

COMMODORE NEWS

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Commodore's VIC 20 personal computer can be used by the entire family, in the home, at school, or in the office. It is the Computer that does "much more than just play games".

COMMODORE LEARNING SERIES MAKES COMPUTING EASY

The Commodore Learning Series—individual book-and-cartridge sets—lets you start using the VIC computer immediately without any peripherals. All you do is plug the cartridge into the back of the computer and read, using the accompanying book.

The first volume in the series is called "*Introduction to Computing . . . On the VIC*" and features everything from the "VIC Menagerie" to introductory programming. It's a fun introduction, designed to familiarize you with the VIC 20 and computing in general.

The second volume in the Commodore Learning Series is entitled, "*Introduction to BASIC Programming . . . On the VIC*." This volume starts your formal introduction to computer programming. Future volumes will deal with music, graphics and more.

The philosophy behind the book and cartridge series is this: first-time computerists are often reluctant to get into thick books about computer programming, no matter how well-written or entertaining they might be. Many of the lessons look ominous when first seen . . . and often, it is impossible to visualize what a particular instruction or command is supposed to do . . . especially if you're having trouble "getting it right."

To take some of the pain and agony out of the computer learning process, Commodore decided to develop a "three dimensional" learning guide which demonstrates on the television screen how a program or command is supposed to work, while at the same time providing a book with easy-to-read step-by-step lessons.

This "show and tell" approach represents an important innovation by Commodore and we hope that VIC users will find it as helpful as it's intended to be.

At time of this print, Canadian availability dates have yet to be announced.

Commodore breaks price barrier—Introduces VIC-20!

Commodore International Ltd. (AMEX-CBU) has officially introduced the world's first full-featured color computer priced at \$450.

The new VIC 20 was unveiled January 8 at the Consumer Electronics Show in Las Vegas.

The new computer puts Commodore squarely in the low-priced personal computer market with a fully expandable microcomputer which connects to any television set and rivals the features of existing microcomputers selling at 4 or 5 times the price.

The features speak for themselves:

- color
- sound
- programmable function keys
- 5K memory expandable to 32K
- standard PETBASIC
- full-size typewriter keyboard
- graphics character set
- plug-in program/memory cartridges
- low-priced peripherals
- joystick/paddles/lightpen
- self-teaching materials

"The new VIC (Video Interface Computer) is designed to be the most user friendly computer on the market . . . friendly in price, friendly in size, friendly to use and expand and enjoy," said Commodore Chairman Irving Gould. "In 1977, we pioneered the personal computer industry with the world's first self-contained personal computer . . . the PET. Then we expanded the PET into a business system . . . the CBM. Now, we're introducing an entirely new generation of personal computers which anyone can afford to buy, to learn on and apply . . . from first-time users to hobbyists."

"With the VIC we—Commodore—are providing a computer system which helps almost anyone get involved in computing quickly and easily . . . with enough built-in expansion features to let the system "grow" with the user as his knowledge and requirements become more sophisticated.

Expansion Features & Peripherals

VIC system peripherals will include a low-priced tape cassette unit, single floppy disk drive, printer—and a broad range of add-on accessories which tailor the system to a variety of special applications from games to bookkeeping to telecommunications.

The VIC's memory—its capacity for storing and processing information—can be expanded using simple plug-in ROM cartridges.

(continued on page 2)

How the VIC was born

IN 1977, Commodore introduced the first self-contained personal computer (the PET). In late 1980, Commodore introduced the first color computer priced under \$300 U.S. Both developments were made possible by the company's unique position as a vertically integrated multinational organization.

Vertical integration means that Commodore makes its own computers "from the ground up." That includes everything from design through engineering and production. Most significantly, Commodore designs and manufactures its own semiconductor chips . . . the computer's "brain."

It is no accident that both the PET and VIC were made possible by the development of proprietary semiconductor devices. In 1977, the PET was created around the 6502 microprocessor chip developed by Commodore's MOS Technology subsidiary in Valley Forge, Pa. Since then, MOS Technology's "computer on a chip" has become a standard in the microcomputer industry and is in fact used in several other microcomputers.

In 1980, MOS chip designers developed the Video Interface Chip (VIC), which provides the necessary interface between the computer and television set. The Video Interface Chip in turn gave rise to the "Video Interface Computer," although the "story of the VIC" is actually much more complex.

