

# Interesting Items and Vintage Computer Ads

Dave Jaffe

April 22, 2017

# Will ISA Survive?

[Link](#)

- From: Electronic Design, April 2017
- By: William Wong

# Diamond System's Aries PC/104 Plus

[Link](#)

- Intel E3800 Atom Processor
- PCI Express, 4 GB
- VGA, HDMI, LVDS, LCD
- PC/104, ISA, and PCI
- 4 Serial, 3 USB, 2 ethernet, SATA



# Diamond System's Venus

[Link](#)

- Core i5/i7
- PCI, 2 mini-PCles, and OneBank Plus
- 20 Gb, HDMI, VGA, LVDS
- 4 USB 2.0, 4 USB 3.0
- 4 Serial



# Build, Buy, or Both?

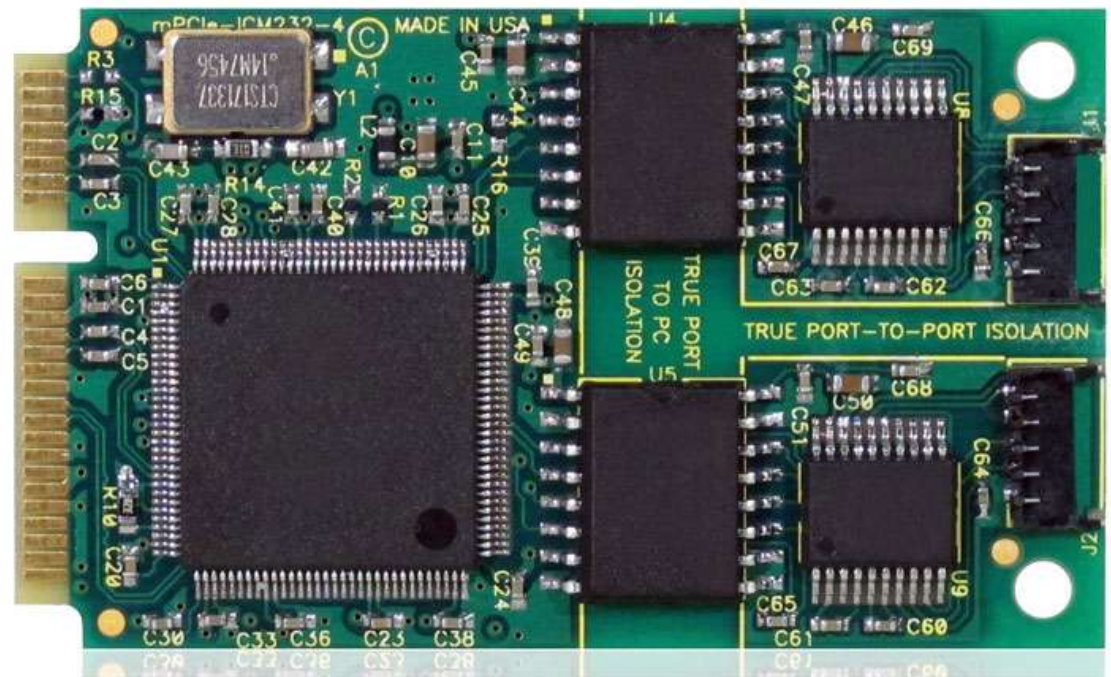
[Link](#)

- From: Electronic Design, May 2017
- By: William Wong

# ACCES I/O's mPCIe-ICM232-4

[Link](#)

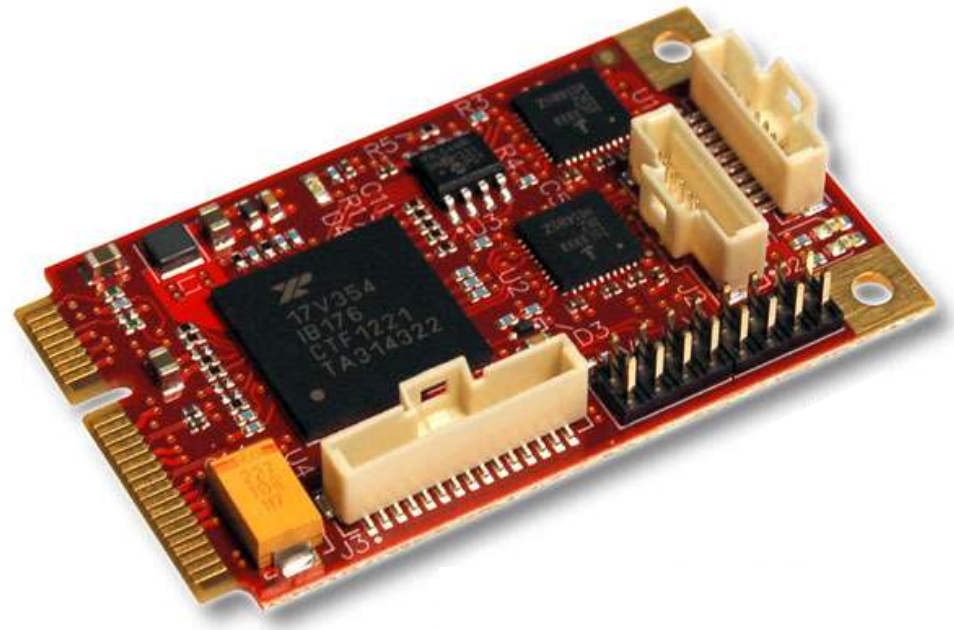
- PCI Express Mini Card
- 2 RS232 up to 921.6 kbps



# VersaLogic's Serial + GPIO

[Link](#)

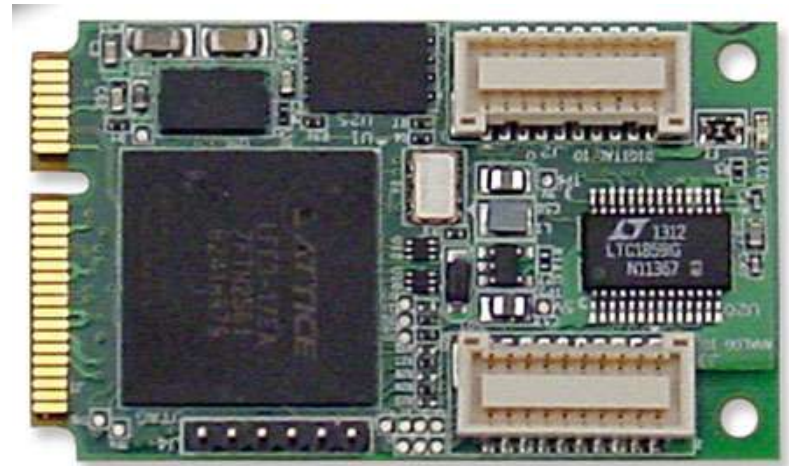
- Mini PCIe card
- 4 Serial (RS232, RS422, RS485)
- 12 GP I/O



# Diamond System's DS-MPE-DAQ0804

[Link](#)

- PCIeMiniCard
- 8 16-bit analog input
- 4 16-bit analog output
- 21 I/O lines





# Logic Supply – ML100G

[Link](#)

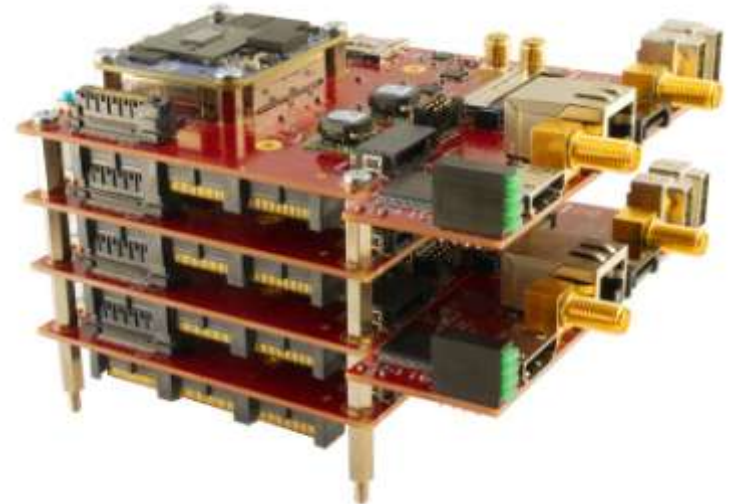
- Rigged NUC for industrial applications - \$600
- Intel i3, 2Gb, 64Gb SSD
- 4 USB 3.0, 1 ethernet
- 2 Mini display port
- 1 RS232 (optional)



# Sundance Multiprocessor Technology

[Link](#)

- PCIe/104 OneBank FPGA I/O Board
- XC7A100
- 1Gbyte DDR3, 32Mb Flash
- Xilinx Artix-7 FPGA for I/O interface
- Ethernet



# ADLINK Express BD7

[Link](#)

- 16 cores
- 10 Gb Ethernet
- 4 USB 3.0, 2 SATA, 2 Serial, 4 GPIO



# Congatec's conga-SA5 SMARC

[Link](#)

- Intel ATOM, Celeron, Pentium processors
- Up to 8 Gb
- 2 Ethernet ports
- 2 USB 3.0, 2 USB 2.0
- 1 SATA 3
- 2 I2C, 2 SPI, 4 UARTS,
- Sound, graphics support



# DFI Technology's QSeven

[Link](#)

- Intel Atom 3800 & 3900, Freescale i.MX6
- 1 – 8 Gb,
- Display options
- Up to 2 SATA & 1 SD



# Raspberry Pi Compute Module 3

[Link](#)

- Mounts in [Gumstix Pi Compute Dev Board](#) \$49
- Based on BCM2835 processor @ 1.2 Ghz
- 2X RAM (1 GB) & 10X performance
- 4 GB Flash
- \$25 & \$35



# Pixevia's Core X1

[Link](#)

- Supports Jetson TX1 and TX2
- Targets drone & real time video applications
- 4X 64bit ARM A57 2MB L2
- Maxwell 256 core GPU
- 2 USB 3, 2 USB2, 3 UART, HDMI, I<sup>2</sup>C, CAN
- 3D accelerometer, 3D Gyro, 3D compass, barometer



# Nano Dimensions' Dragonfly 2020

[Link](#)

- 3D printer generates multilayer PCBs
- No limit to number of layers
- 10 layer board takes hours to print
- Works with Gerber files





# terasIC DE1-SoC Board

[Link](#)

- Altera University Program - \$175
- Altera System-on-Chip FPGA – Dual core Cortex A9
- Dev Kit available
- 64 Mb SRAM, ethernet, UART, video, audio
- Buttons, switches, 7 segment, LCD, 8 12-bit ADC, 2 USB



# Rubik's Cube

- Altera showcased Terasic's "Rubik's Cube Solving Robot"
- Massive Rubik's Cube installed on University of Michigan campus



# tinyTILE - Intel Curie Based Board

[Link](#)

