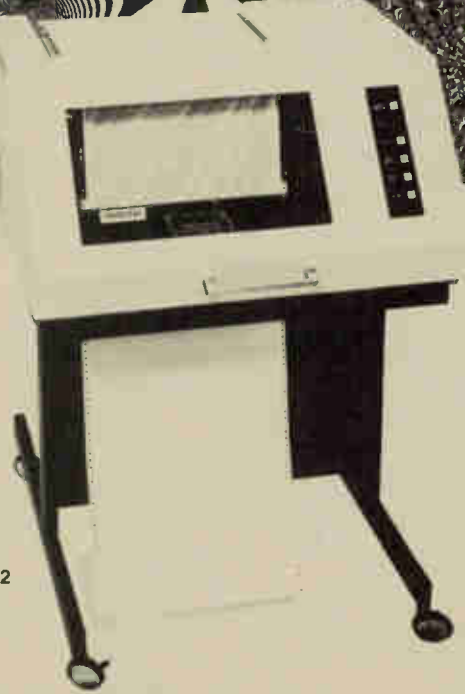












Why Settle For A Band Printer When You Could Have a Printronix Printer/Plotter?

Printronix 300 and 600 LPM line printers became popular as economy devices known for flawless print quality and reliability.

They're still growing in popularity because the same unit can print multilingual and OCR fonts and plot barcodes, labels or graphics.

We're Canada's largest independent printer distributor, and we've probably already installed a Printronix line printer on your model of computer. Call any of our five offices for further information

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ESE funds awards to datacomm students

In recognition for the need for cooperation between industry and universities, ESE Ltd., Rexdale, Ont., will sponsor three scholarships at the University of Toronto to encourage talented students to further their education in data communications.

Established in the Faculty of Applied Science and Engineering, the scholarships will be presented annually, starting in May 1981. The recipients of the awards will be eligible for the awards providing they maintain honours academic standing and demonstrate, through their selection of courses, an interest in electronics and data communications.

Bell woos small business with communications centre

Bell Canada has created a 'Business Communications Centre' in its futuristic Scarborough, Ont., offices where small businessmen can get personal presentations and demonstrations of the variety of Bell telephone products available to them.

"In the rush to provide high-technology business communications for big firms, many small businessmen have perhaps felt that we've left them behind," Bell Ontario marketing vice-president Harry Pilkington notes. "With this centre, we want to redress that imbalance, and show these people what we can do for them."

The Centre has extensive presentation and demonstration facilities, and the complete line of Bell telephone and auxiliary equipment is on display and fully functional. Full-time communications consultants will assist customers in selecting the equipment best-suited to their present and future needs.

Data General boosts Eclipse memory storage

An increase of main memory aimed at providing larger resident programs and decreasing disc overhead has been announced by Data General (Canada) Ltd., Mississauga, Ont., for its 32-bit Eclipse MV/8000 computer.

The new capacity, representing an increase from two to four megabytes, is packaged in 3- and 4-megabyte configurations consisting of multiple 0.5-megabyte boards.

Stock exchanges install Auto-display boards

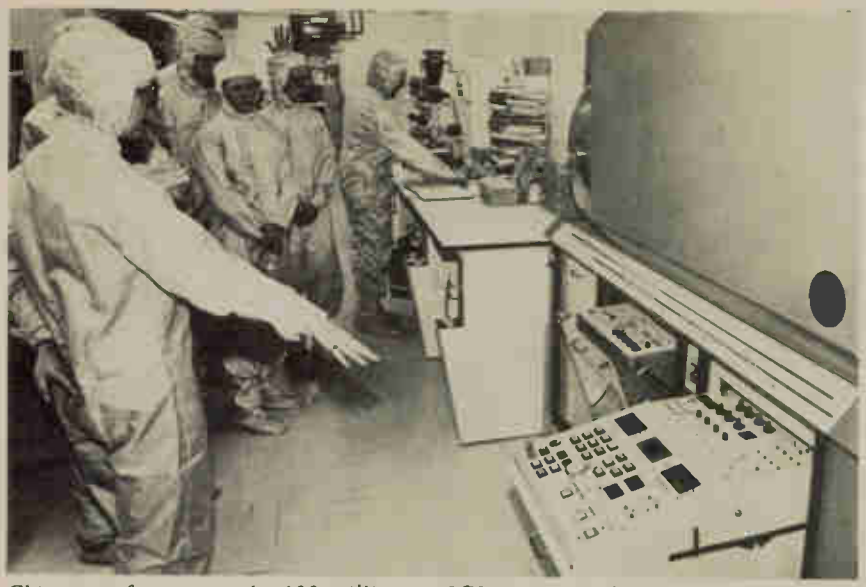
Ferranti-Packard Electronics Ltd., Mississauga, Ont., was recently awarded contracts totalling $2 million for the design and installation of automatic display boards for the Montreal Stock Exchange, the Chicago Board of Trade, and the Kansas City Board of Trade. Installations are scheduled for completion by the end of 1981.

Norango launches iBEX computer in Canada

Norango Computer Systems Inc., Toronto, now offers the iBEX small business computer product line from Logic Systems Inc., Japan. As exclusive Canadian distributor for the computer, Norango began Canadian deliveries in March, 1981.

The computer handles word processing, general accounting, and data processing for manufacturers, distributors, doctors, dentists, accountants and retail organizations.