The real story dates back nearly 20

years, to when Commodore was marketing electromechanical calculators. Jack Tramiel, the founder and chief executive officer of Commodore, was among the first to recognize the need for a low-priced electronic hand-held calculator. The first low-priced Commodore calculators were consequently introduced several weeks before Texas Instruments entered the market and broke what had been a very high price barrier. Commodore went to Europe with its calculators and

"The Japanese are coming, so we will become the Japanese."

— Jack Tramiel

became the best-selling hand-held calculators on that continent.

Out of these early marketing experiences—and Commodore was and still is primarily a marketing company—Jack Tramiel resolved to vertically integrate Commodore so the company could exert stronger controls over its internal product development and pricing, and therefore meet a larger goal—to bring superior low-priced consumer electronics products to the world marketplace.

Commodore started moving toward the VIC more than 18 months ago. In the spring of 1980, Tramiel formally announced his intention to develop and market a computer priced under \$300 U.S. More than a few thought the

new product was premature, or unnecessary . . . but Tramiel insisted, noting that several Japanese computer companies were already poised to enter the U.S. market with low-priced computers.

He said: "The Japanese are coming, so we will become the Japanese."

He was right. The Japanese were poised to assault the U.S. marketplace just as they attacked—and captured—the automobile and television markets.

To show the Japanese what they'd be coming up against, and to test market the new VIC (Video Interface Computer), Commodore introduced the product in Japan first, in mid-September . . . choosing purposely to "carry coals to Newcastle." The thinking was, if you want to find out how good a grade of coal is, you go to the experts . . . at Newcastle where coal is mined. If you want to find out how good a computer is, you go to the toughest consumer electronics market in the world . . . Japan.

The results were impressive. Orders for over 1,000 VIC's were taken the first day the computer was demonstrated at Seibu Department Store in downtown Tokyo.

Commodore's subsidiary in Japan started producing Japanese VIC's with Katakana/English keyboards, at the company's new plant in Osaka.

The VIC will be manufactured in the United States during the first calendar quarter of 1981.

VIC 20 INTRODUCTION

(from page 1)

Special application programs and games will also be available in plug-in ROM form, as well as on tape and disk media. Some of these programs will be designed by Commodore programmers, but the majority will come from outside software developers—individuals as well as software houses. Commodore is actively encouraging ROM-based program development, with excellent results.

Additional special features like the computer's built-in RS232C interface capability make it possible to use the VIC with a telephone modem for accessing telecomputing services such as "The Source" or communicating with other computers. Special interface cartridges will also enable the VIC owner to use a wide variety of peripherals now on the market.

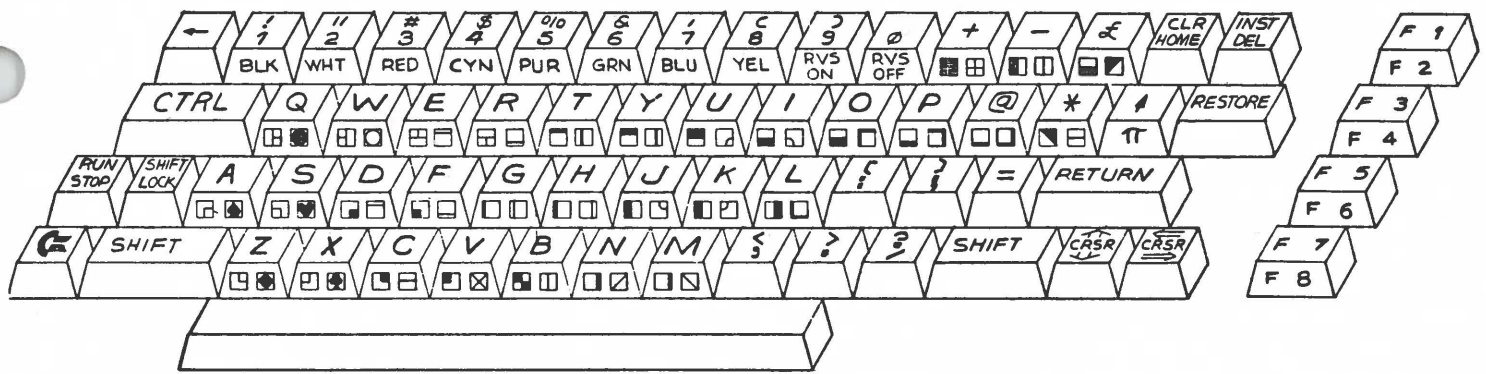
Documentation & Self-Teaching Materials

Commodore will provide excellent documentation for first-time users as well as software writers and computer entrepreneurs, in the form of books and manuals.