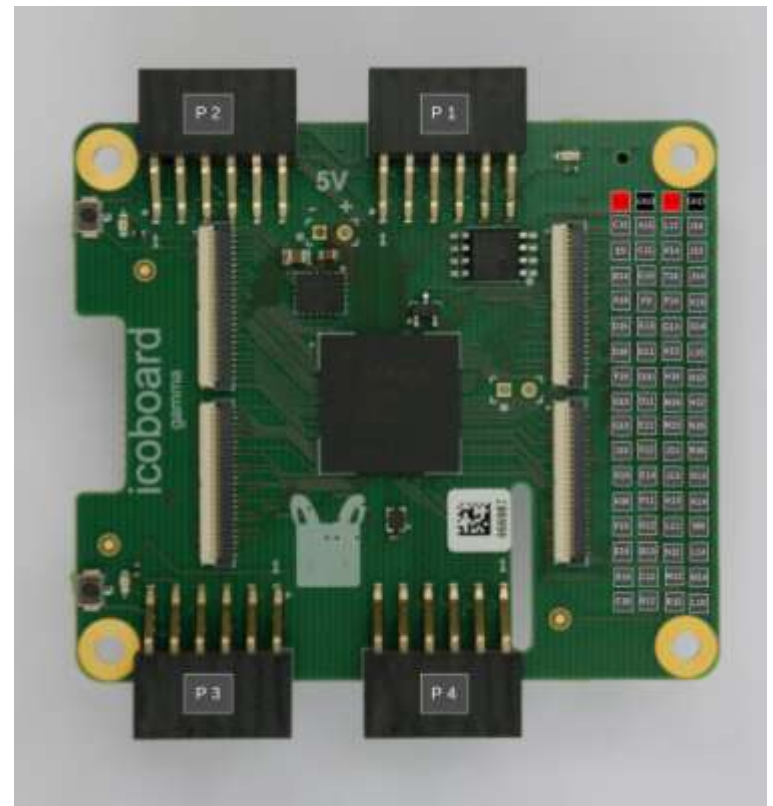
- [Low power 32-bit Quark microcontroller](#) – 35 x 26 mm – \$39
- 384 Kb Flash, 80Kb SRAM
- BLE
- 6 axis accelerometer / gyro
- [Arduino module](#) - \$30



# icoBoard

[Link](#)

- FPGA, Memory, I/O Board for Raspberry Pi
- 16 Mb Flash, 128 Mb SRAM



# myStorm BlackIce Board

[Link](#)

- Lattice FPGA, 256Kb SRAM, 4 LEDs, 6 switches
- 80 Mhz ARM Cortex M4
- SPI, UART, 60 I/O, USB
- \$30



# Microchip ATmega168PB Xplained Mini

[Link](#)

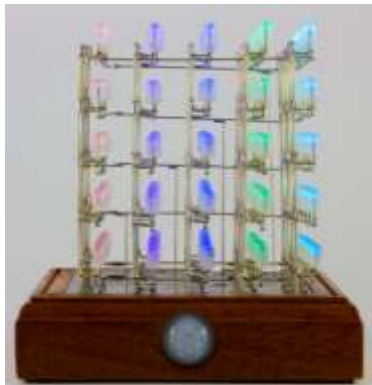
- ATmega168PB microcontroller with debugger
- Integrates with Atmel Studio
- Virtual COM port
- 16 Mhz clock, USB powered



# Microchip AC100200 LED Light Cube

[Link](#)

- 125 RGD LEDs - \$70
- 12 custom scenes
- Light sensor for dimming
- Bluetooth control
- UART, timer, output compare, SPI



# LCR SBC System

[Link](#)

- Xeon Core i7
- 32 GB, < 8 lb
- Dual display ports
- Multiple configurations: ethernet, USB, audio
- Space for 2 SSD





# Microchip 32-bit Curiosity Boards

[Link](#)

- PIC32MZ EF CPU
- 2 Mb Flash, 512 Kb RAM
- Integrated FPU
- Wi-Fi module, GPIO
- Bluetooth, stereo audio
- Sockets for MikroElektronika adapter boards



# Vintage Computer Ads

[10 Fun Tech Ads through the Years](#)

[40 Vintage Computer Ads of Yesteryears](#)

# Now you can get our disk systems within 30 days ARO at the industry's lowest prices:

- 80 Mbytes for under \$12K\*
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Field-proven reliability, total software support and 30-day delivery. You've come to expect them all from us. And that's why we've become the world's largest independent supplier of minicomputer disk storage systems.

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The prices listed above are for complete disk systems ready to plug into your minicomputer. Each system includes our high-performance controller, an appropriate minicomputer interface and the software of your choice.

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## System Industries

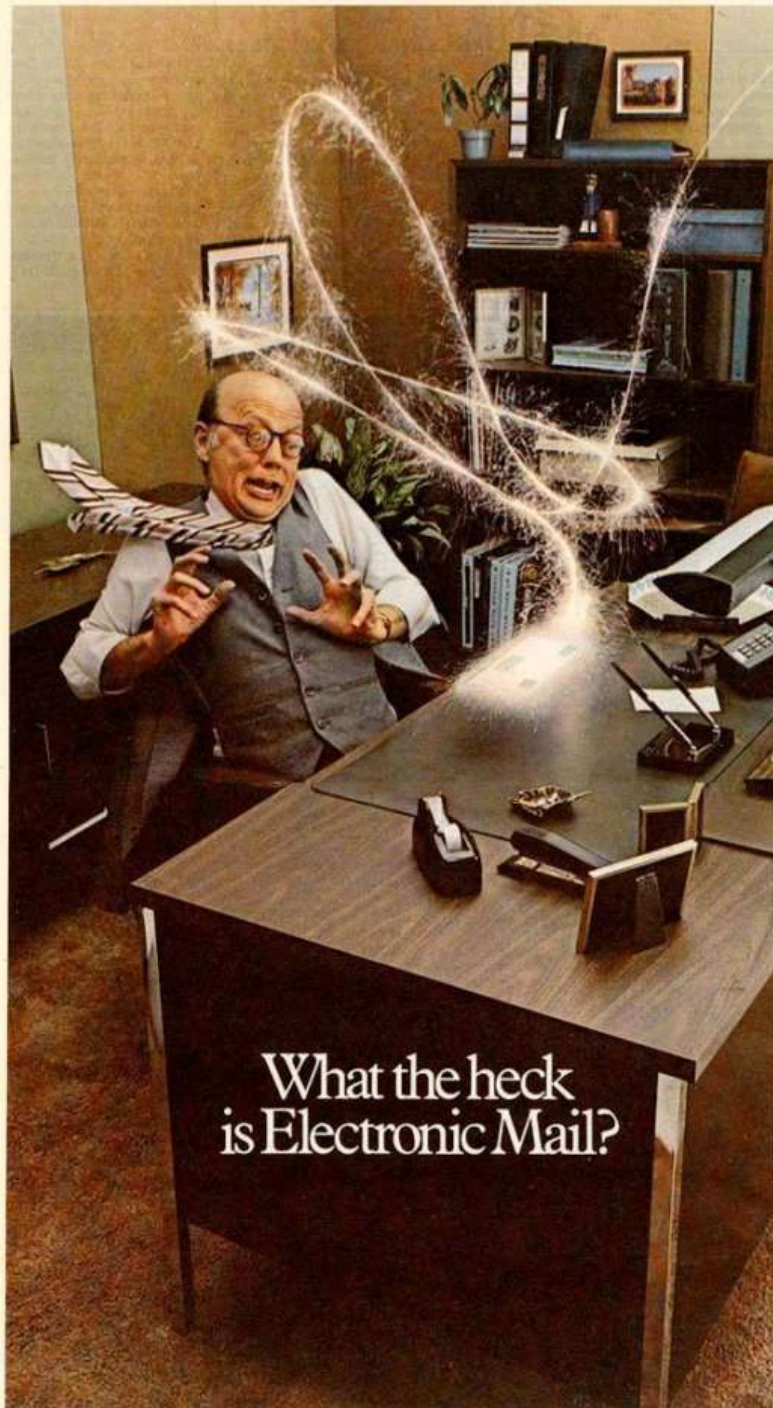
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\* OEM prices: 40-69 systems.

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**Washington, D.C.:** (202) 337-1180. **Cincinnati:** (513) 661-9156. **Los Angeles:** (714) 752-8904. **Houston:** (713) 465-2700.  
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What the heck  
is Electronic Mail?

Electronic Mail is a term that's been bandied about data processing circles for years.

Simply put, it means high-speed information transportation.

One of the most advanced methods is terminals talking to one another.

Your mailbox is the terminal on your desk. Punch a key and today's correspondence and messages are displayed instantly.

Need to notify people immediately of a fast-breaking development? Have your messages delivered to their terminal mailboxes electronically, across the hall or around the world.

Electronic Mail is document distribution that's more timely, accurate and flexible than traditional methods.

There's no mountain of paperwork.

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\*Runs on most Z80/8080/8085 microcomputers with CP/M (TM of Digital Research), 48K, and terminal with addressable cursor.

# SWEATY PALMS? DOUBLE VISION? COBOLITIS!

You say you don't know your process from your loop?  
Or your CASE from your GOTO?

No doubt, you're suffering from COBOLitis — a dread affliction characterized by insecurity and ignorance. There's only one cure, and it's contained between the covers of two books entitled **Learning to Program in Structured COBOL, Parts 1 and 2**. Taken in large doses at least once a day, these books will help you become a confident, more competent COBOL programmer.

**COBOL Part 1** teaches beginning students how to write structured code that works. Written by Edward Yourdon, Chris Gane, and Trish Sarson, the book serves as a sound introduction to structured programming using COBOL. Now available in a new, second edition, this classic 280-page text first presents the basic steps of a simple computer project, introducing progressively difficult levels of detail later. Topics include Processes, Decisions & Loops; Defining Data; Doing Arithmetic; Developing Programs; Program Logic; Data Entry & Retrieval; Index.

**COBOL Part 2** by Timothy R. Lister and Edward Yourdon treats the more advanced features of COBOL using structured code. All discussions and numerous, tested programming examples illustrate the proper way to develop reliable, maintainable, readable COBOL code and programs. Topics in this 224-page text include Facilities; Internal Coding & the DATA DIVISION; Tables; Advanced I/O Techniques; Sorting & Merging; Testing & Debugging; Efficiency & Optimization; Index.

If you've grown to like sweaty palms and double vision, there is another reason to buy these books: Order the set today, and get a special package rate of \$22.50. But don't delay. After January 1, 1979, each book will cost you \$15, and your COBOLitis may become terminal.

---

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- Payment enclosed for \_\_\_\_\_ copies of **COBOL Part 2** @ \$12.50.
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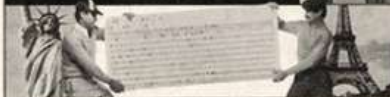
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Address: \_\_\_\_\_

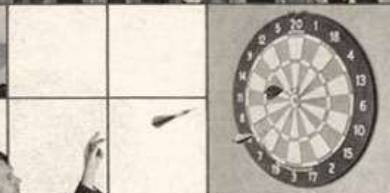
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# The Personal Mainframe.

And how to know  
if you need it.



When hundreds of people  
in different places  
need the same information.



When people  
are waiting  
in line for their  
applications.



When your software costs  
are always higher than  
you planned on.



When you can't predict how  
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next year.



When some people need  
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need a number-cruncher.