The turnkey system operates with the CP/M operating system. The central processing unit is a Z-80 microprocessor and an entry level Model 2100 contains 64K of RAM memory, one 5¼-in. floppy disc drive with a total of 80 KB of disc storage, typewriter-style 63-key keyboard with numeric and special function keys, and a 9-in. video screen. High speed printers or letter quality units can be interfaced with any model. All models can be expanded by increasing the size of the memory and disc storage.



Chip manufacture on the 100-millimeter LSI circuit production line is computer-aided. More than four million chips were produced in 1980.

Northern Telecom LSI production reaches 4 million chips

The Semiconductor Components Group of Northern Telecom Ltd., Ottawa, has reported a 1980 production of large scale integrated (LSI) circuits of four million chips at a cost of $40 million. Manufacturing custom LSI circuitry, hybrid components, and electronic modules for proprietary communications products, the expanded Ottawa facility began operations in 1979.

Said to be one of the major developers and manufacturers of custom LSI circuits, NT's Ottawa facility supplied more than $26 million worth of LSI components to Northern Telecom divisions. This represents almost 33 percent of the corporation's total semiconductor purchases. In addition, the Semiconductor Group bought about $14 million worth of custom LSI which have been designed by them and manufactured by other suppliers.

Originally used strictly as a centre for research, design and development, the Ottawa facility was expanded in 1979 to include full manufacturing capabilities using a 100-millimeter production line at a cost of $15.6 million. According to Lloyd A. Taylor, Vice-President, SCG, Northern Telecom Ltd., the current production yield over waste, using a batch process, is roughly twice the industry standard for production of this type.

The facility now encompasses integrated circuit design, mask fabrication, a wafer etching process, assembly, testing, production control, and process engineering. Silicon research and development for 1980 totalled almost $10 million.

The facility was established as an in-house manufacturing plant to fill the internal demand for custom LSI and to solve the problem of having them made by outside suppliers. Northern Telecom forecast a shortfall in external production by 1981, coupled with a tripling in the dollar volume demand between 1980 and 1986 from outside suppliers for telecommunications components.

About a dozen contracts are currently being filled for other manufacturers and Canadian federal government agencies under Northern Telecom's policy to make up to 20 percent of capacity available to other manufacturers. The work includes applications engineering and custom LSI process and product development in such areas as high-speed instrumentation and data processing, digital switching and transmission systems, electronic private business exchanges, and electronic telephones. Current manufacturing contracts for other companies include the production of fast FSK modems.

Northern Telecom is scheduled to begin high-volume LSI manufacturing in a new plant to open in June 1981 in San Diego, Ca.

Centronics to install 400 printers for CNCP

A contract for up to 400 Model 730 and 704 computer printers, valued at approximately $750,000 a year, has been awarded to Centronics Canada Inc., Mississauga, Ont. by CNCP Telecommunications, Montreal. The printers will replace the firm's discontinued Model 306C computer line.

Centronics is claimed to have supplied CNCP with more than 1,000 computer printers during the last five years.

Kombi creates division for computer furniture

Kombi Corp., Kanata (Ottawa), Ont., has launched a new office automation systems division in response to the furniture needs of the computer hardware industry.

The company's new product line will examine all aspects of electronic information processing, such as ergonomics, wire management, productivity and human resources. The systems will be designed to allow personnel to use a wide range of electronic office products with greater comfort and efficiency than presently available in such systems.

Kombi estimates that over a three to five year period, the new division will more than triple its existing operations, and predicts that sales of office related furniture products will increase revenues by 50% through 1983.

Wynchester gets contract for government installation

Wynchester Systems and Electronics Inc., Weston, Ont., was recently awarded a contract in the range of $100,000 from the Federal Department of Defense for the supply of a series of small computer systems for use within the education group in Ottawa. The computers selected include a 64K CPU, 12-in. screen and typewriter keyboard terminal, 1.6 million characters of disc storage, and a 150-character/sec printer.

Hi-tech DMS system available in Canada

MPS Management Consultants Ltd., Toronto, was recently appointed the Canadian distributor for the 'Oracle' database management system from Relational Software Inc., Menlo Park, Ca.

Oracle is the first of RSI's new generation of high technology database management systems. The system is said to offer simplicity of use, increased flexibility and improved performance when compared with other types of management systems.

The system's user interface is SQL, the relational data language developed by IBM. All SQL commands are available from on-line terminals and programming languages such as Cobol and Fortran. The package also features an integrated data dictionary, a forms facility for on-line data entry, and a report writer/word processor.

The system is currently available on the DEC PDP 11 and VAX series computers and will be offered on IBM computers by the end of 1981. The system is available in Canada on a timesharing basis through APEX Computing Resources, Toronto.

Punctilious

pungk til′ēəs *org. L: to the point.* 1) a conscientious, punctual, utterly scrupulous performer who delivers excellent Leasametric rental data processing terminals. 2) man of a thousand hands.

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NEC	5520	Letter Quality KSR
DEC	LA120	KSR, 1200 Baud
HP	2624A	Editing CRT, Block Model
Cybernex	XL-87	CRT
DEC	VT100	80/132 Columns, Advanced Video Option
Anderson Jacobson	AJ1234	Coupler/Modem
Gandalf	LDS-120	Limited Distance Modem, Async, 0-9600 Baud
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1039	45 ips	three pens

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CALCOMP

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'Techno-business services' offered by Toronto firm

WITS (World Information and Technology Systems Corp.), Toronto, has set up a series of executive-level consulting services that the firm calls 'Techno-Business Services'.