These publications will include innovative self-teaching materials which allow new and experienced computerists alike to explore their own special needs and interests . . . from basic computing to computer screen animation and use of the VIC in the classroom.

Product Availability

The VIC 20 was officially introduced January 8-11 at the Consumer Electronics Show in Las Vegas. It is anticipated that the computer will be in full production during March-April, with VIC products sold not only through Commodore's existing authorized computer dealers but also through selected retail outlets.



A Tour of the VIC 20 Keyboard

It's difficult to convey in a one dimensional publication just how powerful a 3 dimensional computer can be, but a good way to get to know the VIC 20 personal computer is to take a quick tour of the keyboard.

The keyboard contains upper and lower case keys, numbers and symbols, just like a typewriter keyboard. In addition, there are special editing keys, and the famous "PET GRAPHICS" character set. Here then, is a brief "tour" of the VIC keyboard:

GRAPHICS & THE COMMODORE KEY — When you turn on the VIC, you're automatically in "graphics" mode which means you can type upper case letters AND the more than 60 graphics you see on the keys. There are two graphics on each key. To get the graphic on the right side, simply hold down the SHIFT key and type the key with the graphic you want. To get the graphics on the left side, hold down the "COMMODORE" key (the little flag). In this way, you can type upper case letters and the full graphics set at the same time!

UPPER/LOWER CASE & GRAPHICS — To get into the "text" mode you simply press the SHIFT and COMMODORE keys together. This lets you use the VIC like an ordinary typewriter, with full upper and lower case letters, plus all the graphics on the LEFT side of the keys. These are the graphics which are most suited for charts, graphs and business forms.

COLOR — You can change the colors of the characters you type by pressing the CTRL key and one of the 8 color/number keys. The colors are

black, white, red, cyan, purple, green, blue and yellow. You can set — and change — colors inside or outside a computer program. In addition to the eight character colors, you can also change the colors of the BORDER and SCREEN on your television set, by typing a special command called a "POKE." For example, if you type the command POKE 36879,X where X is some number from 1 to 255, you can get up to 255 different combinations of screen and border colors, including 16 screen colors and 8 border colors.

SPECIAL EDITING KEYS — Here are some of the other special keys which make the VIC such a powerful microcomputer:

CTRL — used to set character colors, and, in conjunction with special programs such as wordprocessing, to execute special commands. Software writers can select their own "Control" commands and incorporate them into their programs.

RUN/STOP — The RUN/STOP key lets you automatically load programs into the VIC's memory from a cassette tape. Hitting this key without shifting (i.e. STOP) interrupts a running program or listing. If you stop a program and want to resume it where you left off, you can type "CONT" and the program will "continue."

SHIFT — The VIC has two SHIFT keys and a SHIFT LOCK key, just like a typewriter, for typing long strings of upper case letters or graphics.

RVS ON and RVS OFF — These two keys let you type reverse characters on the screen (for instance

white on black instead of black on white).

CLR/HOME — This key makes the cursor move to the "home" position at the top lefthand corner of the screen. If you type SHIFT and CLR/HOME you "clear" the screen of all the characters that were present.

INST/DEL — This is a super editing key which lets you insert or (shifted) delete characters. It's great for correcting mistakes and inserting extra information.

RESTORE — This is a "reset" key. If you type the RUN/STOP key and the RESTORE key together, you completely reset the computer as if you just turned it on . . . with the benefit that any programs you had in the memory are retained and can be listed or run from the start.

CURSOR KEYS — Ability to move the screen cursor up and down and sideways by hitting single keys is a powerful feature of the VIC. Being able to move the cursor this easily is essential but not all computers include it as a feature.

RETURN — The RETURN key is used primarily for entering commands and instructions to the computer.

