PLAYBOY GUIDE

ELECTRONIC ENTERTAINMENT

THE BEST!

**VIDEO GAMES
HOME COMPUTERS
STEREO SYSTEMS**

PLUS: **PETE HAMILL,
JAMES DICKEY,
THE GRATEFUL DEAD**

BONUS! FREE GUIDE TO WHEELS

RCA

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Pac-Man comes home. Photographed by Bill King. Hair, Scinon Marsden for Pipino Buccheri; makeup, Joey Mills; styling, Paul Cavaco; her sweater, Zoran; his, Paul Stewart; game, Atari; TV, RCA ColorTrak. WHEELS cover (page 57) photographed by Palma Kolansky. Hair and makeup, Irnfried von Wechmer; styling, Jamie Simpson; dress, Laura Ashley; tuxedo, Lord West; jewelry, Zigul.

ON THE AIR

What TV pros watch when they're not being watched

host, CBS' The NFL Today

BRENT MUSBURGER

"I do a *lot* of TV watching at the office, especially during football season—mostly sports events that we get on ¾″ tape or live events. In the fall, I practically move into the CBS Broadcast Center on weekends, and watch as many games at one time as I can.

"At home, I'm not that obsessive. We have a 25″ Zenith color set in the living room of our New York apartment, and a 17″ color Zenith in the kitchen of our house in Connecticut. I bought Zenith, to be honest, for the same reason I drink Budweiser. They advertise a lot. My boys watch a lot of TV—they're 9 and 12 and I've found that TV is cheaper than a babysitter—and my wife does occasionally, but she's usually involved in other things. But I don't watch TV all that much. I turn it on only to relax, to watch mindless junk I can never remember. Or for the morning news. I'm a news junkie, and a big fan of Charles Kuralt.

"Are there any TV rules in my house? Just two: One, no remote control—I have to get my exercise somehow, and crossing the room to flip the channels is usually about it. Two, when the kids go to bed, they must leave the dial tuned to CBS so that when I wake up, I can go straight to Kuralt."
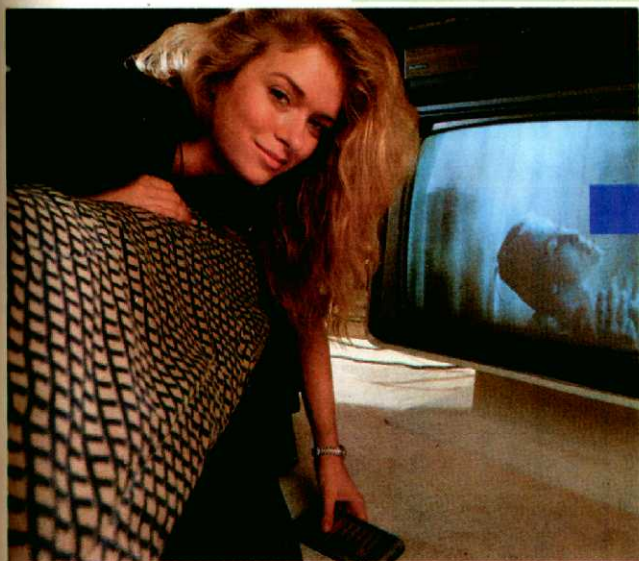
star, ABC's Bosom Buddies

DONNA DIXON

"My prime—that is, my only—TV watching hours are late at night after work, and on weekends. So I bought a Panasonic VCR; that way I wouldn't miss shows like *Dynasty, Happy Days* and *Making a Living.* Friends of mine are always appearing in them and I like to watch them work. I also like to watch myself work, so I tape my own show, as well as classic movies like *Some Like It Hot* and *To Kill a Mockingbird.* I save them for a rainy day.

"I keep my set in the bedroom because I think watching TV is relaxing and I want to really relax while I'm doing it. I love big screens—my set's a 25″ Zenith—and remote control, so I can watch lying in bed and not have to move a muscle. Now, that's luxury."

THE VIDEO GAME HALL OF FAME

We pick

the cartridges

you shouldn't

live without

J ust you wait. In a matter of months, you'll be seeing grown men coming to work with Band-Aids on their thumbs. They will probably tell you something about tennis blisters. Don't believe them. It's bigger than that. It's the latest mystery malady to puzzle the field of sports medicine. At this writing, there is no known cure. It is Joystick Finger.