The firm aims to assist business, industry, and government executives in meeting such challenges as procurement or development of computer-based systems where mistakes and loss of time must be strictly avoided; determination of risk factors concerning investment in or acquisition of a high-technology company; evaluation of best-course-of-action concerning investment in new, computer-related product lines or systems; development of a corporate information strategy/system to allow an executive to control company performance by division, product, market, or geographical region; and showing how a firm can boost revenues through decisive moves into on-line, interactive electronic funds transfer services, marketing, publishing, 'video-shopping,' and the like.

WITS will apply the new service to cases where perceptive use of electronic information and automation technologies is seen as the key determinant for business success.

Control Data, Geodigit merge computers, software

Geodigit, a Calgary firm specializing in applied geophysics studies, and Control Data Canada Ltd., Mississauga, Ont., a large-scale computer hardware manufacturer, have combined forces to market a seismic software package for the petroleum industry.

Geodigit has been using Control Data equipment since 1970, and has progressively developed all its software for use on these computers, including the Cyber 174, 175, 720 and 760 models. Each of these computers, located at various Geodigit centres across Canada and the U.S., include the Control Data Map III, an industry-tailored matrix algorithm processor which refines and speeds seismic data handling.

In addition to processing seismic exploration data, Geodigit provides clients with remote batch and interactive graphics terminals linked with the Cyber systems. Clients can then run these applications from anywhere in North America or Europe. Geologists and geophysicists have access to various modeling or interpretative programs, allowing them to visualize in minutes the seismic response to different geological problems, says Control Data.

Software developed by Geodigit's parent company, Compagnie Generale de Geophysique, France, is available from Geodigit or in the Control Data CGG package. It includes seismic modeling, acoustic impedance, three-dimensional and wavelet processing, SHEAR wave and VSP methods, and long- and short-wave automated static connections.

Control Data has also signed a cooperative marketing agreement with Franlab Consultants, a French firm specializing in software for petroleum production, engineering and reservoir simulation. As well, Control Data operates its own petroleum services centre in Houston, Tex. Equipped with a Cyber 176 computer system, and linked to the worldwide Cybernet services network of computers, the centre develops and acquires new petroleum industry application programs.