PROGRAMMABLE FUNCTION KEYS — One of the most unique features on the VIC is that mysterious vertical row of "function" keys on the far right side of the keyboard. There are four keys and (if you shift them) a total of eight functions. These keys are not defined when you turn on the computer, but you may assign any BASIC command or instruction set to them, under program control.

VIC accepts tape, disk and plug-in cartridge

There are three ways to store data on the VIC 20: tape, disk and cartridge. In other words, the VIC 20 may be used with the same computer storage media as most larger computers.

Working With Tape

The VIC comes equipped with a tape cassette interface which lets you plug a Commodore cassette tape unit directly into the computer. A new lower-priced VIC cassette unit will be provided, although the existing cassette unit which works with the PET/CBM can also be used with the VIC.

To demonstrate how easy it is to load and retrieve data on tape, you simply insert a standard tape cassette cartridge into your tape unit. If you have a program in the computer which you would like to "save," you simply type: SAVE "NAME OF PROGRAM". The screen will display: "PRESS RECORD & PLAY ON TAPE PLAYER" then, while the cassette unit is recording, it will show, "OKAY. SAVING (NAME OF PROGRAM)" on the screen. When it is done saving the program it will print: "READY" so you know it's done.

Thus, the VIC has a "brain" to help you along when you want to conduct a simple operation like saving a computer program you've written. Once a program is saved on tape . . . or if you buy a program already provided on tape . . . you can "LOAD" the taped program back into the computer by typing "LOAD" and hitting the RETURN key.

Working With Disk

Most computer owners find they prefer working with computer disks because disks are much "faster" than tapes and can store more data.

Commodore will introduce a low-priced single floppy disk unit with 170 kilobytes of memory (for reference purposes one byte may be thought of as one character or space, so 170K means 170,000 characters of storage).

PET owners may write programs for the VIC on disk and run the disk in the VIC disk drive (recognizing that the programs must conform to the VIC's 22 character x 23 line screen format).

The VIC will also be able to use PET/CBM peripherals through a special IEEE interface card which will be provided as an accessory. This accessory will allow PET owners to use the same IEEE PET/CBM peripherals for both PET and VIC products.



The VIC 20's unique self-teaching materials make this computer an ideal "first computer" for students as well as businessmen, house-wives and anyone else who wants to join "the computer revolution".

Working With Cartridge

One of the unique features of the VIC is its ability to access programs on a plug-in cartridge. This cartridge might contain a game or instructional lesson . . . or it might contain a program into which you can feed data, get results . . . and then "save" those results on tape or disk.

The combination of cartridge based programs with tape or disk is especially powerful because it allows you to store large amounts of data on disk and change or process that data using the cartridge.

It is anticipated that two types of cartridges will develop . . . auto-starting cartridges which activate as soon as they are plugged in, and cartridges which must be "turned on" using some sort of access command.

Storing Data

These methods of storing and retrieving data allow the VIC user to purchase existing software in a variety of standard formats, to create his or her own programs and store them, and to take advantage of the VIC's powerful cartridge option. This flexibility makes the VIC suitable for use by all levels of computerists, from novices to experienced programmers.

VIC SYSTEM PERIPHERALS

Watch for these exciting peripherals and accessories, which will be introduced during and throughout 1981:

- **VIC TAPE CASSETTE** — a low-priced cassette player for storing programs on ordinary cassette tapes.
- **VIC SINGLE DISK DRIVE** — a low-priced single floppy disk drive unit.
- **VIC DOT MATRIX PRINTER** — a special dot matrix tractor feed printer to produce paper copies of programs, text and graphics.
- **VIC 3K MEMORY EXPANDER** — a 3K cartridge which plugs directly into the VIC to expand the computer's memory, and includes space for ROMs containing programs up to 24K!
- **VIC 8K MEMORY EXPANDER** — (must be used with control panel).
- **VIC 16K MEMORY EXPANDER** — (for use with control panel).
- **VIC MASTER CONTROL PANEL** — a 4 slot multiplexer which accepts 3K, 8K and 16K memory cartridges, program cartridges, and/or IEEE devices.
- **VIC GAME CONTROLS** — joysticks, lightpens and paddles.
- **VIC MULTIPLE GAME CONTROLLER** — to accept more than one game device.
- **RS232C INTERFACE CARTRIDGE** — for telecommunications.
- **VIC TELEPHONE MODEM** — telecommunications.
- **VIC SUPER EXPANDER CARTRIDGE** — high-res graphics, music, 3K memory.
- **VIC PROGRAMMING CARTRIDGE** — machine monitor, "toolkit" commands, function key programming & more.
- **VIC PROGRAM CARTRIDGES** — plug-in programs for recreation, home use, business & education.
- **VIC IEEE INTERFACE** — for using IEEE devices with the VIC.
- **COMMODORE LEARNING SERIES** — self-teaching book-and-cartridge sets.
- **VIC PROGRAMMING GUIDE** — the complete VIC reference book.