For those of you who have been traveling with the Space Invaders instead of fighting them, a joystick is not something you buy at the Pleasure Chest. It is a control device for a home video game, the kind you play on your TV set. It is used, in its simplest form, to throw curveballs and to save the planet Earth.

The proliferation of these video games has followed a pattern not unlike that of an alien invasion. It has been fast, it has been

hard and it won't stop coming.

Some figures: By the end of this year, industry sources say, over 10 percent of all American homes will have video game consoles. And that figure is expected to more than double in 1983. This year alone, manufacturers will ship more than 50 million units of game consoles and cartridges. Retail sales figures for the past year were over $1 billion.

The history of video games is very short

"Each company is busy making reproductions of its competitors' games. It's a tough battle— anything but kids' stuff."

indeed. In 1972, Atari came out with an arcade game called Pong. For a quarter, you could try to stop moving electronic dots with sliding electronic dashes. The technology developed quickly, and space games led the way. As complex as those space games have now become, the principle is simple. You kill off the invading forces or you die.

And then there were the sports games— some of them so complicated, with so many variations, that they took months to master. The final frontier for video games has been pure craziness: For instance, two clowns bounce off opposite ends of a teeter-totter. As one clown is catapulted to the top of the screen, he breaks a balloon with his head. He comes back down at an unpredictable angle. Your joystick controls the teeter-totter. You move it to catch the clown. You miss, he goes splat.

A man jumps from a plane. Your mission is to make him land on a moving target. A jerk of the joystick opens his parachute. The closer he gets to the target with the chute closed, the more points you get. You wait too long, he dates Amelia Earhart.

Video games quickly left public places for the comfort of the living room. Now you don't have to keep feeding them quarters. After the initial purchase of a game console, you're in business. At discount stores, the consoles cost between $130 and $260. If you buy one at full retail price, you should get your parachute checked. You can get game cartridges for anywhere from $15 to $50.

With a pressing market demand, new game cartridges are being developed and marketed at breakneck speed. Atari offers over 50, Mattel (Intellivision) and Odyssey² have over 35 each. And, in the true spirit of free enterprise, none of the games is compatible with a competitive console. Atari only plays on Atari, and so on.

Other game companies have made minor dents in the market—Astrovision, for

LEFT OUT?

There is this big problem for those of you who bat and throw left. Joysticks are right-handed. It's not so much the stick; it's the button—the one you push to fire the missiles that protect the world from alien invaders, the one you push to hit homeruns. On Atari and Odyssey² systems, it's on the left-hand side of the control. Which means if you're using your left hand to push the button, you have to use your right hand to steer the stick. All of this puts left-handers at a definite disadvantage. And since history has proven that left-handers are genetically superior to right-handers, shouldn't *they* be the ones to defend the universe?

We decided to confront the game companies with this obvious case of Southpaw Slight. There is good news and bad news. "I don't see any way out of it without relearning hand domination," said a spokesman for Atari. "Not many people will want to do that," he admitted. "It's a total problem. Not much you can do."

And now the good news. In a matter of months, Atari will be coming out with a "new advanced game system." Joystick and paddle controls will be combined in one device, and that device will have buttons on both sides. Thus, finally, an end to Southpaw Slight.

Those of us who have been left out all these years would like to thank Atari. We think they're doing a fine job. That is a left-handed compliment.

BEST SELLERS

We've made our choices for the best game cartridges, and you've made yours. Here, the companies tell us, is what you've been buying the most:

ATARI
Asteroids
Missile Command
Space Invaders

MATTEL INTELLIVISION
Major League Baseball
NFL Football
Space Battle

ODYSSEY²
K.C. Munchkin
U.F.O.
Quest for the Rings

ACTIVISION
Ice Hockey
Stampede
Kaboom!

one—and a couple of companies (most notably Activision, started by some former Atari aces) have been making nothing but cartridges. Then, the original companies keep upgrading their products. Intellivision came out with a keyboard component that turns the game console into a respectable home computer. Atari has matched that move. Mattel came out with cartridges that talk.