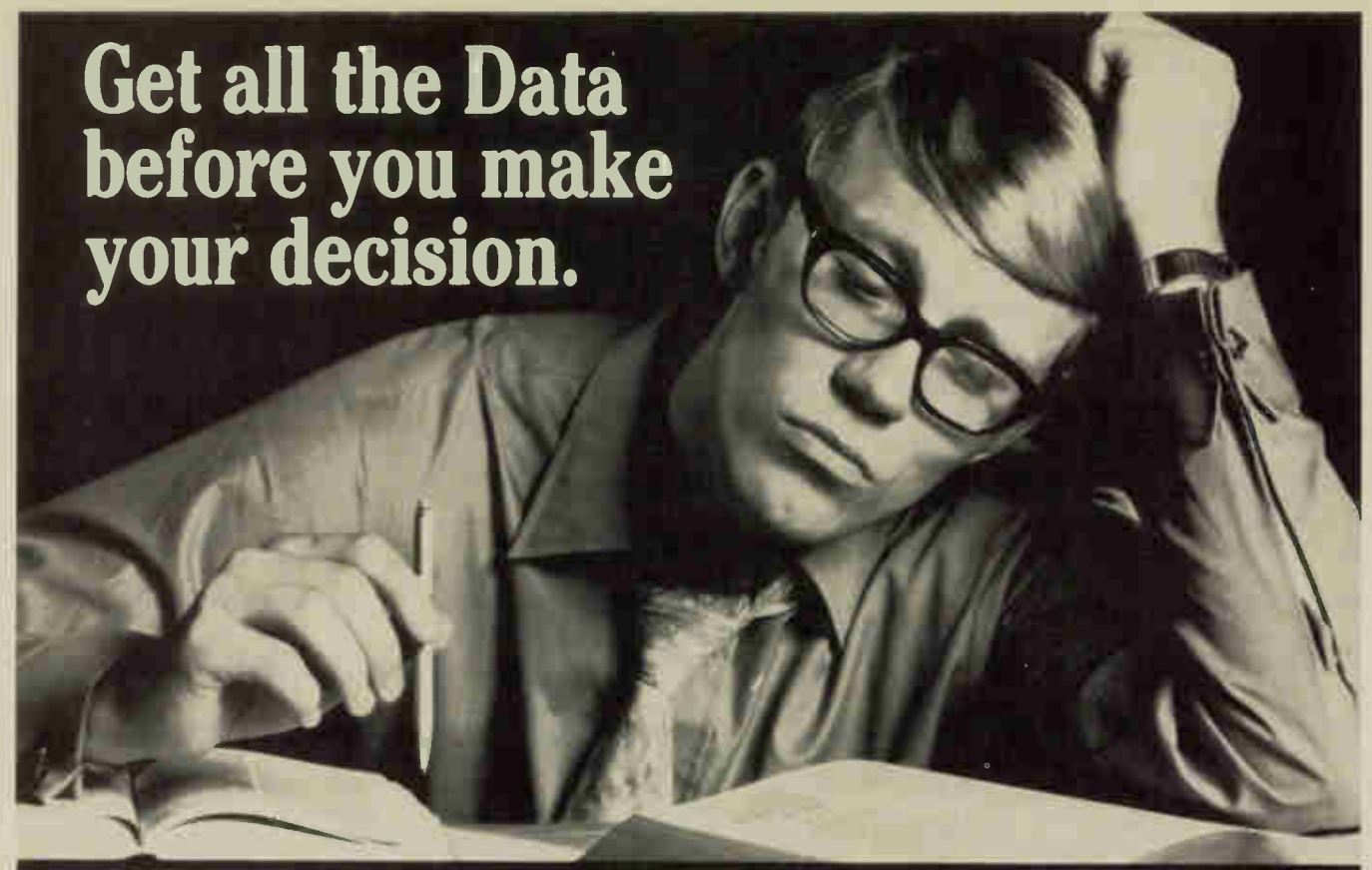
Retail stores install software system

STS Systems Ltd., Montreal, has sold its retail software system "Store", to two Canadian retailers: Universal Stores of Prince Rupert, B.C., and Ricki's of Winnipeg, Man.

Universal Stores has purchased the package for merchandising control and various STS accounting packages for accounts payable, general ledger and accounts receivable.

Ricki's is a 75-store chain of women's apparel and will use the package with its Eclipse processor with 600 MB of disc storage.

Get all the Data before you make your decision.



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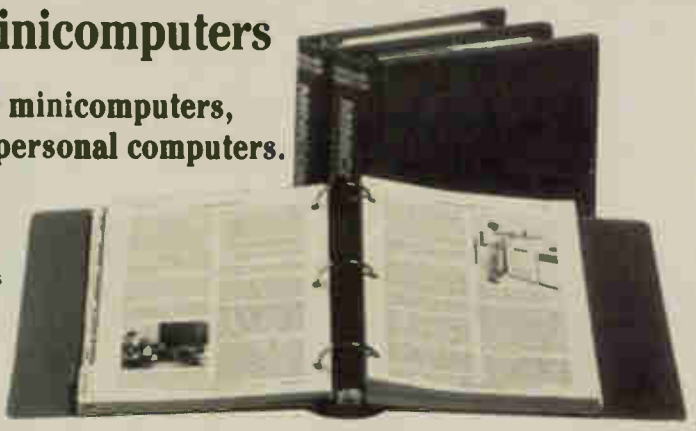

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Reader Service Card Number 140

The Candat computerized stock market information system, recently purchased from the Toronto Stock Exchange by Canquote Inc., processes more than 150,000 trading transactions per day.

New company buys computerized stock market system

A new, privately-owned Canadian computer services company has purchased the Candat computer-based stock exchange system from the Toronto Stock Exchange.

Canquote Inc. purchased the Candat system for $1.7 million, including a network of more than 1,600 terminals. The T.S.E.'s decision to sell its stock market information system was prompted by the system's rapid expansion of 50% per year, making it a growing capital burden.

In the hands of Canquote, the system will continue to provide realtime stock market trading data, handling more than 150,000 trading transactions per day and responding to roughly 340,000 daily inquiries.

According to Joseph Paradi, president of Canquote, the Candat service will soon begin actively marketing Canadian data in the U.S. and Europe. "This data will become available anywhere in the world to help promote investment in Canadian securities," Mr. Paradi says. American and European information will also be offered to the Canadian financial community.

The system includes two IBM 4341 computers for database activities, two DEC PDP 11/44 systems forming the communications network, and more than 90 DEC PDP 11 microcomputers for network control. The system's 1,600 terminals are installed in the offices of over 100 brokerage houses and financial institutions across Canada.

Canquote will expand its services with future use of the Telidon data communications system providing greater user access to the Candat system, enhanced by color graphic displays, says Mr. Paradi. He also indicates Canquote's possible use of Teleglobe as early as 1982, in order to link Candat to European exchanges.

Improved interactive graphics featured in Tektronix 4110

Tektronix Canada Inc., Barrie, Ont., has announced the release of the 4110 Series of interactive graphics display terminals, which constitute a compatible extension to the existing 4010 Series.

The 4110 Series consists of the 4114, a 19-in. high-resolution direct-view storage tube unit with refresh and fast redraw capabilities; the 4114 Option 31, a variation with color-enhanced refresh for better contrast; and the 4112, a moderate-resolution 15-in. raster scan model that still offers the high addressability of the storage tube. All are equipped with a range of optional fonts.

Tektronix's claims of improved productivity for the units is based on their capacity to significantly reduce communications traffic while enhancing local interactivity, especially through locally retained picture segments. These pictures and elements can be defined by 'Move' and 'Draw' commands, then locally stored, recalled, and manipulated with simple commands from the host rather than re-transmission of all the vectors.

The units feature RAM expandable up to 800K in the 4114 and 600K in the 4112. Integral single or dual flexible disc mass storage is available as an option on the 4114, and single disc mass storage on the 4112, with 512K capacity per disc.

Bell Labs chooses UW for computer courses

The University of Waterloo has been selected, along with several American universities, to participate in a graduate program in computer science for employees of Bell Laboratories.