DATAQUEST compares VIC 20, Atari 400 and Radio Shack Color Computer

Commodore announces new Low-Priced Personal Computer

Commodore International last month announced its entry into the low-cost personal computer market with a \$450 5-Kbyte color computer designated VIC (Video Interface Computer) 20.

The VIC represents a cooperative effort between Commodore semiconductor chip designers in the United States and the Company's systems engineers in Japan. Introduction of the new computer took place in Japan in mid-October, and Japanese response was extremely enthusiastic. Reportedly, orders for 1,000 VICs were booked on the first day of sales, despite the fact that a 25-percent down payment was required. The VIC will go on sale in the United States sometime in January 1981, with European introduction to follow.

It is Commodore's intention to market the lowest-price full-power entry-level machine possible while also providing a piece of equipment that is highly expandable. The 5-Kbyte VIC 20, expandable to 32 Kbytes, seems to achieve this intention. In addition to its color capability and full-sized typewriter keyboard with programmable function keys, the VIC features a sound device, external expansion ports, and a 506-character screen display (22 characters by 23 lines). The machine is equipped with standard PET BASIC and a graphics character set for generating high-resolution graphics (176 x 176 or 30,976 pixels). Table 1 compares the features of the VIC with those of the Atari 400 and Radio Shack TRS-80 Color Computer.

In addition to the ability to externally expand memory to 32 Kbytes (with the additional 27 Kbytes possible in a variety of combinations of RAM and ROM cartridges), the following special expansion features will be available on the VIC at additional cost: voice synthesizer, joystick, lightpen, and game controller paddles. An RF modulator that enables the VIC to be directly connected to a television set is also included.

The external memory expansion and ROM program abilities of the VIC are especially interesting. Memory is expandable externally in a number of combinations of RAM and ROM, starting with a 3-Kbyte cartridge that contains space for additional ROM. The user can open up this cartridge and add ROM programs to it so that, in effect, a ROM program can be piggy-backed onto the RAM memory expansion. Commodore will also be selling these cartridges to software developers who will be able to package their own ROM programs into the

Table 1			
PERSONAL COLOR COMPUTER FEATURES SUMMARY			
	Commodore VIC 20	Atari 400 System	Radio Shack TRS-80 Color Computer
Entry-Level Memory (RAM)	5 Kbytes	8 Kbytes	4 Kbytes
Entry-Level Memory (ROM)	n.a.	10 Kbytes	8 Kbytes
Pricing	\$299.95	\$630.00	\$399.00
Maximum RAM Memory Expandability	32 Kbytes Total	16 Kbytes	16 Kbytes
Maximum ROM Expandability		26 Kbytes	16 Kbytes
Features			
Keyboard	Full Typewriter Keyboard	57-Key Flat Panel, Touch Sensitive	53-Key Typewriter Style
RF Modulator	Included	Included	Included
Communications	RS-232C Interface	None	RS-232C Interface
Sound	3 Tone Generators (3 Octaves each) 1 Sound Generator; Uses TV Speaker	4 Synthesizers (4 Octaves Total) Internal Speaker Plus TV	256 Tones; Uses TV Speaker
Screen Display	22 x 23 (506 char)	24 x 40 (960 char)	32 x 16 (512 char)
Graphics Resolution	176 x 176 (30,976 pixels)	320 x 192 (61,440 pixels)	64 x 32 (2,049 pixels) Expandable to 256 x 192 (49,152 pixels)
Compatibility with other Products Manufacturer	All Standard PET Software*	None	None
Options			
Joysticks	Yes	Yes	Yes
Rotary Paddles	Yes	Yes	No
Light Pen	Yes	Yes	No
Plug-in ROM Programs	Yes	Yes	Yes
*Subject to memory and display size limitations.		Source: Commodore International, Ltd., Atari, Tandy Corporation	

*Subject to memory and display size limitations.