It has become a very bitter battle. Atari commercials knock Intellivision. Mattel commercials fight back. It has all the makings of a great video game.

All of this helps raise the ultimate consumer question: Which is the best system? Sorry, but there is no easy answer. It depends on what you're looking for. Intellivision's controls are the most sophisticated; they allow for more movement and variation. So if you're a sports nut, you might want to stick with Mattel. But Atari has more games to offer, and the company has almost cornered the market on home versions of hot arcade games like Space Invaders and Pac-Man. And each Atari game cartridge has tons of variations. Were you weaned on arcade and space games? Then Atari might be right for you. But Odyssey² has a built-in keyboard, which makes "learning" games easier—perhaps a better bet for younger kids.

The console conflict is compounded by the fact that each company is busy making near-faithful reproductions of its competitors' games. It's a tough battle, and it's anything but kids' stuff. Adults obviously *buy* most of the games. More important, says the industry, marketing studies show adults *play* with them just as much as kids. Maybe more so. All over suburbia, poker night has given way to electronic-game leagues. Midday mahjong players are cashing in their tiles, turning off their soap operas and jumping for joysticks.

And why? What's the big attraction? Interaction. You can't play with your TV set when the standard programming is on. You certainly can't beat it. But with a video game on the screen, you become more than just an observer of electronic entertainment; you turn into an active participant. Finally, right there at home, you can experience the thrill of victory and the agony of shelling out more money for new cartridges.

That's really why we're here. By the end of this year, there are likely to be over 200 game cartridges on the market. Buying by trial and error is an expensive proposition, so we're about to save you some big bucks. We spent months testing just about every game in creation—and a number that were still in the embryonic stage. Our mission was to sift through them all, eliminate the passing fancies and pick the ones that will endure. Regardless of what else comes out, the following games are ones that no respectable victim of Joystick Finger should be without. Just turn the page.
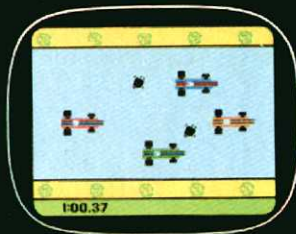
You've finally qualified for the classic. The Grand Prix.

Grand Prix™ by Activision.® A racing game for use with the Atari® Video Computer System.™

Every other video racing game was a trial run. For Grand Prix. Grand Prix explodes off the screen with all the sound and fury of the real thing. Accelerate off the line. Weave through the pack. Anticipate treacherous oil slicks, and push yourself and your car to the limit.

It's you against the clock in the ultimate video racing game.