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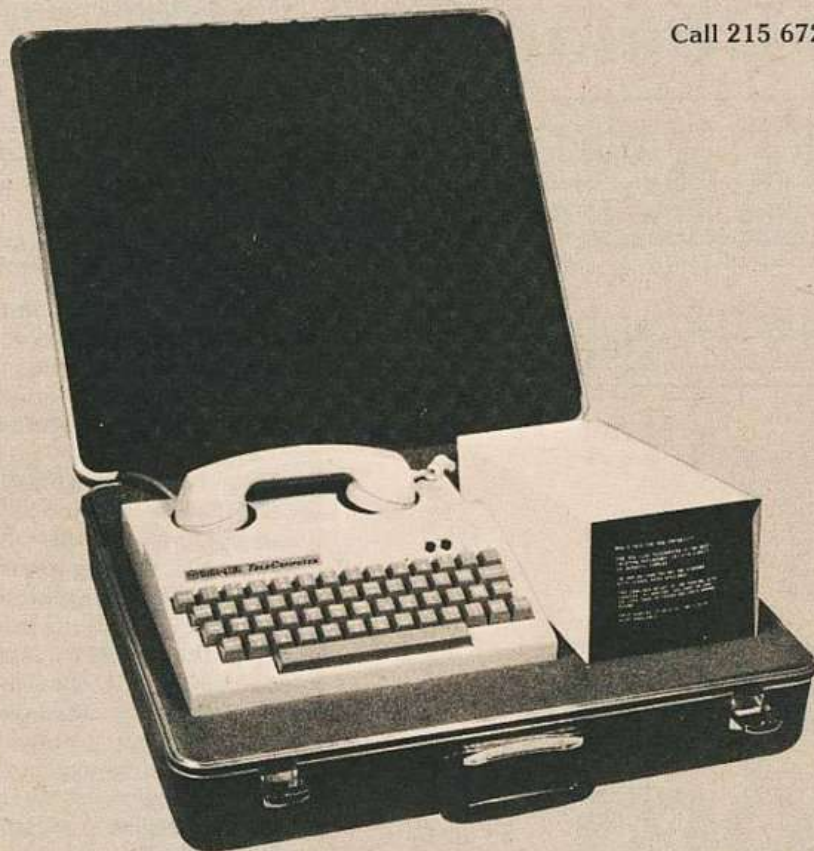
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The heart of it is our exclusive bar code. Which you'll find beneath every English character on IBM's DF-2 element.

This little ball turns an ordinary Selectric typewriter into the only bilingual input device in the world.

So, instead of a big, expensive data preparation center and the expensive personnel that go with it, all you need is a couple of Selectrics, (which you may already have), a few DF-2 elements and our Optical Page

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of \$36,000. Because they have to make up to 150 decisions per character. Thanks to the bar code, our reader only has to make 7.

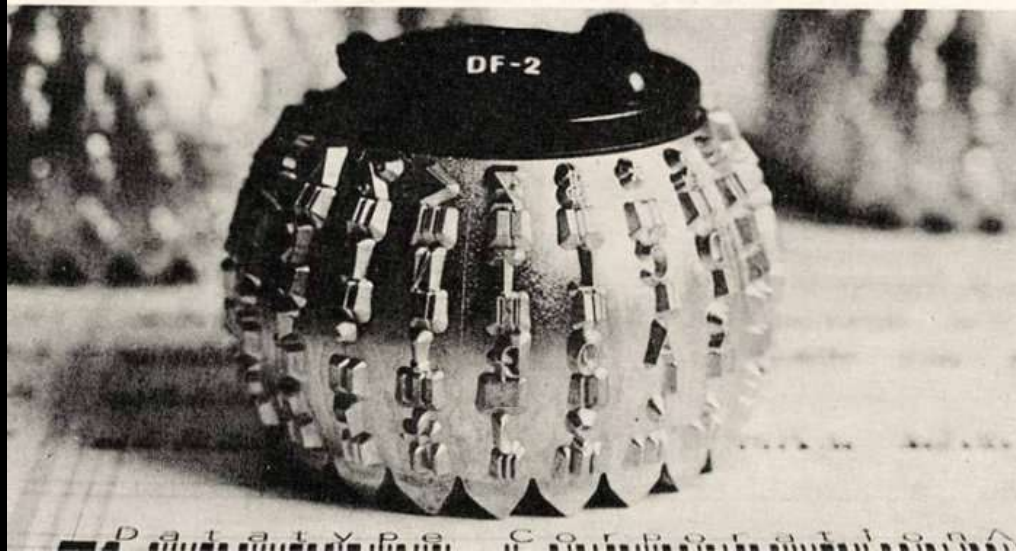
The people responsible for your input are efficient, too. An average typist is about 28% more productive than an average keypunch operator. And you know how their salaries compare.

We've got a substantial base of satisfied customers already. And we're getting more every day. Why not give us a call soon? Or come check us out at the Spring Joint?

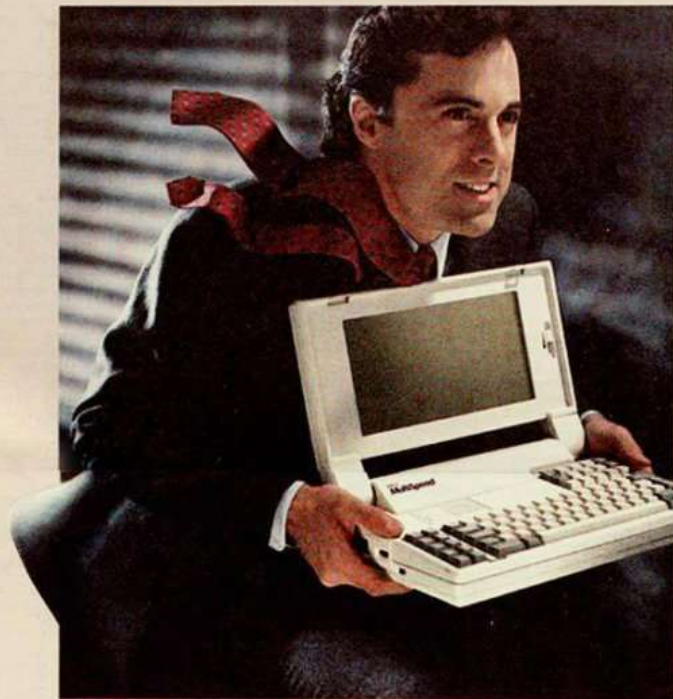
It's about time you got on the ball.

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on the ball.**



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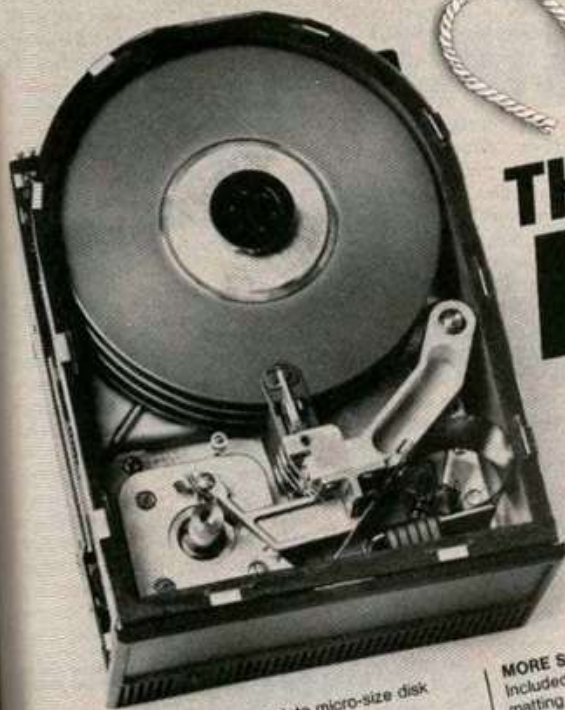
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Floppy disk and larger, more expensive hard disks are no match for this powerful little system. More data is available on every seek: 64K on 10MB and 32K on 5MB. Faster seek time too — an average of 70MS. It provides solid performance anywhere with only 20 watts of power. Data is protected in the sealed enclosure, and the landing zone for heads provides another margin of safety. The optional power board plugs directly into the S100 bus and provides power for the drive.

#### **FAST CONTROLLER**

The XCOMP controller is the key to this system's high efficiency operation. Speed-up features include interleave without table lookup, block-deblock with controller buffer, and read lookahead. OEMs worldwide have already proven the outstanding performance of the XCOMP controller.

#### **MORE SOFTWARE**

Included with the system is software for testing, formatting, I/O drivers for CP/M<sup>®</sup>, plus an automatic CP/M driver attach program. Support software and drivers for MP/M<sup>®</sup> and Oasis<sup>®</sup> are also available. The sophisticated formatting program assigns alternate sectors for any weak sectors detected during formatting, assuring the lowest possible error rate — at least ten times better than floppies.

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Circle 405 on inquiry card.

# Seagate's 80MB ST4096

## The capacity is high. The price is not.

If you have a voracious appetite for computer storage, Seagate's ST4096 is the drive for you.

This full-height 5.25" drive features a full 80 megabytes of formatted storage capacity, compared to other drives that format down to 72MB. With capacity this high, the ST4096 is ideal for heavy database or spreadsheet applications.

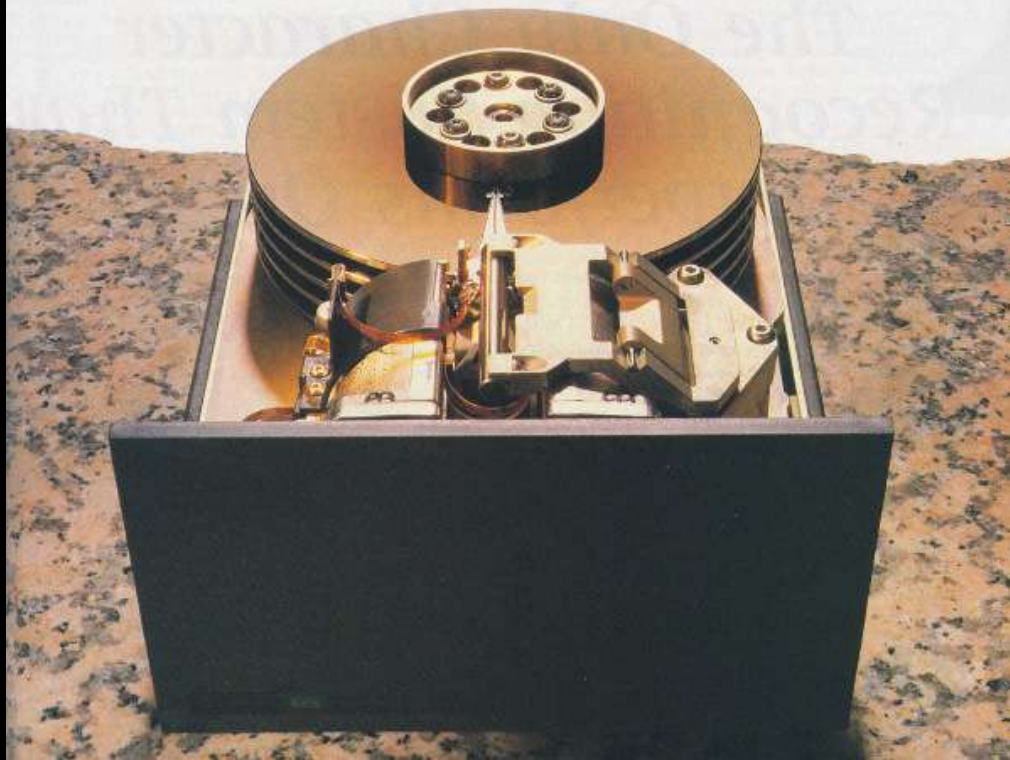
If it's a multiuser system you have in mind, the ST4096 offers a speedy 28ms access time for quick system response.

Every ST4096 we ship comes complete with menu-driven utility software for easy installation, partitioning and data management. It's just the kind of added value you'd expect from the first name in disc drives.