Bell Labs' education centre in Holmdel, N.J., has developed an ongoing program of support to employees undertaking masters programs in computer science, electrical engineering, operations research, and mechanical engineering. This support is intended to maintain the performance and evolution of new research and development for Bell's telecommunications equipment and networks, says C.R. Wischmeyer, director of Bell Labs' education centre.

Some of the American universities participating in the program include Harvard, M.I.T., Princeton, Columbia, and Stanford.

Software seminar stresses maintenance

The "Software Maintenance Seminar", sponsored by Shetal Enterprises, Chicago, is now available for in-house presentations and is intended to make software maintenance more effective, efficient, and economical. It reviews managerial and technical problems in maintenance and suggests some strategic solutions while providing an overview of current technologies.

Designed for managers, and senior programmers, the seminar includes topics on the problems of maintenance, management considerations and techniques, structured technologies, and the future of maintenance.

For further information, contact: Shetal Enterprises, Dept. 501-4, 1787 B West Touhy, Chicago, IL 60626. Tel. (312) 262-1133.

More Canadian cities added to Intelpost link

Intelpost, Canada's electronic and satellite mail link, has expanded across Canada, connecting Montreal, Ottawa, Halifax, Winnipeg, Calgary and Edmonton to the Intelpost link that operates between Toronto and cities in England, Europe and the United States.

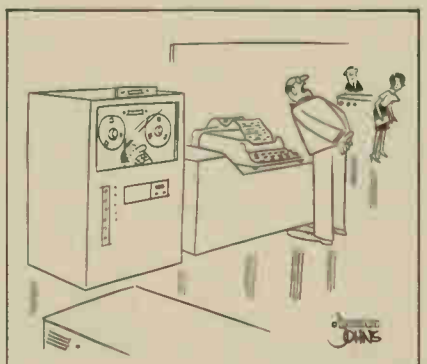
Located at main postal facilities, Intelpost uses CNCP's microwave network and Teleglobe Canada's international satellite facilities to transmit letters, charts, and other documents in seconds. International messages can be received in 30 minutes.

IEEE show in Toronto to feature Telidon

More than 150 exhibitors of new products will participate in the 1981 International Electrical, Electronics Conference and Exposition, to take place in Toronto, October 5 to 7, 1981. Fifty percent of the exhibitors are Canadian manufacturers.

The exposition will feature a display presentation of Telidon and technical sessions on its application in telecommunications.

The Department of Industry, Trade and Commerce will sponsor potential buyers in telecommunications, defense electronics and components, to visit the show from Europe, South America, and the U.S.



"Who's the clown who wrote 'I'm being held in this computer against my will!'?"

CALENDAR

MAY

20. Toronto
Seminar: "Curbing User Dissatisfaction." Sponsored by the Association for Systems Management. Contact: ASM, Suite 600, 55 University Ave., Toronto, Ont. M5J 2H7. Tel. (416) 364-4018.

20. Montreal
The Office of the Future: A Management Perspective. This seminar is given by the McGill University Management Institute. Contact: Mrs. Joan Gilday, Associate Director, Management Institute, McGill University, 1001 Sherbrooke St. W., Montreal, Que. H3A 1G5. Tel. (514) 392-5870.

21-22. Montreal
Word Processing Today: Systems and Sources. This seminar is given by the Management Institute of McGill University. Contact: Mrs. Joan Gilday, Associate Director, Management Institute, 1001 Sherbrooke St. W., Montreal, Que. H3A 1G5. Tel. (514) 392-5870.

25-26. Toronto
Canadian Business Equipment Manufacturers Association (CBEMA) 1981 Annual Conference. The conference will feature a seminar on telecommunications and Canadian business. Contact: CBEMA, Suite 212, Yorkdale Place, 1 Yorkdale Rd., Toronto, Ont. M6A 3A1.

25-27. Hamilton, Ont.
1981 National Conference and Exhibition: "Hard Hat Solutions." Sponsored by the Data Processing Management Association, Hamilton Chapter. Contact: DPMA, P.O. Box 814, Station "A", Hamilton, Ont. L8N 3M8.

JUNE

1-5. Vancouver
Computer Language Workshop: PL/1. Given by the Centre for Continuing Education, The University of British Columbia. Contact: Computer Science Programs, Centre for Continuing Education, University of B.C., 5997 Iona Dr., Vancouver, B.C. V6T 2A4.

3-5. Montreal
1981 International Computer Show & Conference, sponsored by Canadian Information Processing Society. Location: Place Bonaventure. Contact: Reg Leckie, Industrial Trade Shows of Canada, 36 Butterick Rd., Toronto, Ont. M8W 3Z8. Tel. (416) 252-7791; or Mr. Fernand Léveillé, 6497 ave Guillaume-Couture, Montréal, Qué. H1M 1C8. Tel. (514) 254-5590.

8-12. Vancouver
Computer Language Workshop: Cobol. Given by the Centre for Continuing Education, The University of British Columbia. Contact: Computer Science Programs, Centre for Continuing Education, University of B.C., 5997 Iona Dr., Vancouver, B.C. V6T 2A4.

8-10. Toronto
Data Entry Management Association: Spring Meetings & Seminars. Topics will cover productivity, people building, and improving data entry. Contact: DEMA, P.O. Box 3231, Stamford, CT 06905. Tel. (203) 322-1166.

15-19. Vancouver
Computer Language Workshop: Pascal. Given by the Centre for Continuing Education, The University of British Columbia. Contact: Computer Science Programs, Centre for Continuing Education, University of B.C., 5997 Iona Dr., Vancouver, B.C. V6T 2A4.