"Gentlemen...start your engines."
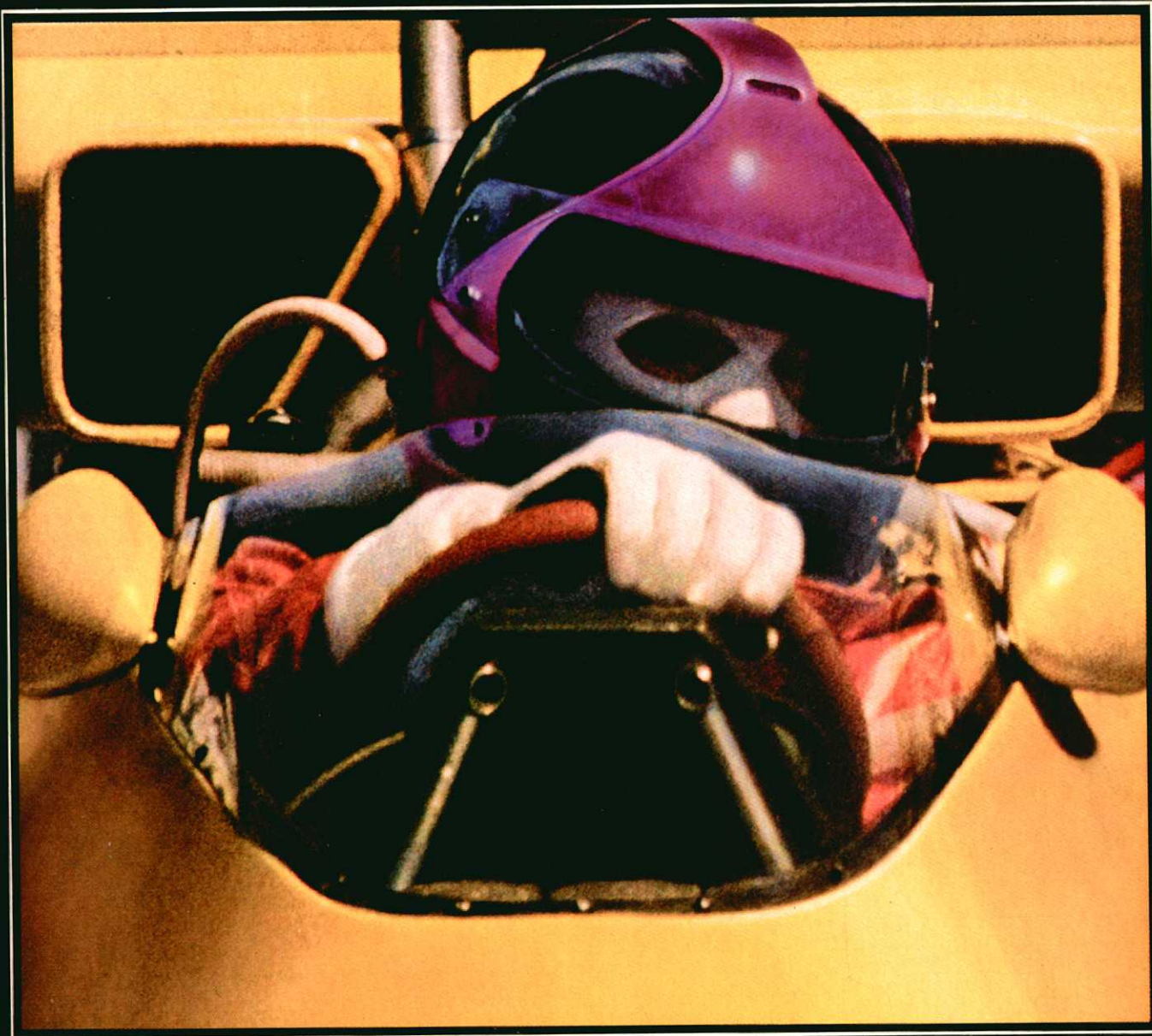
GRAND PRIX™

ACTIVISION®
WE PUT YOU IN THE GAME.

ACTIVISION®
GRAND PRIX™
VIDEO GAME CARTRIDGE

FOR USE WITH THE
ATARI VIDEO COMPUTER SYSTEM
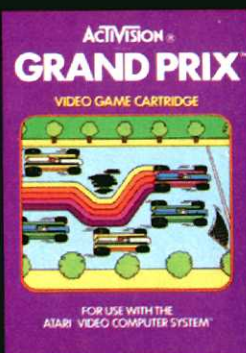
VIDEO GAME HALL OF FAME
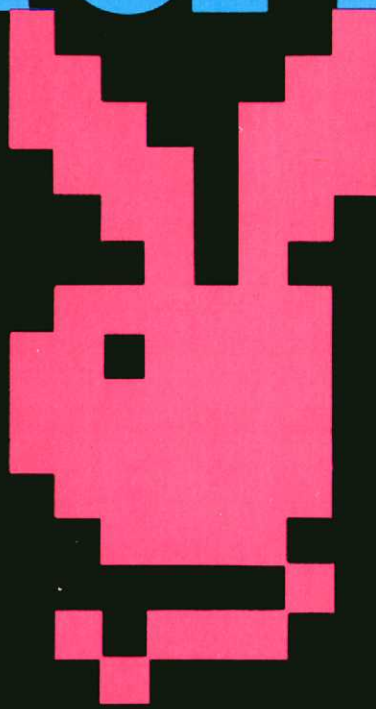
ASTEROIDS (Atari)

You're in a spaceship trapped in a shower of asteroids. Just when you think you've shot your way out, mystery ships appear to try to shoot you down. This one's a fast frontrunner on the final frontier.