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The first name in disc drives



# 10 Megabyte Hard Disk \$3,495\*



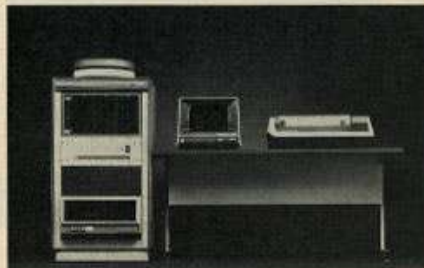
5440-12 Top Load Drive

\* Factory rebuilt 10MB cartridge disk drive only  
A new Cameo Data Systems controller is available for \$1,495  
\$1,495 for a brand new Ampex 10MB drive only



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## COMPUTER COMPONENTS

# First compare quality. Then compare cost.

**Morrow Designs' 10 megabyte  
hard disk system: \$3,695.**

#### MORE MEMORY. LESS MONEY.

Compare Morrow Designs' DISCUS™ M26™ hard disk systems to any system available for S-100 or Cromemco machines. First, compare features. Then, compare cost per megabyte. The M26 works out to under \$200 a megabyte. And the M10 is about half the cost of competing systems.

#### COMPLETE SUBSYSTEMS.

Both the M10 (8"), and the M26 (14"), are delivered complete with disk controller, cables, fan, power supply, cabinet and CP/M® operating system. It's your choice: 10 Mb 8" at \$3,695 or 26 Mb 14" at \$4,995. That's single unit. Quantity prices are available.

#### BUILD TO FOUR DRIVES.

104 Megabytes with the M26. 40+ megabytes with the M10. Formatted. Additional drives: M26: \$4,495. M10: \$3,195. Quantity discounts available.

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**Morrow Designs'  
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Sausalito, CA, (415) 332-4443, offers a CP/M expanded to full Cromemco CDOS compatibility.

#### AND NOW, MULT-I/O.™

Mult-I/O is an I/O controller that allows multi-terminal and multi-purpose use of S-100 and Cromemco computers. Three serial and two parallel output ports. Real time clock. Fully programmable interrupt controller. Designed with daisy-wheel printers in mind. Price: \$299 (kit), \$349 assembled and tested.

#### MAKE HARD COMPARISONS.

You'll find that Morrow Designs' hard disk systems offer the best price/performance ratios available for S-100, Cromemco and North Star computers. See the M26 and M10 hard disk subsystems at your computer dealer. Or, write Morrow Designs. Need information fast? Call us at (415) 524-2101.

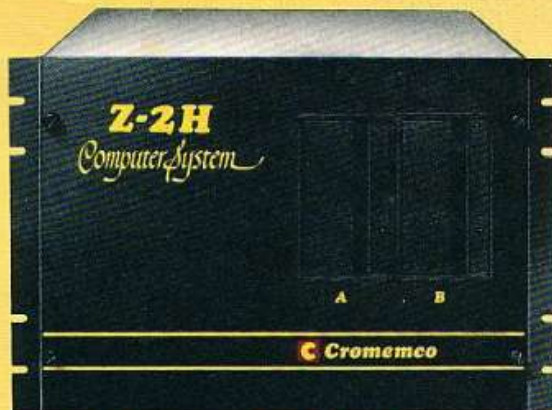
**Look to Morrow  
for answers.**

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North Star is a trademark of North Star Computers, Inc.





## Low-cost hard disk computers are here

11 megabytes of hard disk and 64 kilobytes of fast RAM in a Z80A computer for under \$10K. Two floppy drives, too. Naturally, it's from Cromemco.

It's a reality. In Cromemco's new Model Z-2H you get all of the above and even more. With Cromemco you get it all.

In this new Model Z-2H you get not only a large-storage Winchester hard disk drive but also two floppy disk drives. In the hard disk drive you get unprecedented storage capacity at this price—11 megabytes unformatted.

You get speed—both in the 4 MHz Z80A microprocessor and in the fast 64K RAM which has a chip access time of only 150 nanoseconds. You get speed in the computer minimum instruction execution time of 1 microsecond. You get speed in the hard disk transfer rate of 5.6 megabits/sec.

### EXPANDABILITY

You get expandability, too. The high-speed RAM can be expanded to 512 kilobytes if you wish.

And the computer has a full 12-slot card cage you can use for additional RAM and interface cards.

### BROADEST SOFTWARE SUPPORT

With the Z-2H you also get the broadest software support in the

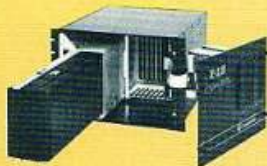
microcomputer field. Software Cromemco is known for. Software like this:

- Extended BASIC
- FORTRAN IV
- RATFOR (RATIONAL FORtran)
- COBOL
- Z80 Macro Assembler
- Word Processing System
- Data Base Management

with more coming all the time.

### SMALL, RUGGED, RELIABLE

With all its features the new Z-2H, including its hard disk drive, is still housed in just one small cabinet.



Hard disk drive at lower left can be interchanged just by sliding out and disconnecting plug. Seven free card slots are available. Z-2H includes printer interface card.

Included in that cabinet, too, is Cromemco ruggedness and reliability. Cromemco is time-proved. Our equipment is a survey winner for reliability. Of course, there's Cromemco's all-metal cabinet. Rugged, solid. And, there's the heavy-duty power supply (30A @ 8V, 15A @ +18 V, and 15A @ -18V) for circuitry you'll sooner or later want to plug into those free card slots.

### CALL NOW

With its high performance and low price you KNOW this new Z-2H is going to be a smash. Look into it right now. Contact your Cromemco computer store and get our sales literature. Find out when you can see it. Many dealers will be showing the Z-2H soon—and you'll want to be there when they do.

### PRESENT CROMEMCO USERS

We've kept you in mind, too. Ask about the new Model HDD Disk Drive which can combine with your present Cromemco computer to give you up to 22 megabytes of disk storage.



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CIRCLE 135 ON READER SERVICE CARD



## You always find something in the last place you look. Unfortunately, the average hard disk has about 20,000 places.

Of course, you might get lucky. And find the file you want in the 19,992nd place.

Or, you can find it almost immediately with new Lotus® Magellan® 2.0.

When you can't remember a file name, just type in a word, phrase, or concept related to it. Magellan will search your entire hard disk and come back with a list of relevant files in seconds.

Scroll down the list and you'll see each one as it actually appears in its application. Even if it's a graphics file. When you find the file you want, a single

keystroke launches the application and loads the file.

Magellan simplifies all of the other utility functions you use most, too. Copy, Delete, Move, Sort, Back-up or Rename files, groups of files, or entire directory

branches in the Tree mode, with one keystroke. And Undelete erased files just as easily. Even view a deleted file before you decide to restore it.

Magellan also lets you save disk space by compressing data files

up to 50%, with the built-in PKzip™ file compressor. And view compressed files without expanding them.

And since Magellan is customizable, you can turn any of its functions on and off, or even build custom menus.

All of which is why *PC Magazine* said, "Magellan could very well be the finest utility ever written for the PC." And why every major computing magazine has given it practically every award they have.

**Call 1-800-TRADE-UP, extension 578, for a free auto demo disk.**

You'll see. It's exactly what you've been looking for.



*Magellan lets you find a file in seconds, even when you can't remember its name.*



New Magellan 2.0 from Lotus



**“For reliable data storage,  
I recommend systems with  
Shugart disk drives.”** Tom Knight, President—  
Nycom, Los Altos, California

“The last thing you need when you put your personal computer or small business system to work is a disk drive that you can't rely on. If the drive quits, your system is out of business.”

That's why more and more manufacturers and dealers depend on Shugart disk drives for reliable data storage. These professionals don't want disk drive problems any more than you do. Shugart has a

large family of drives, too—in all sizes and capacities to suit your system storage needs. For the smaller system, the original 5¼-inch Minifloppy™ stores 250 to 500 kilobytes (single or double-sided)—that's about 50 to 100 pages of printed material. Our single and double-sided 8-inch floppies store 800 to 1600 kilobytes. And for systems that need a larger data base, our 8-inch or 14-inch fixed disk drives

store from 5 to 58 megabytes. No other manufacturer offers such a wide variety of disk storage for personal computer and small business systems.

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Because of its ability to reduce large volumes of data at tremendous speeds, the Univac Scientific System easily handles even the most difficult research problems. Furthermore, it offers many other outstanding characteristics, including: superb operating efficiency, obtained through large storage capacity . . . great programming versatility . . . the ability to

operate simultaneously with a wide variety of input-output devices . . . and far greater reliability than any computer of its type.

For more information about the Univac Scientific System or for information about ways in which you might apply the system to your particular problems, write on your business letterhead to . . .

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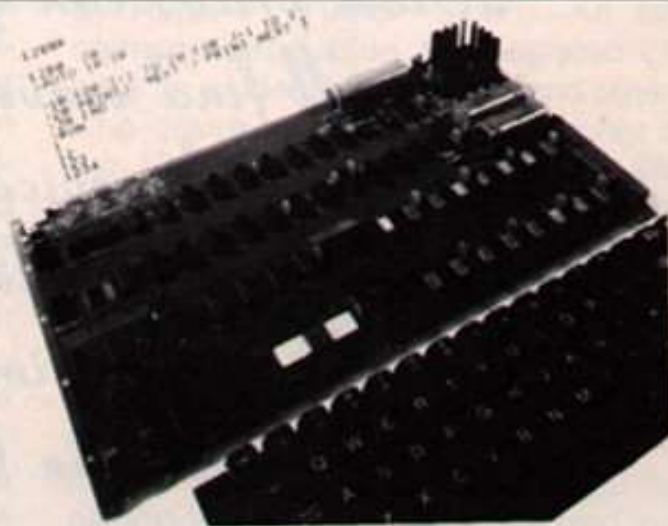
**Remington Rand Univac**

DIVISION OF SPERRY RAND CORPORATION

## A BALANCE OF FEATURES

The APPLE-1 SYSTEM is a fully assembled, tested & burned-in microprocessor board using the 6502 microprocessor. The board contains processor & support hardware; **complete video electronics** for a 40 character/line, 24 line video display; **on-board RAM capacity of 8K BYTES**; software system monitor in PROM; and fully regulated power supplies. The Apple attaches directly to an ASCII encoded keyboard and a video monitor, allowing the efficient entry and examination of programs in hexadecimal notation. The use of the new **16-pin 4K RAM chips** results in low power and high density memory, which can be upgraded to the 16K chips when they become available (32K bytes on-board RAM!!)

A fast (1 kilobaud) cassette interface is available and includes a tape of **Apple Basic**. And ... Yes, Folks, **Apple Basic is Free!**



**APPLE-1** **\$666.66**  
\*includes 4K bytes RAM

- |                  |  |
|------------------|--|
| <b>Micro</b>     | • 6502 Microprocessor  |
| <b>Interface</b> | • Full video display electronics - 40 char/line, 24 line. Outputs composite video. |
|                  | • Has ASCII keyboard interface on-board.   |
|                  | • Cassette interface board available. FAST - 1 Kilobaud.                           |
| <b>Memory</b>    | • Uses 16-pin 4K Dynamic RAMS.   |
|                  | • 8K BYTE RAM capacity on-board!   |
|                  | • Upgradable to 16K RAM chips.   |
|                  | • Software system monitor in PROM  |
| <b>Basic</b>     | • Apple Basic ... pseudo-compiled. FAST, FREE.                                     |
| <b>Power</b>     | • Fully regulated power supplies on-board.   |

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The most personal computer. 