Source: Commodore International, Ltd., Atari, Tandy Corporation

cartridge and resell it under their own label to Commodore users. A user desiring additional RAM may procure a four-slot multiplexer to accommodate additional RAM cartridges in increments of 8 or 16 Kbytes. However total add-on RAM and ROM memory combined cannot exceed 27 Kbytes.

The VIC is intended as a bridge between the hobby market and the home-computer market and has been described by one Commodore spokesperson as a "sub-desktop computer" that fits between the desk-top and hand-held models in size, shape, price, and power, and with the potential of expanding to almost desk-top computer capability.

It is aimed at several markets:

- The would-be computer hobbyist who could not heretofore afford a computer
- The first-time user who has been around computers or computer-like equipment as a time sharing or word processing user and who wants to gain some sophistication
- The primary education market that has previously found classroom computers too expensive

The first type of user will be able to bring some sophistication to his interaction with the VIC, while the latter two will find that Commodore has provided learning materials that are "friendly" to the novice.

—Ellen K. Clements
—Grant S. Bushee

VIC Cartridge provides software breakthrough

Early interest and response from software developers make it apparent that many software writers and programmers have been waiting and hoping for a product like the VIC, which lets them write "user friendly" programs whose operating systems and protocols are invisible to the user, and whose potential for day-to-day practical application is enormous.

Commodore is currently working with a number of professional software houses to explore creative new program ideas. The company will also encourage talented individuals/entrepreneurs to write more "user friendly" software and will take creative approaches in this area as well.

Plug-In Cartridge for ROM-Based Programs

The development of a plug-in cartridge that will accept memory expansion RAM and/or ROM provides software developers with an exciting opportunity to "painlessly" enter the market for VIC software programs.

The VIC has been designed so 3K memory can be added to the computer's existing 5K by plugging the "3K Memory Expander" cartridge DIRECTLY into the VIC. But the 3K Memory Expander does more than add memory. It also has two empty ROM slots—which means that a software developer can put a program on ROM or EPROM and

have a ready-made Commodore product to plug it into.

This breakthrough circumvents the cumbersome "software development" systems that some companies charge up to \$100,000 for. Commodore puts software developers directly into the cartridge business by providing a cartridge that accepts ROMs and EPROMs directly.

And VIC programs can be written in BASIC or machine code using a PET, then "downloaded" into the VIC. A special machine code monitor cartridge (machine monitor is not included in the VIC) and some further documentation is required for programming, but Commodore is making available a Software Development Kit which will include necessary hardware and documentation.

Developing Software Cartridges

The VIC cartridge itself comes packaged in a plastic case which unscrews so a ROM/EPROM based program can be inserted by either the VIC owner or dealer. It is of course recommended that all ROM changes be made by authorized Commodore computer dealers.

Although Commodore has not yet announced a formal policy on software development for the VIC, there are three alternatives being explored for software providers who wish to write programs for VIC

cartridges:

1. Development of programs which Commodore will purchase and manufacture and sell as part of the VIC Cartridge Library or Commodore Learning Series.
2. Purchase of cartridges from Commodore for insertion of ROMS and relabeling as a proprietary product of the software developer.
3. Development of independently produced cartridges under license from Commodore following the Commodore cartridge design.

These, then, are the simple mechanics of producing cartridge-based software.

By way of further technical data, the VIC comes with 5K RAM memory of which approximately 3.6K is user accessible, allowing for color, sound and screen "nibble." The computer will accept up to 32K RAM or ROM in combination, which means that after subtracting the 5K RAM in the computer, 28K may be added externally in any combination of RAM and/or ROM.

The memory may be boosted 3K using the direct plug-in 3K Memory Expander Cartridge. To expand the memory further, a separate "Master Control Panel" with slots for memory expansion and program cartridges is required. The control panel will have its own power supply. The panel is still under development and will be available with 8K and 16K memory expander cartridges.