ASTROSMASH (Intellivision)

A hostile universe and homicidal aliens offer star wars from yet another galaxy. This one's super-tricky. You think you've beaten the assault, but then, here it comes again. Quick, see if you can hyperspace your way out!

CONQUEST OF THE WORLD (Odyssey²)

Someday, all wars will be fought this way. This is a combination video and board game. The air, land and sea battles on the screen determine which international alliances are made on the board. Win enough games, make the right moves and you can be Ronald Reagan.

FREEWAY (Activision)

We're told this was Colonel Sanders' favorite game. You have your choice of eight busy highways. You have one chicken. With swiftness, planning and a lot of daring, you try to get your chicken across the road without being hit by speeding cars. Have a drumstick.

KABOOM! (Activision)

A mad bomber stands at the top of a wall. You have three buckets of water. The bomber has an endless supply of bombs. He moves, you try to follow and catch the bombs. Sound easy? Wait till the bombs start coming at 13 a second. That's why they call it Kaboom!

K. C. MUNCHKIN (Odyssey²)

A highly creative variation of Pac-Man. You can use the Odyssey² keyboard to create your own mazes, giving the hungry chase endless variations. Go ahead, eat your heart out.

MAJOR LEAGUE BASEBALL (Intellivision)

Damn, this one's good. You can throw inside curves, outside fastballs; you can bunt, steal bases, get involved in rundowns. The fielders run to catch the ball and throw it where you want it. All this without free agents.

MISSILE COMMAND (Atari)

You are the protector of the peace-loving planet of Zardon. The clever and deadly Krytolians are out to destroy you. You try to stop them with antiballistic missiles. But *they* have smart bombs. If only you hadn't cut your defense budget.

NFL FOOTBALL (Intellivision)

This one takes a long time to master, but it's worth it. You choose from over 180 offensive and defensive plays. You can run, pass, or run and pass. It's so realistic that you'll want to call all your players Bubba.

PAC-MAN (Atari)

Just out, the home version of the cult arcade game packs just as much power and fun. You run through a maze trying to eat up all the blips you can before menacing, multiplying ghosts have a ghost of a chance to eat you first. Survival of the fastest.

SPACE BATTLE (Intellivision)

This takes space games one step beyond. Sure, you're trying to dodge the usual alien armada. But you have technology on your side. Just flip on the computerized situation map and analyze your position. Then blow their little heads off.

SPACE INVADERS (Atari)

Everyone's trying to copy this favorite. Accept nothing but the original. You surely know the plot. Here, it's been thickened with 112 variations on the theme, including invisible invaders.

TENNIS (Activision)

Talk about realistic—the ball even has a shadow. You can lie back and play the baseline, rush the net, even figure out ways to spin your serve. It won't get you to the Wimbledon finals, though. For that you need the cursing adapter.

VIDEO PINBALL (Atari)

A classic that still holds up. Pull the plunger and hit the bumpers, spinners and targets all you can without ever having to worry about tilting the machine. Ah, if only Tommy could see this one.

UTOPIA (Intellivision)

This brand-new one signals the start of a new generation of games. You have a country, you have a budget. You have to allot money to feed, house and educate your people without being destroyed by quirks of nature or invading armies. Or you can just put your people on welfare.