# Two Bytes Are Better Than One

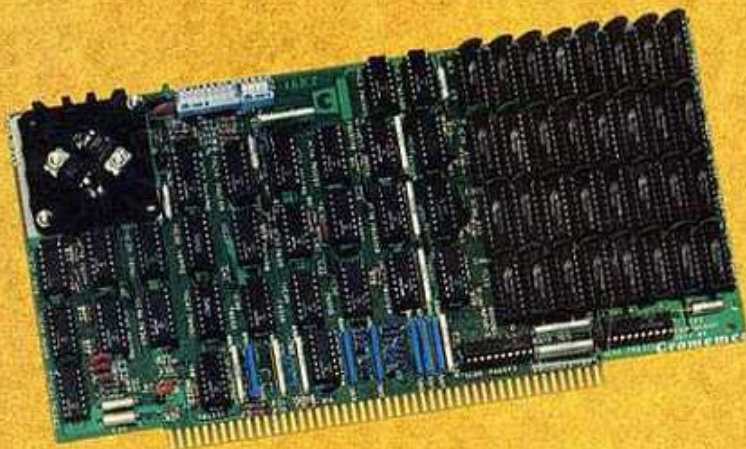


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## The new 16K RAM card that turns your computer into a working giant

Available now —  
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Here's the industry's leading 16K RAM card.

It has two outstanding features that make it important to you:

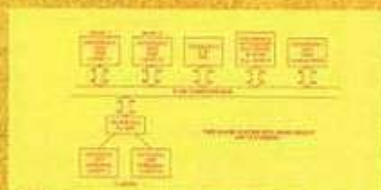
(1) **It's fast!** It operates up to 4 MHz with **no wait states**. That's important because it lets you run programs on your Cromemco Z-1 and Z-2 computers in about half the time required by other systems. Even if your present computer is not 4 MHz fast, this new Model 16KZ RAM equips you for the time when you'll need and want higher computer speed.

(2) **It has Cromemco's Bank-Select feature.** Bank-Select lets you expand memory far beyond 64K bytes. Not just beyond 64K but far beyond — up to 512K bytes if you wish. Again, with Cromemco you get present outstanding performance plus obsolescence protection.

Bank-Select lets you organize memory into 8 banks of 64K each. The active bank is software-selected.

### A useful giant

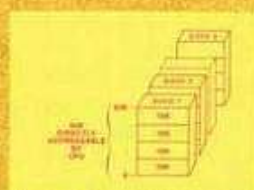
Whatever your S-100 bus computer — Cromemco, Altair 8800 or IMSAI 8080 — you can have enormous memory with the new Model



16KZ. You can run the large programs and files that make computers truly valuable — that take them out of the toy class and make them useful, producing units.

With Bank-Select you can even operate an S-100 bus computer as a time-share computer with up to 8 stations. A given memory bank can be accessed only by one station, so there is full confidentiality.

**Advanced Cromemco engineering** — Designing a 16K RAM card to operate at 4 MHz is a significant engineering accomplishment. That's why



Cromemco with our strong engineering staff is the only manufacturer to offer such a card.

And notice that this advanced card is available and ready for delivery — at your store or from the factory.

**16K RAM memory kit**  
(Model 16KZ-K) . . . . . \$495.  
**16K RAM memory assembled,**  
**tested, and burned in for 160**  
**hours (Model 16KZ-W) . . . . . \$795.**

Mastercharge and BankAmericard accepted with signed orders. Show complete card number and expiration date. California users add 6% or 8.25% sales tax as applicable.



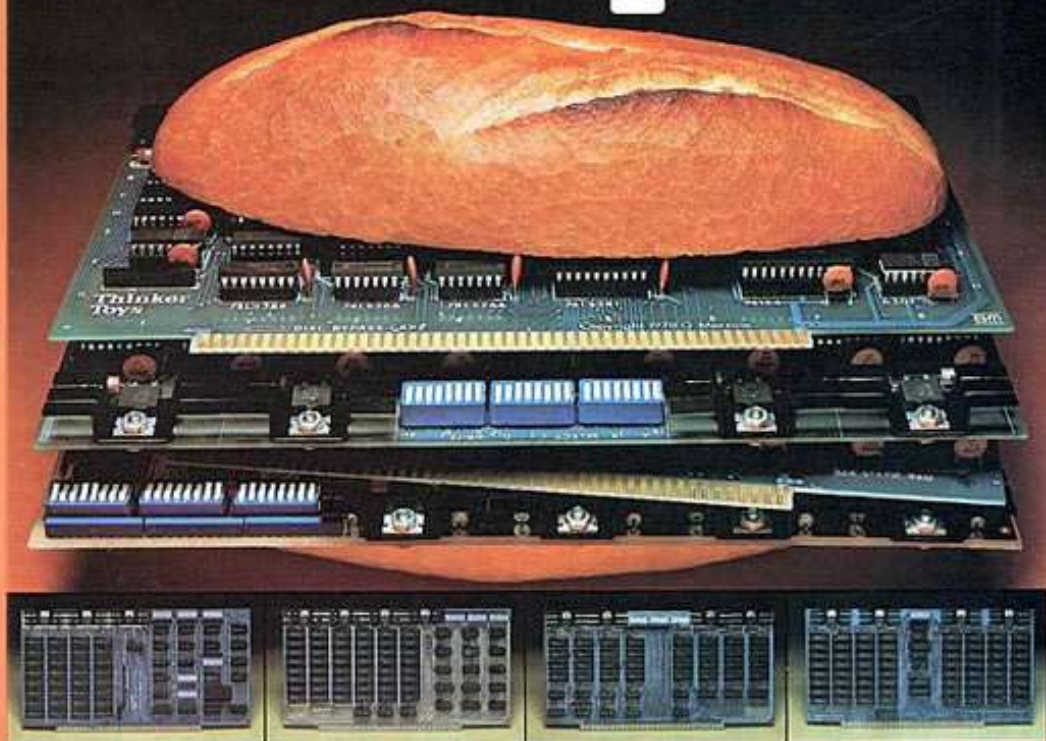
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# 2¢ a byte!



MM16K/\$349 = 2.1¢

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**N**ow you can afford to sink your teeth into some big, feature-packed static memories. Because George Morrow's ultra-efficient designs have brought S-100 memory down to 2¢ a byte.

Introducing Morrow's new "MemoryMaster" Bank Select Logic memories, the top of the SuperRam™ line.

The SuperRam™ MemoryMaster 16K Static may be the most sophisticated S-100 memory at any price. The MM16K is switch-programmable to write-protect any of the four 4K blocks... or to open invisible 1K "windows" to accommodate VDM's or disk controllers. An on-board I/O device and jumper block allow you to use the memory-extending Bank Select Logic features of your software.

Yet, the SuperRam™ MemoryMaster 16K kit is just 2.1¢ a byte at \$349. Assembled and tested, \$399.

The SuperRam™ MemoryMaster is also available in 24K configuration: 3 individually write-protectable 8K blocks with Bank Select Logic capability. MM24K Kit, \$499. Assembled and tested, \$549.

Or, get your memory at a rock-bottom 1.8¢ a byte with the SuperRam™ 16K Static. It gives you 4 individual 4K blocks... plus the ability to switch-enable the Phantom Line for power-up sequencing. Kit, \$299. Assembled and tested, \$349.

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# extensys corporation

# 64K for \$1495

## The most cost effective products for your microcomputer.

RM64  
64K bytes

**THE EXTENSYS RM64 MEMORY BOARD** provides the most cost effective system memory found in the industry. The RM64 provides this because of our low cost per byte when compared to our competition plus the increased reliability of a single board over multiple boards containing less memory. The board is S-100 bus compatible making it usable in over a dozen different microcomputer systems including ALTAIR and IMSA1. The RM64 is available in three configurations: 32K, 48K or 64K bytes of memory all on ONE board. The board is completely assembled, checked out and burned in for at least 50 hours prior to shipment. This complete testing procedure allows Extensys to provide a one year warranty on parts, labor and materials (assuming no misuse of the board occurs).

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- Individual memory bank address selection in 8K byte increments;
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- Board select logic which allows more than one 64K byte board per system;
- S-100 bus compatibility including on-board voltage regulator;
- Memory overlap which allows memory sharing the same address space to coexist in the same system;



Write protection in 16K blocks; and

Fully socketed for 64K, allowing 32K and 48K versions to be upgraded at a later date.

Delivery of the RM64 is 15 to 30 DAYS upon receipt of order. Prices for the RM64 include shipping and handling prepaid in the continental United States.

EXTENSYS Corporation is also announcing several other new highly cost effective products. These include a total floppy disk system based around File I/O board and a multiprocessor operating system. The other product, which interfaces with the RM64 memory board to create a megabyte or more of memory and adds full DMA capability to the File I/O board, is a Board Select/DMA board. Both of these products are S-100 compatible.

Contact your local computer store or order directly from EXTENSYS

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So nobody knows better than Sony how important high standards are for producing 3.5" floppy disks. But then, Sony invented those, too, as well as the most demanding methods for making 3.5" disks.

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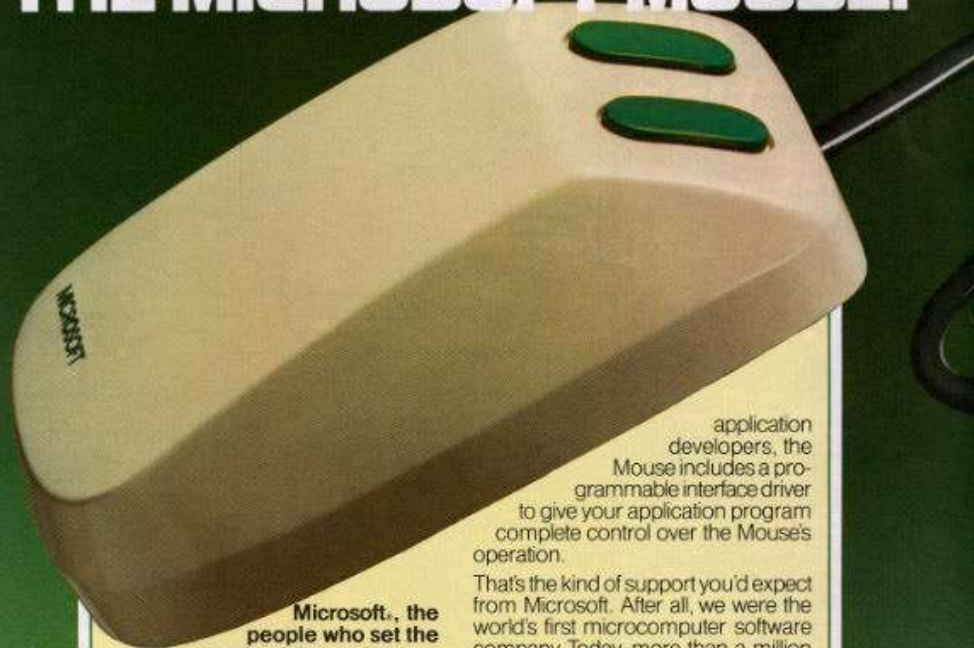
The LOGITECH HiRez Mouse.

For the dealer nearest you, call 800-231-7717 (800-552-8885 in California), or write Logitech, Inc., 6505 Kaiser Drive, Fremont, CA 94555. In Europe, call or write: Logitech Switzerland, European Headquarters, CH-1111 Romanel/Morges, Switzerland (+41-21-869-9656).

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The Mouse lets you move the cursor freely and naturally, then execute commands at the push of a button.

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That's the kind of support you'd expect from Microsoft. After all, we were the world's first microcomputer software company. Today, more than a million microcomputers are running Microsoft languages, operating systems, application programs, and hardware-software combinations.

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**The Sinclair ZX80.**  
A complete computer—  
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It's the Sinclair ZX80, the computer that independent tests prove is faster than all previous personal computers. The computer that "Personal Computer World" gave 5 stars for 'excellent value.'

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Yet, with all this power, the ZX80 is easy to use, even for beginners.