If the 3K Memory Expander is used, the RAM is boosted by 3K. This totals 8K RAM and leaves 24K. This 24K may be used to accommodate up to 24K of ROM program using the two empty ROM slots in the Memory Expander. The benefits of a program as large as 24K cycling through 6.6K RAM (user accessible after screen) are obvious. It is recommended that programs be written in machine code to take maximum advantage of the cartridge and RAM capacity and the VIC's processing speed.

Questions relating to software development should be forwarded "Software Support Manager, Commodore Business Machines Ltd., 3370 Pharmacy Ave., Scarborough, Ontario M1W 2K4

"Yes, but what can I do with it?"

We are entering an era where computers will be as widespread as automobiles and television sets. Not knowing how to use a computer will be like not knowing how to drive a car. We like to say that "not having a Commodore computer is like not having a telephone"—that's how certain we are that computers will soon reach the status of a home and office "appliance."

As a truly "personal" computer, the VIC fits comfortably into all environments—home, school and office—but to give you a better idea of what the VIC "does," here are some specific examples:

Teach Yourself Computing

You don't have to be a computer programmer, or even a typist, to use a computer but it helps to have a working knowledge of what a computer is and what it can do for you.

One of the most obvious uses for the VIC is to teach yourself computing. Commodore has developed some innovative self-teaching materials to help you learn about your VIC, and about computing in general.

Games and Recreation

It would be foolish not to recognize that personal computers are—in addition to their utilitarian uses—the most powerful "game devices" yet devised. There are hundreds of computerized arcade games which take you on exciting intergalactic journeys, and many of these games will be made available for the VIC 20, on easy-to-use plug-in cartridges.

One of these games is called "Invaders," and is similar to some of the computer games found in many arcades. A computer chess game will also be provided—adapted from what may be the most powerful chess game available on microcomputers. Truly challenging! Additional games include such standards as bridge, backgammon, etc.

Educational Applications

It is anticipated that the VIC will follow in the footsteps of its big brother, the Commodore PET—the world's most widely used educational microcomputer. The VIC will undoubtedly be used by students

both in and outside the classroom.

Students who've been using the PET in their classroom will find that their programming skills translate directly to the VIC 20, which uses the same programming language as the PET (with the addition of color and sound!), and incorporates the same famous "PET graphics" characters.

Given the lower price of the VIC, teachers will find that they can put more computers on student desks . . . and elementary and intermediate grade teachers will find that budgets which couldn't accommodate higher-priced computers can now include the VIC.

Personal Computing in the Home

One of the first "home" computer programs to become available for the VIC is a home tax preparation system. This easy-to-use system will include a special plug-in cartridge which asks you a variety of questions and prepares your current federal tax returns based on the answers. A new cartridge will be provided each year to account for changing tax regulations.

Home budgeting is another area which will be addressed. By entering your monthly expenses and allowances into the home budget system, you can accurately determine what your future savings will be, how much you will have for "emergencies," even whether you can afford that new car or vacation next year, and when!

Several other home application cartridges are currently being developed by Commodore and will be announced as they are tested and made available. It is Commodore's intention to concentrate on practical home applications which take full advantage of the VIC's computing power and convenience, with special emphasis on programs which help fight inflation, conserve energy and provide more time and convenience for the user.

Computerized Energy Control

Commodore entered the energy electronics field during Fall 1980 with a unique electronic programmable thermostat which regulates heating and air conditioning temperatures for a savings of up to 30% in home and office fuel costs.

It is expected that Commodore's continuing emphasis on energy control electronics will result in adaptations for the VIC which allow the user to "computerize" such things as lighting and temperature control and other aspects of home energy consumption which can result in significant cost savings.

Telecommunications

One of the VIC's most powerful features is its ability to use any television set as its "computer screen." If we take this marriage of technologies one step farther, we can attach the VIC to a telephone via a modem (a device for translating computer signals into telephone signals and vice-versa) and tie in our computer to a telecomputing service.

Wouldn't it also be nice to be able to call up a local telephone number and get a rundown on all your current stock market investments, and punch up individual news stories on the companies you've invested in? This service is being made available by Dow Jones.

Business Applications

The VIC's full-size typewriter keyboard, special screen editing keys and lowcost peripherals will undoubtedly result in the computer being used by small businessmen, primarily as an intelligent terminal but quite probably in more creative roles as well.