PLAIN TALK ABOUT HOME COMPUTERS

A complete guide to what they can do for you

by Cathy Ciccolella
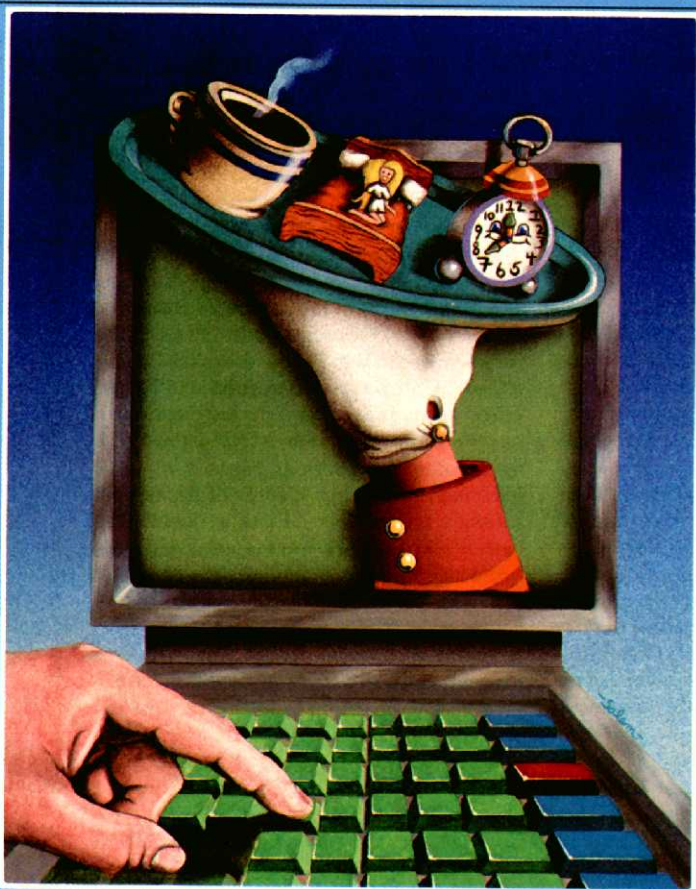
a home computer is probably not what you think it is. To many, a computer conjures up visions of flashing lights, punch cards spitting out across the room and an electronics whiz standing by to swap esoteric conversation with a whirring machine the size of a one-car garage. Today's computers, however, aren't nearly that cumbersome, that complicated or that intimidating. In fact, the same technology that's behind the brains of the home, or personal, computer (the terms are interchangeable) is already found in products you use every day.

That handheld calculator on your desk, the video game that ate up all your quarters at the bar last Friday night and the touch controls on your lover's microwave oven are all built around "microprocessors"—thumbnail-size chips composed of layers of microscopic silicon patterns that act as transistors. Microprocessors also control such simple-seeming products as the thermostat that automatically turns the heat up to a toasty 70 degrees half an hour before you crawl out of bed in the morning.

But the current crop of personal computers has capabilities far beyond such simple functions as filling out your 1040 tax form. If you follow the stock market, they can plug into the Dow Jones News/Retrieval Service, so you can ask questions about stock quotes and obtain financial news. They can track your monthly financial obligations, reminding you who gets how much and when. If you're a collector, they can catalog your records, stamps or videotapes according to genre. If your little black book is starting to overflow, you can transfer all the notations to your home computer, arranged to fit your personal criteria and whims. With the push of a button you can summon up the names and numbers of all the tall blondes you know who like Woody Allen movies and Mexican food—do-it-yourself computer dating. You can give yourself a crash course in U.S. history or basic psychology. You can learn to touch-type. If struck with a creative impulse, you could buy programs that let you compose music and vary the score by tone and pitch until you have just the opus you want. Other programs let you "paint" a picture on the com-

puter's video display screen or amuse yourself with a game of chess, poker, backgammon or Space Wars. A regular all-in-one electronic *Phil Donahue Show*.

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Basically, a home computer breaks down into two elements—the **hardware** and the **software**.

You've heard the names—Apple, Radio Shack, Atari, Commodore. The **hardware** of all these models consists of the internal "brains" of the computer (the CPU, or "central processing unit," which in these models is a microprocessor), a keyboard (similar to that on a typewriter with a few extra keys), used to enter and retrieve data, and some form of video display, by which you and the computer communicate. Many home computers can be hooked up to an ordinary TV set, although you may find that images seen on a separate monitor—preferably one that flashes green on a black background—are easier on your eyes. You'll also need a mass storage device such as a cassette tape recorder or a floppy disk drive. (The former stores data on regular cassette tapes—a slow, time-consuming process, but one that is much cheaper than a floppy disk, which acts like a record player and picks up signals stored on magnetic coated plates.) For the computers available, see the section "Which One?"

Then there's the **software,** the programming—the information that controls what the computer can be instructed to do. It is probably the most important factor for you to consider if you're seriously thinking of buying a machine.

Most of the financial and budgetary functions you'd probably want the computer to perform are available in convenient preprogrammed plug-in cassettes or discs. More personalized tasks generally have to be individually programmed once you get the computer home—but that process is a lot less complicated than it was a few years ago.