## Your course in computing.

The ZX80 comes complete with its own 128-page guide to computing. The manual is perfect for both novice and expert. For every chapter of theory, there's a chapter of practice. So you learn by doing—not just by reading. It makes learning easy, exciting and enjoyable.

## The ZX80's advanced design features.

Sinclair's 4K integer BASIC has performance features you'd expect only on much larger and more expensive computers. These include:

- Unique 'one touch' entry. Key words (RUN, PRINT, LIST, etc.) have their own single-key entry and are stored as a single character to reduce typing and save memory space.
- Automatic error detection. A cursor identifies errors immediately to prevent



entering programs with faults.

- Powerful text editing facilities.
- Also programmable in machine code.
- Excellent string handling capability—up to 26 string variables of any length.
- Graphics, with 22 standard symbols.
- Built-in random number generator for games and simulations.

Sinclair's BASIC places no arbitrary restrictions on you—with many other flexible features, such as variable names of any length.

And the computer that can do so much for you now will do even more in the future. Options will include expansion of 1K user memory to 16K, a plug-in 8K floating-point BASIC chip, applications software, and other peripherals.

## Order your ZX80 now!

The ZX80 is available only by mail from Sinclair, a leading manufacturer of consumer electronics worldwide. We've already sold tens of thousands of units in Europe, so demand will be great.

To order by mail, use the coupon below. But for fastest delivery, order by phone and charge to your Master Charge or VISA. The ZX80 is backed by a 30-day money-back guarantee, a 90-day limited warranty with a national service-by-mail facility, and extended service contracts are available for a minimal charge.

Price includes TV and cassette connectors, AC adaptor, and 128-page manual.

All you need to use your ZX80 is a standard TV (color or black and white). The ZX80 comes complete with connectors that easily hook up to the antenna terminals of your TV. Also included is a connector for a portable cassette recorder, if you choose to store programs. (You use an ordinary blank cassette.)



The ZX80 is a family learning aid. Children 10 and above will quickly understand the principles of computing—and have fun learning.

Phone orders only: (203) 265-9171. We'll refund the cost of your call.  
Information: General and technical—(617) 367-1988, 367-1909, 367-1898, 367-2555.  
Phones open Monday-Friday from 8 AM to 8 PM EST.

# sinclair

Sinclair Research Ltd., 475 Main St.,  
P.O. Box 3027, Wallingford, CT 06492.

To: Sinclair Research Ltd., 475 Main St., P.O. Box 3027, Wallingford, CT 06492.  
Please send me \_\_\_\_\_ ZX80 personal computer(s) at \$199.95\* each (US dollars), plus \$5 shipping. (Your ZX80 may be tax deductible.)  
I enclose a check/money order payable to Sinclair Research Ltd. for \$ \_\_\_\_\_

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

Occupation: \_\_\_\_\_ Age: \_\_\_\_\_

Intended use of ZX80: \_\_\_\_\_

Have you ever used a computer?  Yes  No.  
Do you own another personal computer?  Yes  No. \*For Conn. deliveries, add sales tax.

IA-12-0



Apple announces a technological breakthrough of incredible proportions.



12" x 11 $\frac{1}{4}$ " x 2 $\frac{1}{4}$ "





## We're looking for the most original use of an Apple since Adam.

What in the name of Adam do people do with Apple Computers?  
You tell us.

In a thousand words or less.

If your story is original and intriguing enough, you could win a one-week all-expense paid trip for two to Hawaii. Which is the closest we could come to paradise.

### Win fabulous prizes for creative writing.

To enter, drop by your nearest Apple dealer and pick up an entry blank. Fill it out. Then write an article, in 1000 words or less, describing the unusual or interesting use you've found for your Apple.

A jury of independent judges will cast the deciding vote for the grand prize: a week for two, airfare included, in Hawaii.

The judges will also choose 16 additional winners, two each from eight categories:

graphics/music, entertainment, home, business, education, scientific, professional, and industrial. And each winner will choose from a long list of longed-after Apple peripherals—from Apple Disk II's to Graphics Tablets to printers. Or you can take a \$250 credit towards the purchase of any Apple product.

The contest ends March 31, 1980. All winners will be notified by May 15.

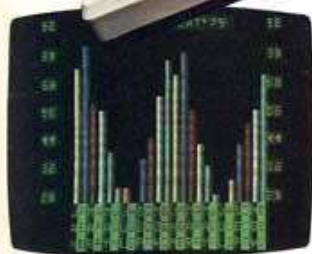
Entry forms are available at your participating Apple dealer. Call 800-538-9696, (800-662-9238 in California), for the one nearest you.

Mail the entry blank, your article and any photos to: Apple Computer, "What in the name of Adam" contest, 10260 Bandley Drive, Cupertino, CA 95014.

And may the juiciest application win.

apple computer 

# The Imagination Machine™



The Imagination Machine offers more at its price than any other personal computer on the market today.

Consider these features: 9K RAM, with 14K BASIC in ROM, 53-key typewriter keyboard. A fine resolution picture, generated on your television set or monitor in 8 colors!

The only computer with color, sound, user programmability and expandability at \$599.

A built-in, dual-track cassette tape deck with 1500 baud rate, for APF's digitally recorded, "saturated," tape programs. A built-in sound synthesizer. And two, built-in, game style controllers, with joysticks and numeric keypads.

When you want to go beyond APF's library of educational, home-and-personal management or entertainment programs... when you want to create your own programs... you can. The Imagination Machine is programmable in BASIC and 6800 machine language. The Imagination Machine

is also expandable. Just add our "Building Block", an optional, four-port expansion device, and you can hook up a printer, telephone modem, and additional memory cartridge or mini-floppy disk drive.

For the name of your nearest Imagination Machine dealer call, TOLL FREE: 1-800-223-1264. (New York residents call: (212) 758-7550) or write: APF Electronics, Inc., 444 Madison Avenue, N.Y., N.Y. 10022.

\$599. Manufacturer's suggested retail price.

**APF**electronics inc.

**"YOUR LIFE WILL NEVER BE THE SAME!"**



# Jefferson had one of the best minds of 1776, but today you can make better decisions with an Apple.

Jefferson and decision makers of every century have faced the same challenge: how to explore every option before you implement the final plan. Today you have a solution. The Apple personal computer.

## A tool to test contingencies.

How would higher interest rates affect your forecasts? What if vendors raised prices 2%? What if you could determine capital equipment depreciation at the touch of a key? Now, you can productively test your assumptions with ease by using the Apple system that sits on your desk.

## Declare your independence with Apple.

The same Apple system that helps you forecast saves you more time by tackling word-related tasks, too. Apple helps you write reports. Print letters. With Apple's text-

editing capabilities, it might not have taken Jefferson 17 days to draft the Declaration of Independence.

## Personal advice on personal computers.

Today, the power and versatility of a \$15,000 computer are at your fingertips with a *complete* Apple system solution for \$2,500 to \$7,800. It's computing made easy and economical. A few minutes with your Apple dealer and you'll understand how powerful the Apple computer can be.

Your dealer will guide you through Apple's extensive line of hardware and software solutions, and he'll prove that all personal computers are not created equal. Don't let history pass you by. Visit your nearest Apple dealer, or call **800-538-9696**. In California, **800-662-9238**. Or write: Apple Computer, 10260 Bandley Drive, Cupertino, CA 95014.



apple computer inc.

CIRCLE 8





## Sol.® The small computer that won't fence you in.

A lot of semantic nonsense is being tossed around by some of the makers of so-called "personal" computers. To hear them tell it, an investment of a few hundred dollars will give you a computer to run your small business, do financial planning, analyze data in the engineering or scientific lab — and when day is done play games by the hour.

Well, the game part is true. The rest of the claims should be taken with a grain of salt. Only a few personal computers have the capacity to grow and handle meaningful work in a very real sense. And they don't come for peanuts.

### **Remember, there's no free lunch.**

So before you buy any personal computer, consider Sol.® It costs more at the start but less in the end. It can grow with your ability to use it. Sol is not cheap. But it's not a delusion either.

Sol small computers are at the very top of the microcomputer

spectrum. They stand up to the capabilities of mini systems costing four times as much.

### **No wonder we call it the serious solution to the small computer question.**

Sol is the small computer system to do the general ledger and the payroll. Solve engineering and scientific problems. Use it for word processing. Program it for computer aided instruction. Use it anywhere you want versatile computer power!

### **Build computer power with our software.**

At Processor Technology we've tailored a group of high-level languages, an assembler and other packages to suit the wide capabilities of our hardware.

Our exclusive Extended BASIC is a fine example. This BASIC features complete matrix functions. It comes on cassette or in a disk version which has random as well as sequential files.

Processor Technology FORTRAN is similar to FORTRAN IV and

has a full set of extensions designed for the "stand alone" computer environment.

Our PILOT is an excellent text oriented language for teachers.

### **Sold and serviced only by the best dealers.**

Sol Systems are sold and serviced by an outstanding group of conveniently located computer stores throughout the U.S. and Canada.

For more information contact your nearest dealer in the adjacent list. Or write Department B, Processor Technology, 7100 Johnson Industrial Drive, Pleasanton, CA 94566. Phone (415) 829-2600.

**In sum, all small computers are not created equal and Sol users know it to their everlasting satisfaction.**

**ProcessorTechnology**



# COMMODORE VIC-20<sup>®</sup>

## "THE WONDER COMPUTER OF THE 1980s. UNDER \$300."

—WILLIAM SHATNER

"The best computer value in the world today. The only computer you'll need for years to come."



JOYSTICK  
INTEGRAL  
LIGHTS

ON/OFF SWITCH

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PLUG-IN PROGRAMS

INTEGRAL MEMORY EXPANDER

PLUG-IN PROGRAMS

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TV MODULATOR

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SOLE  
DIN DRIVE

PRINTERS

CONNECTING DISKETTES

MODEM FOR TELEPHONE AND TELECOMPARING

### VIC-20<sup>®</sup> VS. OTHER HOME COMPUTERS

Product Features	Commodore VIC-20	Atari <sup>®</sup> 400 <sup>™</sup>	TI <sup>®</sup> 99/4A	TRS-80 <sup>®</sup> Color Computer
Price*	\$299.95	\$458.95	\$499.00	\$399.00
Maximum RAM Memory	32K	16K	16K	32K
Keyboard Style	Full-Size Typewriter Style	Flat Plastic Membrane	Half-Size Typewriter Style	Calculator Style
Number of Keys	66	57	40	53
Programmable Function Keys	4	0	0	0
Graphic Symbols On Keyboard	62	0	0	0
Displayable Characters	512	256	64	256
Microprocessor	6502	6502	T1990	6809
Accessible Machine Language	YES	YES	NO	YES
Upper/Lower Case Characters	YES	YES	NO	NO
Operates with all Peripherals (Disk, Printer and Modem)	YES	NO	YES	YES
Full Screen Editor	YES	YES	NO	NO
Microsoft Basic	Standard	N/A	N/A	\$ 99.00
Telephone Modem	\$109.95	\$399.95	\$450.00	\$154.95

\*Manufacturer's suggested retail price (Jan. 1, 1982). Includes BASIC cartridge required for programming.



Read the chart and see why COMPUTE! Magazine<sup>1</sup> calls the VIC-20 computer "an astounding machine for the price." Why BYTE<sup>2</sup> raves: "...the VIC-20 computer unit is unexcelled as a low-cost consumer computer." Why Popular Mechanics<sup>3</sup> says: "...for the price of around \$300, it's the only game in town that is more than just a game." And why ON COMPUTING INC.<sup>4</sup> exclaims: "What is inside is an electronic marvel... if it sounds as if I'm in love with my new possession, I am."