14-17. Denver. CO
ICC '81: International Conference on Communications. Contact: Bob Skelton, P.O. Box 21291, Denver, CO 80221. Tel. (303) 779-0600.

22-26. Vancouver
Computer Language Workshop: APL. Given by the Centre for Continuing Education, The University of British Columbia. Contact: Computer Science Programs, Centre for Continuing Education, University of B.C., 5997 Iona Dr., Vancouver, B.C. V6T 2A4.

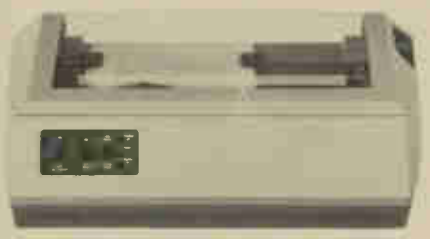
OCTOBER

29-30. Montreal
Montreal Office Exhibition. Contact: ECM Exhibition & Conference Management, 2 Robert Speck Parkway, Suite 750, Mississauga, Ont. L4Z 1H8. Tel. (416) 273-3910.

Four new printer ideas from the matrix printer leader

ONE

New 40 x 18 matrix Dual purpose printer: The new T-1805 serial printer uses a unique 40 x 18 matrix dot pattern for high quality correspondence printing; or, flip a switch, it uses a 7 x 9 matrix for high speed data processing printing. In the high speed mode it turns out reports at time-saving throughput rates up to 200 lines per minute. In the reduced speed correspondence mode, its pivoting print head lays down an overlapping dot array to create high quality characters that look like they came from an office typewriter.



TWO

Line printer offers business graphics and more: The T-3000 line printer is more application extensive than ever. This 300 line per minute multi-font machine now prints business graphics, subscripts, superscripts and customer defined special characters. This in addition to double high character or condensed printing. And to further its flexibility, characters can be loaded downstream from a host computer on command. Any number of character sets can be changed or interchanged on the fly. No printer stoppage. No wasted time.

For remote applications, the T-3000 even offers a communications adapter for long distance link-up with the host computer.

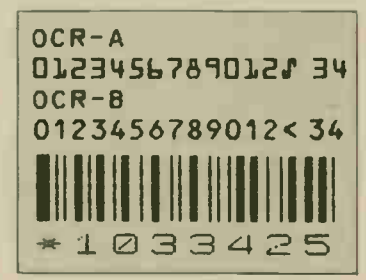
THREE

New enhancement! DEC LA-120 compatible: The versatile T-1612 teleprinter can now conform to the same function codes as the DEC LA-120. That means it's a simple swap to upgrade to the feature packed, lower priced T-1612. Remember, the T-1612 teleprinter offers the same functional features as the LA-120, plus extras like nine-needle print capability for true descenders and underlining, two-color red and black printing and forms handling bonuses like the Auto Front Feed for pre-cut forms and the Quick Tear for fast and easy forms removal.

FOUR

Low cost bar code, OCR printing: Here's the economy answer to high quality bar code printing. And OCR-A and OCR-B printing. And data processing printing good enough for correspondence printing. And as a bonus, highly efficient and cost effective forms handling. Its the M-Series of serial matrix printers. With models in 80, 132 or 184 column widths.

Print two forms simultaneously! Some models can be equipped with dual tractor sets to handle two different forms sets in tandem. For example, print bar code labels and a summary sheet in one operation.



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PEOPLE


WALTER


CORLETT

The Computer Communications Group, Ottawa, has appointed **Alan Walter** assistant vice-president, computer communications business development. **Michael S.G. Corlett** has been named general manager for Toronto and western Ontario. **David R. Durnford** has been appointed general manager of sales, Ontario region marketing for Bell Canada.

Systemhouse Ltd., Ottawa, has made four executive appointments. **Keith Soley**, formerly vice-president, Canadian operations, has been named senior vice-president, operations. He will be responsible for world-wide sales and deliveries of the company's products and services. **David McConomy**, formerly vice-president, finance, is now appointed to vice-president, finance and corporate services. He will be responsible for corporate administration and financial management. **Douglas Seaborn**, formerly vice-president, hospital systems division, has been named vice-president, product development. He is now responsible for the manufacture and enhancement of proprietary software products. **Brian Greenleaf**, formerly vice-president within operations, becomes vice-president, advanced technology.


ATKINSON


BEST

Quasar Systems Ltd., Ottawa, has elected **Robert Atkinson** to its board of directors. He currently holds the position of vice-president, secretary and treasurer, of Lumonics Inc., Ottawa.

George T. Best has been named vice-president and general manager for General DataComm Industries (Canada) Ltd., Ottawa. He was most recently general manager, TRW customer service, a division of TRW Data Systems.

Canon Optics and Business Machines Canada Ltd., Toronto, has made the following appointments: **Ted Purvis**, eastern regional sales manager; **Bob Hogg**, national accounts manager; **Larry Villneff**, district sales manager, Ontario; and **Frank Veenema**, assistant product manager.

André Sousan is now president of Apple Canada Inc., Don Mills, Ont. He began his career with the company in 1977 as president of Eurapple, the international divison of Apple. **David J. Killins** has been appointed national sales manager. He was most recently branch sales manager for Sperry Univac.