For example, the VIC is compact enough to fit snugly into a briefcase. A salesman might carry a VIC with him on the road, record data as he travels and report the results back to his home office through his computer, over the telephone.

The VIC might be taken to the site of a disaster to help record statistics for emergency and relief purposes.

The Future of the VIC

What specifically can you do with the VIC 20? How will it improve your lifestyle, or save you money, or contribute to your welfare and convenience? There isn't room in this article to cover all the possibilities. All we can do is make it available with as many suggestions as possible, and let you adapt the computer to your own needs—you may even invent some new applications of your own!

Questions and Answers about the VIC

What does VIC stand for?

VIC stands for "Video Interface Computer." It derives from the "Video Interface Chip" developed by Commodore's MOS Technology semiconductor subsidiary. The VIC is designated VIC 20 in the U.S. and VIC 1001 in Japan.

What peripherals and accessories will be available with the VIC and when will they be on sale?

Commodore will introduce a full line of accessories and peripherals which will make the VIC computer a total low-priced "system." A list of peripherals is included on page 4 of this publication. Most of these items will be available during the first six months of 1981.

Do I have to buy anything "extra" with my VIC?

You can start using your VIC immediately. The user's manual which accompanies the computer contains several sample programs to try, and instructional material to help you get started. The next step is to purchase Volume 1 of the Commodore Learning Series, which includes a book and plug-in cartridge which "introduce" you to computing on the VIC. Additional cartridges are available, and as you get further into computing you will undoubtedly want to acquire a tape cassette unit or disk drive to store programs and data, and perhaps a paper printer.

Where can I buy a VIC and how soon?

VIC's will be sold through authorized Commodore computer dealers and selected retail stores. It is anticipated that VIC's will become available in quantity during March 1981, with most peripherals available at the same time or shortly thereafter.

What kind of warrantee comes with the VIC?

A 90 day over the counter exchange warrantee is provided—in other words, if the VIC fails to operate due to a factory defect within the first 90 days of purchase, you can return the VIC to your dealer for an over the counter exchange.

Is the VIC compatible with the PET/CBM?

Software for the VIC may be written on the PET/CBM, in BASIC or machine code, and transferred to the VIC via tape or disk. However, VIC programs written on the PET/CBM must conform to the VIC's 22 character screen width and cannot exceed the VIC's available RAM memory. PET lines longer than 22 characters will "wrap" around and not produce the same image on the VIC. The VIC may be used to write 40 and 80 column programs for the PET/CBM if color, sound and other commands unique to the VIC are avoided.

In terms of peripherals, the VIC, PET and CBM all use the same tape cassette so tapes are transferable. PET/CBM disk drives and printers may be used with the VIC if an IEEE interface cartridge is attached to the VIC. A low-priced single disk drive unit will be made available for use with the VIC, and a low-priced dot matrix printer is also anticipated.

Do I need an RF Modulator or other device to connect the VIC to my TV?

The VIC will come with an RF modulator included. An external power supply and video cable are also included.

Can the VIC be used with a modem?

An RS232C interface is built into the VIC, which enables the computer to be used for telecommunications purposes, using a Commodore "RS232C Interface Cartridge."

Who Will Use the VIC?

It is anticipated that the VIC will be used by many people to teach themselves about computing—to help them prepare for the increased use of computers not only in business and science, but also in home and school environments.

Students using the PET in their classroom will find it easy to use the VIC at home or in school, since the VIC uses the same BASIC computer language and graphic symbols as the PET. (Market researchers estimate that the PET is used in more schools worldwide than any other microcomputer.)

A variety of small business programs will be provided during 1981. Businessmen may want to use the VIC as a "portable" computer, since it fits snugly into a briefcase and connects to any television. The VIC also works with a modem and may be used as a telecommunications device.

Engineers and hobbyists will undoubtedly find a variety of new uses for the VIC, as they did with the VIC's big brothers, the PET and CBM. Although the VIC comes with a serial bus instead of an IEEE bus, a special interface board enables the user to connect the VIC to IEEE devices and control instruments and mechanical devices through this connection.

The most obvious VIC users will be hobbyists . . . avid computerists who perhaps own a PET or CBM and would like to have color and sound . . . or hobbyists who couldn't afford a computer before, but now can get started at a S.R.P. of \$450 Cdn.