The wonder computer of the 1980s. The VIC-20 from Commodore, world's leading manufacturer of a full range of desktop computers. See the VIC-20 at your local Commodore dealer and selected stores.

1 April '81 issue 2 May '81 issue 3 November '81 issue 4 Fall '81 issue



Commodore Computer Systems VIC-PC  
481 Moore Rd., King of Prussia, PA 19406  
Canadian Residents: Commodore Computer Systems  
3370 Pharmacy Ave., Agincourt, Ont., Canada, M1W 2K4

Please send me more information on the VIC-20.

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Address \_\_\_\_\_  
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The \$1795.  
Personal Business  
Computer  
that is changing  
the way people  
go to work.

Henry Ford revolutionized personal transportation.

Adam Osborne has done the same for personal business computing.

Virtually everything you need in a personal business computer to work faster and better with words, numbers, and ideas is included in a portable carrying case you can take anywhere.

The Osborne is easy to learn, fun to use, and quickly becomes indispensable.

One price, \$1795, buys it *all*.

The Osborne is available from a computer retailer near you.

And you can buy it in any color you want. As long as it is blue.

Put away your buggywhips.

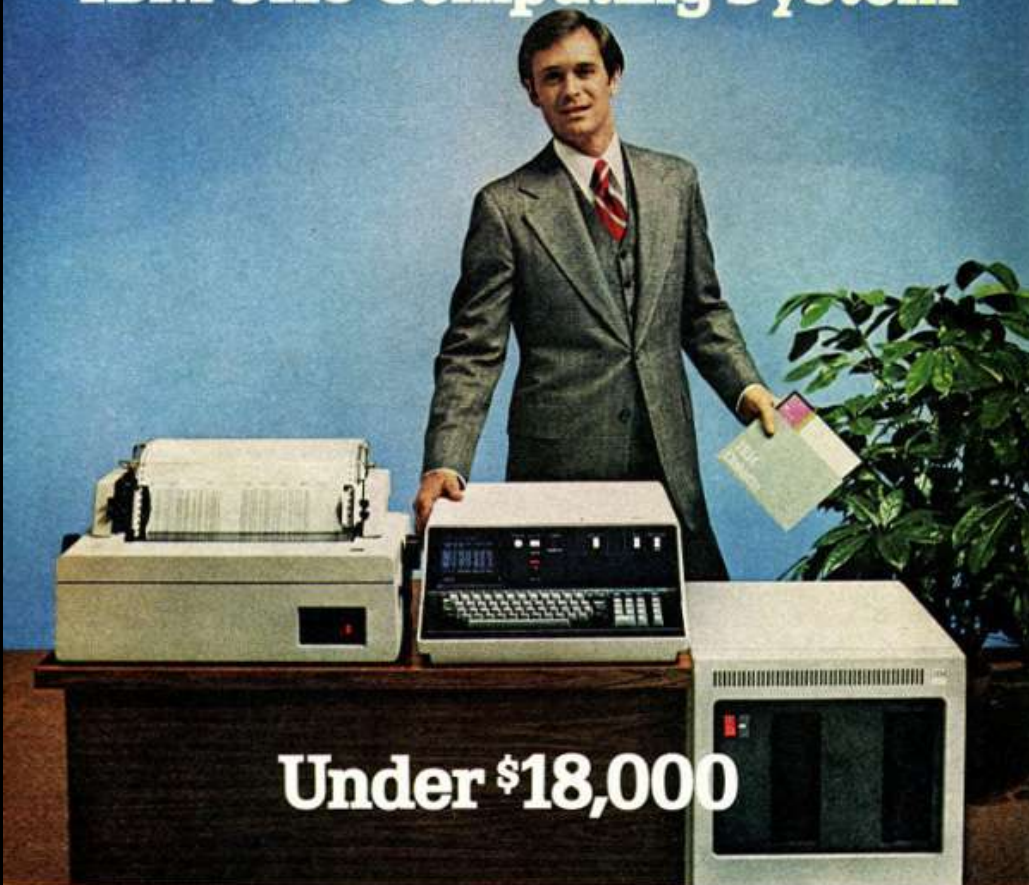


**\$1795. Complete. Including Software.**

For your nearest dealer, call (in California) 800 772-3545 ext. 905; (outside California) call 800 227-1617 ext. 905.

**OSBORNE**  
COMPUTER CORPORATION

# Introducing the extraordinary IBM 5110 Computing System



**Under \$18,000**

There was a time when \$18,000 wouldn't even cover the *monthly* cost of a computer. But the new IBM 5110 Computing System shown above sells for \$18,000 (other configurations range from under \$10,000 to about \$30,000). And for any of these prices, you get a versatile IBM computer backed by IBM service and reliability.

The 5110 can make a major contribution to your business. For example, it can be programmed to do your accounts receivable, handle your payroll and prepare your general ledger, as well as provide a wide

variety of timely management reports.

The 5110 can also be tailored to fit your particular needs. For instance, if you need quick access to data in an area like inventory, we'd recommend a diskette-based system. If the information you work with is more sequential, like payroll, a lower priced tape-based system might be best. Or perhaps, a combination of both.

You can also choose between a higher and lower speed printer and BASIC or APL programming language, depending upon your particular operation.

The 5110 also offers a variety of main

storage capacities as well as a familiar typewriter-like keyboard with a convenient 10-key numeric pad and a built-in display screen.

What's more, it's easy to use. In fact, your own people can learn to operate the 5110 in just a few days.

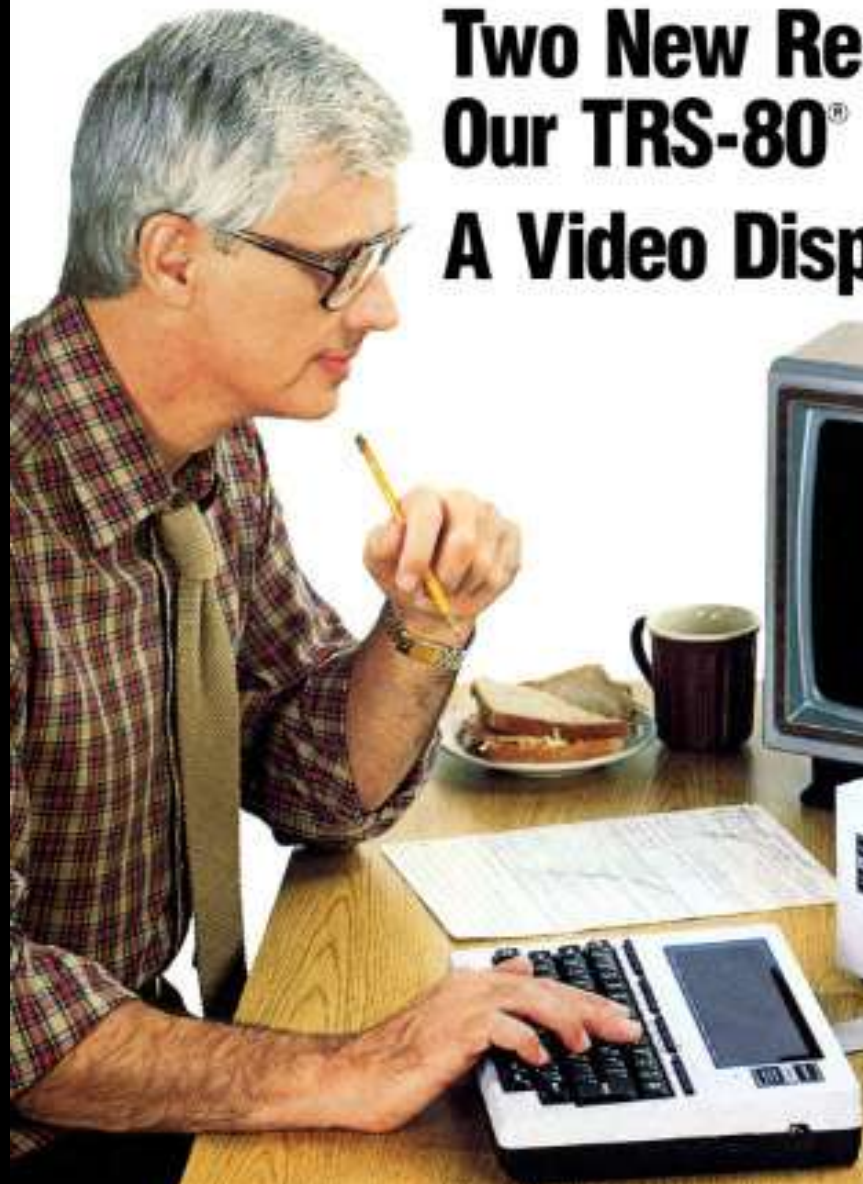
In short, the new IBM 5110 Computing System is a lot of computer for the money. And we'd like the opportunity to talk with you about it. Call your nearby IBM General Systems Division office and arrange for a personal demonstration.

You'll find it time well spent. **IBM**

**A small computer can make a big difference**



# Two New Reasons to Choose Our TRS-80® Portable Computer: A Video Display and Disk Storage!



AS LOW AS  
 \$45 PER  
MONTH

TRS-80 Model 100  
Disk/Video Interface  
**79900**  
26-3806

Shown with optional second drive

# Putting color to work in computers.

Computers that present a wealth of confusing information serve only to slow the information process. At ISC, we use color graphics as a highly-effective communications medium. Why color? Research has shown that color conveys information more quickly and effectively than any other visual method. Thus, when compared to black and white, a color CRT display results in faster, more accurate user response. And that means faster decisions from the ultimate processor, the human brain.



Our new Intecolor 3621 puts the color advantage in a desk-top computer. The 13" screen can display 32 lines of 64 ASCII characters, as well as plot graphics on a 128 x 128 grid—in eight brilliant colors. A full-featured keyboard (117 keys) and 51K mini-disk drive are built-in, as is Extended Disk BASIC, vector software and 32K user RAM. There's a standard RS232C interface for use as a time-sharing terminal, too.

The power of color graphics in a sleek, self-contained case. At just \$3300\* it's simply incredible.

And the 3621 is just one of the entries in Intecolor's new 3000 series. Contact your representative today and put color to work for you.

**Color Communicates Better.**

\*U.S. Domestic price

Unretouched photo of screen.

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For sales and service in other countries contact ISC headquarters in Norcross, GA, U.S.A.



**Intelligent Systems Corp.**

□ 5865 Peachtree Corners East □ Norcross, GA 30071 □ Telephone 404-449-5961 □ TWX 810-766-1581



## What kind of man owns his own computer?

Rather revolutionary, the whole idea of owning your own computer? Not if you're a diplomat, printer, scientist, inventor... or a kite designer, too. Today there's Apple Computer. It's designed to be a *personal* computer. To un-complicate your life. And make you more effective.

### It's a wise man who owns an Apple.

If your time means money, Apple can help you make more of it. In an age of specialists, the most successful specialists stay away from uncreative drudgery. That's where Apple comes in.

Apple is a real computer, right to the core. So just like big computers, it manages data, crunches numbers, keeps records, processes your information and prints reports. You concentrate on what you do best. And let Apple do the rest. Apple makes that easy with three programming languages—including Pascal—that let you be your own software expert.

### Apple, the computer worth not waiting for.

Time waiting for access to your company's big main-frame is time wasted. What you need in your department —

on *your* desk — is a computer that answers only to you... Apple Computer. It's less expensive than timesharing. More dependable than distributed processing. Far more flexible than centralized EDP. And, at less than \$2500 (as shown), downright affordable.