RAWLINGS


HARRISON

Canada Systems Group, Mississauga, Ont., has appointed **James Rawlings** as Ottawa branch manager of the Multiple Access division, responsible for all administration and marketing functions.

Michael Harrison has been appointed North American NUANS manager to handle marketing and administration.


BONAMI


HUSKA

Robert D. Bonami has been named manager of the newly-opened Montreal office of Software International. He was most recently Canadian sales manager for the Human Resources Management System with Wang Laboratories Inc.

Raymond Huska has been appointed sales manager for western Canada for Centronics Canada Inc., Mississauga, Ont. He will be based at the new Calgary office.

Miscoe Data Communications, Mississauga, Ont. has named **Richard Chung** as parts co-ordinator.

Elspeth Eldred has joined DMR and Associates, Calgary, as a senior consultant specializing in office automation. She has been engaged in word processing consulting for eleven years.

COMTERM

S/4270

INTRODUCING IBM3270 SNA/SDLC

Comterm's established SERIES 4270 family of IBM 3270 compatible display systems are now available with full SNA/SDLC support.

The SERIES 4270 SNA/SDLC systems are based on a structured implementation respecting the established SNA/SDLC layers. Support is provided for all existing SDLC commands (U format and S format), SNA commands and SCS printer commands.

The new SERIES 4270 SNA/SDLC components are system compatible with the IBM 3274/3276/3278/3287 components in an SNA/SDLC environment. Key features include:

- Three controller versions supporting up to 8, 12 or 32 devices respectively. Controllers are integrated in the cabinet of an attached display station.
- Four display station versions offering display capacities of 960, 1920, 2560 or 3440 characters respectively. Status presentation is fully compatible with IBM 3278. Keyboard layouts are identical to IBM 3278 keyboard layouts.
- Three printer versions offering printing speeds of 80, 120 or 180 characters per second. The operator control panel is fully compatible with the IBM 3287. SCS (SNA Character String) features are fully supported.

The new Series 4270 also provides full compatibility with IBM 3270 working under BSC.

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Digital announces plans for $8-M head office

Digital Equipment of Canada, Ottawa, will build an $8-million multistorey office building adjacent to its present facility in Kanata, Ont. (near Ottawa), with occupancy planned for mid-1982.

The 108 000-sq-ft building will house 475 employees now located in the existing facility, and will accommodate most of the front-office functions, company management, and the Management Information Service computer centre.

The new building will bring DEC's total floor space at Kanata to about 400 000 sq ft.

Centronics printer order to go in Mitel 'Superswitch'

A contract worth about $½-million per year has been placed by Mitel Corp., Ottawa, with Centronics Canada Inc., Mississauga, Ont., for Centronics' 730-3 printer series. The units will be incorporated into Mitel's 100/200 Superswitch product line.

The printers will be marketed in North America and Europe, and initial orders have already been shipped to Canadian, U.S., and European customers.

In Brief:

□ **RCS Retrieval Systems** and **Eichner Storage Systems** have merged to form **RCS Eichner Systems,** Toronto. RCS brings a base of 500 dealers and a line of office and systems products to the merger. Eichner Storage deals in microform and magnetic media storage.

RCS Eichner Systems is located at 71 Wingold Ave., Toronto, Ont. M6B 4A9. The company is also located at 8148 Devonshire, Montreal, Que. H4P 2K3.

□ **Allan Crawford Associates Ltd.,** Mississauga, Ont., a supplier of electronic test and measurement equipment, has opened an office in Edmonton, Alta. It will be linked by an on-line computer system to the other offices across Canada. The new office is at 15043A-118th Ave., Edmonton, Alta. T5V 1H9. Tel. (403) 451-4893.

□ **Data Terminal Mart,** Mississauga, Ont., has added Telxon portable data terminals to its list of inventory. The Telxon products will be available at all DTM locations in Toronto, Montreal, Ottawa, Calgary, Edmonton, and Vancouver.

□ **Custom Computing Systems Inc.,** Saskatoon, Sask., has relocated to larger premises at 124A 2nd Ave. N., Saskatoon, Sask. S7K 2B2. Tel. (306) 664-8933. The company is a franchised retailer of microcomputers.

←Reader Service Card Number 131

an open forum for readers' views relevant to the industry

Is Canadian high technology doomed by disinterest?

While Canada's politicians wrangle with the constitutional battle, the country is losing the technological war. The president of Northern Telecom tells why.

By Walter F. Light

IT MAY well be that with a constitution resting in Ottawa instead of London, we shall have the last political symbol needed to mark our political 'sovereignty.' However, this will do little to give us sovereignty in our own economy, and nothing to give us the technological sovereignty that we desperately need if we are indeed to compete successfully in world markets and be economically free in the future.

We buy 80 percent of the technology that we use. There was almost no Canadian participation in the growth industries of the past two decades, and very little more to date in the growth industries of the *next* two decades. We own only 45 percent of our manufacturing industry and only 66 percent of our economy.

Reluctant investors

This has come about principally because of the reluctance—almost resistance—of Canadians, as individuals and collectively as governments, to invest in their own futures, in their own enterprises, and in the rich potential of innovation.

This is particularly true of Canadian support of innovation, or research and development. I use the term 'innovation' because this is the end product of successful R&D, whether it be research into a new manufacturing process, a new marketing system, a new technology or an enhancement of an existing product.

It is the custom to measure national R&D activity by percentages of GNP and gross dollars spent, but to me the most meaningful measure is the number of people employed in R&D. Innovation and new technologies come from use of brains, not just from the spending of dollars. The creation of technology, the development of new products, the effective use of innovation are just like any other challenge. They cannot be overcome simply by throwing money at them. They are solved by dedicated talented people working with the best tools and equipment towards specific objectives.

In 1977, the most recent year for which statistics are available, Canada with a population of 23.3 million employed 21,519 persons in industrial research and development. In contrast, Sweden with 8.3 million employed 24,245 and the Dutch with 13.9 million employed 26,448. The 53.5 million French had 120,638 of their number working in industrial R&D. West Germany with 61.4 million people had 197,800 and the Japanese with a population of 115 million employed 305,740. Our next door neighbor, the United States, with a population of 217 million had 393,700 working in industrial R&D.

As a percentage of population Canada had a third, or less-than-a-third, as many people working in industrial R&D as did the Swedes, the Germans and the Japanese. We had one-half or less-than-one-half as many as the Dutch, the French and the Americans.

These other nations, even the smallest ones, have realized that in a technological age, technology is power. Technology is like oil. You can't get along without it. If you don't have it you must buy it from those that do have it. And, again like oil, you buy it at *their* price. However, unlike oil you can create technology. It is the one inexhaustible resource.

R&D leadership

Much of this worldwide investment in industrial R&D, in fact, perhaps even the majority of it, is going into electronics and the two technologies which drive the electronics industry—semiconductors and software.

Electronics will be one of the five key industries in world development as far ahead as we can reasonably see—at least until well into the 1990s.

Canada has been given the opportunity again to become a power in the electronics era and electronics industry, largely because of the technological leadership of Northern Telecom in the world telecommunications industry. This was not part of our grand design. It has just happened that way.

In the late 1960s, we anticipated,

before the rest of the world did, the industry move from electro-mechanical telecommunications equipment to digital electronic equipment. Thus, we became the first company in the world to create and manufacture a full line of digital switching and transmission equipment.

Stated that way it sounds simple. It wasn't. Our digital leadership alone has required an R&D investment to date of more than $200 million, which could reach $500 million by 1985. Our total annual investment in R&D, measured as a percentage of sales, has been *14 times* greater than the national corporate average.

In becoming the country's largest manufacturer of electronic systems, we also became Canada's largest and only meaningful designer and manufacturer of integrated semiconductor circuits, and the largest designer and maker of software systems.

Because of this technological breakthrough in telecommunications, Canada again entered the electronics industry in a significant way for the first time since the country was eliminated from the electronic entertainment industry by foreign competition.

There is now an opportunity for Canada to build on the electronics capability that has been created by telecommunications. It can use this capability as a base upon which to build a much broader electronics industry designed to be so technologically advanced that it can compete successfully, as Northern Telecom is doing, in world markets and, in particular, in the United States

Electronics the key

The impact of electronics in the next decades will be all-pervasive. It will affect all of the industries key to Canada's industrial future—mining, fishing, pulp and paper, agriculture. We have a chance to develop for all of these Canadian industries electronic techniques, controls and systems that could have worldwide applications and mind-boggling potential for decades of positive balances of trade.

Both France and the UK have committed huge sums (France, $25 billion over five years) to the development of telecommunications, semiconductor and software technologies. Both have fully developed, government-financed strategies for the promotion of these industries. Both have fully developed, government-financed strategies to sell in world markets the products arising from the government-supported research.

Without some massive changes in priorities, in attitudes and in traditions in Ottawa, I cannot see Canada grasping what may be its last opportunity to enter the electronics era as a technology supplier rather than a technology buyer. Time is running out on us if, in fact, it has not already run out.

Federal finance people give too much attention to the so-called immediate loss of revenue instead of the long-term gain that comes from the financial support of R&D. When it comes to revenue, Ottawa wants its cake today, it wants to eat its cake and it wants its cake tomorrow.

While our political leaders joust with one another for the privilege of governing and taxing us according to their individual lights, our industrial future is slipping away into the hands of more committed, more aggressive, more knowledgeable, more mature nations who are literally investing billions of dollars in the development of new technologies—and in their economic futures. □

CAREERS AND OPPORTUNITIES

ADVERTISERS' INDEX

CAREERS AND OPPORTUNITIES

MINI-COMPUTERS FOR SALE

The following computer hardware will become available for sale starting approximately May 15. Preference will be given to those buyers who wish to purchase a complete system, however, offers on any or all devices will be seriously considered. A typical system consists of 64 K CPU, 80 MB disk drive, magnetic tape, printer, and 4 CRT's. They are currently operating in most major cities in Canada.

Description	Quantity
DG NOVA CPU 64 KB	1
KERONIX CPU 64 KB	8
SYSTEM INDUSTRY disk controller #9500	6
AMPEX disk drives (80 MB)	8
SYSTEM INDUSTRY disk controller #3045	2
DIABLO disk drives (10 MB) #44A	6
GE terminet 340 printers	5
WESTERN PERIPHERAL tape controller #TC120	6
KENNEDY tape drives 9000/9300	6
WANGCO tape drive	1
HAZELTINE 2000 CRT's	27
HAZELTINE 1500 CRT's	6
AMPEX test pack & tool kit disk packs (10 MB & 80 MB)	

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