### Visit your local computer store.

You can join the personal computer revolution by visiting the Apple dealer in your neighborhood. We'll give you his name when you call our toll free number (800) 538-9696. In California, (800) 662-9238.

Apple Computer, 10260  
Bandy Drive,  
Cupertino,  
CA 95014.

apple computer 

# IF PERSONAL COMPUTERS ARE FOR EVERYBODY, HOW COME THEY'RE PRICED FOR NOBODY?

A personal computer is supposed to be a computer for persons. Not just wealthy persons. Or whiz-kid persons. Or privileged persons.

But person persons. In other words, all the persons whom Apple, IBM, and Radio Shack seem to have forgotten about (including, most likely, you).

But that's okay. Because now you can get a high-powered home computer without taking out a second mortgage on your home.

It's the Commodore 64. We're not talking about a low-priced computer that can barely retain a phone number. We're talking about a memory of 64K. Which means it can perform tasks most



**\$1395\***  
APPLE® IIe 64K

**\$999\***  
TRS-80® III 16K

**\$1355\***  
IBM® PC 64K

other home computers can't. Including some of those that cost a lot more. (Take another look at the three computers above.)

By itself, the Commodore 64 is all the computer you'll ever need. Yet, if you do want to expand its capabilities some day, you can do so by adding a full complement of Commodore peripherals. Such as disk drives, Modems. And printers.

You can also play terrific games on the Commodore 64. Many of which

will be far more challenging than those you could ever play on a game machine alone. And as great as all this sounds, what's even greater-sounding

is the price. It's hundreds of dollars less than that of our nearest competitor.

So while other companies are trying to take advantage of the computer revolution, it seems to us they're really taking advantage of something else: Their customers.

\*Manufacturers' suggested list prices as of March 20, 1983. Monitor included with TRS-80 II only. Commodore Business Machines, 100 Blue Bell Boulevard, PA 19426; Canada-3870 Pharmacy Avenue, Agincourt, Ont., Can. M1W 2K4.

**commodore**  
**COMPUTER**

CIRCLE 143



**THE COMMODORE 64. UNDER \$600.**

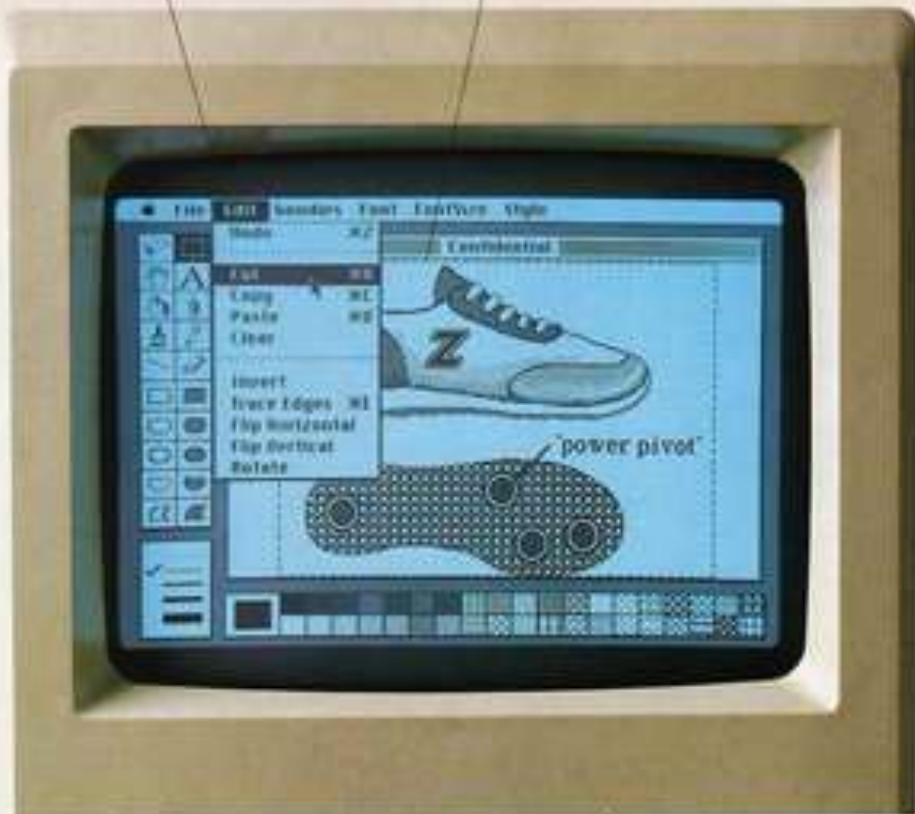
You can't buy a better computer at twice the price.

*That black menu displays all your options.*

*To select whatever you want 'cut' from the screen, just put a rectangle around it.*

*Macintosh uses the mouse pointer 'cut' out an illustration in a moment.*

*Macintosh automatically makes room for your illustration in the text.*



## Cut.

Once you've completed your illustration, you need to cut it out of the document you created it on, so that you can put it into the word processing program you used to write your memo.

To do this, you simply use the mouse to draw a box around the illustration, which tells Macintosh this is the area you want to cut.

Then you move the pointer to the top of the screen where it says "Edit." Hold the mouse button down and Edit will then show you a list, or "pull-down menu" of all the editorial commands available. Then pull the pointer down this menu and point to the command "Cut," highlighted by a black bar.

Release the mouse button and, zap, it's done.



## Paste.

And now, to finish your memo, bring up MacWrite, Macintosh's word processing program. Just pick a place for your illustration.

In the meantime, your illustration has been conveniently stored in another part of Macintosh's ample memory.

To paste the illustration into your memo, move the mouse pointer once again to the Edit menu at the top of the screen.

This time, you pull the mouse down until "Paste" is highlighted by a black bar. Release the mouse button and, once again, zap.



# How to turn a sea of data into data you can see.

There are more people in more places doing more things with Apples than with any other personal computer in the world. Which is saying a lot. But you'd like to take the time to explain just one of the things that can make an Apple Personal Computer

more meaningful to you, personally. It's called business graphics. An important business tool that demonstrates, quite graphically, how one picture is worth a few thousand numbers.

## More ways to see what you're doing.

That's the beauty of Apple Business Graphics. The software package that gives your Apple II or Apple III personal computer the power to convert rows and rows of numbers—

or pounds of printed—into one simple, colorful, comprehensible illustration.

And that gives you the power, for example, to thoroughly understand relationships and comparisons in a complex market analysis. Without having to spend hours sifting through

Business Graphics can make presentations more presentable.

Because whenever you've produced can be rapidly, easily and colorfully reproduced, on virtually any printer or plotter on the market.

Moreover, sophisticated Apple features like exploded views,

## Getting started in pictures.

Start by writing any of the over 1300 authorized Apple dealers.

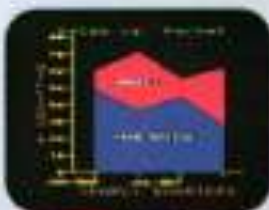
They'll show you Apple Business Graphics software can generate more types of pictures, in more colors, using more data



Horizontal bar graphs compare figures across a wide range of categories. In this example, the performance of six different products is being compared.



Use the overall picture to get an overview, and use other displays to compare data in detail. This pie chart compares the sales figures for five



With graphs, you can see trends and compare data for long periods. This graph shows the performance of two products over the course of a year.

dull data—armed with little more than a ruler, a compass and a few not-so-waggy markers.

With Apple Business Graphics, all you do is enter the data or transfer it directly from your VisiCalc™ model or a number of other computer files. Your Apple will take it from there.

Helping you to get the big picture in a variety of ways. Line or area graphs, bar graphs, pie charts or scattergrams.

Whichever configuration best suits your application.

When you're through charting, another shows you can do the same with forecasts, budgets, stock trends, business plans or customer demographics.

## Show your stuff.

In addition to helping you better visualize results, Apple

unlimited overlays and floating titles allow your displays to be remarkably flexible.

By combining Apple Business Graphics with various slide-show packages, charts and graphs on your monitor can easily be converted into impressive slides and transparencies.



than any other graphics package.

More important, they'll show you what all that can mean to you, your accounting firm, your import business, or your chain of quick-serve-then family restaurants.

They'll even help you produce your first picture.

But business graphics is just one of the things an Apple can help you do. One of thousands. Which is not terribly surprising, when you consider there's more software available for Apples than for any other personal computer.

So consider a trip to your Apple dealer. And draw your own conclusions.



The most powerful computers.

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# How to send mail at 670,000,000 mph.

There are more people in more places doing more things with Apple than with any other personal computer in the world. Obviously one advantage of the whole story.

But it gets even better: one of the things that can make an Apple Personal Computer meaningful to you, personally, is called "electronic mail."

Which, simply stated, is a quick and inexpensive way of sending any information, anywhere, anytime.

## Put your computer on the phone.

For the six dollars it costs to produce and mail a typical business letter, you

could easily write on a piece of paper and flit it to The Blue Yonder.

Or, you could send the same letter for about 1/10 the cost using electronic mail.

This new technology enables your Apple to send or receive any message, anytime, to any compatible computer over standard phone lines. The same ones your voice has been using for years.

So there's no costly hook-up expense. All you need is an Apple and a device, called a modem, that translates the computer's electronic codes into floor phone signals.

Which, in turn, can actually receive messages at about the speed of light. Versus the speed of the U.S. Mail. And not just letters. But memos,

messages right on the screen. So you can edit at the last minute. Or make comments on incoming mail, and send it on to another department. Another office. Another company. Or any compatible computer anywhere.

It can even record the date and time of all transactions. Sort, filter

"data banks" provide Apple users with access to a wealth of services and information.

So you can use your Apple to obtain stock quotes, make travel arrangements, scan The New York Times, or tap into an electronic encyclopedia for detailed answers



The best thing to do is to simply look at your mailbox. Your Computer will receive messages and notify you personally. After you look through them, you can delete, you can save to the computer's memory, you can print and forward them, or delete them.

charts and graphs, stock reports, VisiCalc reports, weather reports or whatever.

To one address. Or just as easily, to a hundred!

## 24-hour postal service.

Depending on the software you use, your Apple Personal Computer can perform a number of unusual postal chores.

Postmarking, for example, as a 24-hour-a-day post office.

Automatically sending and receiving messages, unattended, even late at night (before phone rates are lowest).

So, instead of paying an overnight service rate to have a two-page report from Wisconsin to Wisconsin, you can have it sent electronically—anytime during the night—for less than \$2 cents.

Your Apple will cheer you on



Or do it all. Most of your business. That's how. In one single place, different people, the computer offers a total solution. You can send the same letter to several companies at once, the same report to one.

print them out. And keep a running directory of up-to-date addresses.

## Dialing for data.

Your Apple can also access larger computers that function as electronic postal services. They offer subscribers a virtual electronic "mailbox," and a number of message-handling services. But that's not all. These same



database tools are great for doing a whole lot. At generally lower speeds and rates than a phone call. Because, no matter how slow the link, you can still have the advantage of searching on that one link or through one.

to answer queries if you wish, it can even provide way with four phases of Connecticut (in hospital).

## Save your stamps.


If any of the above interests you, just drop us on any of the over 100 authorized Apple dealers.

They'll be delighted to show you how electronic mail works. And how Apple has more software to support it than any other personal computer (even the popular Apple II and Macintosh computers).

But electronic mail is just one of the many-wonder things you can do on an Apple. One of thousands. To let your Apple dealer tell you all about it.

We think you'll get the message rather quickly.



 **apple**

The most personal computer.

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