Keep in mind that while the new computers can do much, the selection of available preset programming is still relatively narrow, though growing fast. As a result, many well-intentioned people wind up using their machines as little more than glorified toys—and at prices ranging upward from $300 they become rather expensive playmates (pardon the expression). To make sure you get your money's worth, we've assembled the following special section. You'll find all the computer knowhow you need to tell your bytes from your bits.

HOW TO CHOOSE THE PROGRAMS

You can buy preset programs from your computer's manufacturer, retail stores or mail order catalogs; the information is stored either on a magnetic disc smaller than a phonograph record (a floppy disc), or on tape in cassette or cartridge form. Or, you can do it yourself by typing your own set of instructions into the computer, using a special computer language. The most common, and popular, one is BASIC, which stands for Beginner's All-Purpose Symbolic Instruction Code. Some others are COBOL, FORTRAN, ALGOL, LOGO, PASCAL and SNOBOL.

If you've opted for a prerecorded program, all you have to do is insert the cassette or disc into the computer or peripheral accessory (a floppy disc drive or a cassette tape player) and the machine does the rest, using data you supply to fill in the blanks.

Creating your own program? Don't forget "memory." The instructions you give the computer must be stored in its memory so you can retrieve the information later, add to it or change it. This memory capacity—how much information the machine can absorb—is one factor determining the price of the computer. The larger the computer's memory the broader its capacity to carry out programs, and the more it's going to cost. (More on this in our

"Where and How to Buy It" section.)

If you're a beginner, you are probably better off buying the machine that gives you access to the broadest spectrum of software programs in areas that match your interests—and that means shopping for programs that fit your needs first, then looking for computers that use those programs.

Today you can buy a smorgasbord of home management, educational, business and entertainment programs. Choose from over 10,000 of them, only a fraction of the software menu that'll be available in a year or two. Computer software is one of the fastest growing areas of the electronics business, and most stores try hard to carry as broad an inventory as possible.

Here's a sampling of some of the newest software around. Keep in mind that there's little compatibility among programs designed for different computers, so make sure you select software that fits the model you have at home.

VisiCalc, from Personal Software, is one of the best-selling programs for home budgeting. By enabling you to set up an electronic budget sheet similar to a ledger page, it helps you keep track of your finances in a clear, concise format. You can also set up a number of "What If" premises—"What if my income goes up $200 a month?" "What if I get that $125 rent increase?"—and test out how they would affect your finances on a monthly or yearly basis. A must for anyone who wants the computer to take over his personal financial management, this program has many business applications too. VisiCalc is available for Apple, Atari, Radio Shack and IBM computers, at about $200.

Need help with your income tax forms? The **Personal Tax Preparer** ($100) from Pansophics Systems is an electronic accountant that will do virtually everything for you except tackle the IRS agent if you get audited. It asks for the information it needs from you, prints out the proper tax form and stores your records so you'll have easy access to them next year. It is compatible with the Apple II Plus, Radio Shack TRS-80 and IBM Personal Computer.

Several programs are available if you want to use the computer to follow the stock market. Among the best, if you have a telephone-connection module, are **Videotex** for Radio Shack ($30) and **Telelink** for Atari machines ($25). With each, you call a local telephone number for the Dow Jones News/Retrieval Service and get delayed stock quotations displayed on your screen.

No telephone module? Your computer can still help you play the market. Radio Shack has two programs—**Trendex Stock Trend Analysis** ($50) and **Cassette Portfolio** ($30)—that help you track gains and losses. Atari offers a similar program for $25, with which you can follow profit earnings and develop performance graphs.

If you're using your computer primarily for business applications and have a Texas Instruments unit, three new **Business Aids Library** diskettes—on inventory management, invoice management ($70 each) and cash management ($40)—will forecast cash flow, track inventory and keep lists of customers' addresses, discounts and so on.

Do you have trouble pulling all your records together at tax time? Check out the new **Expense Calendar** for the Commodore VIC 20 computer; the program compiles income and expense notes and keeps track of important dates, for only $15.

Among the best educational programs are Dorsett Educational Systems' **Talk & Teach** cassettes ($79 for a series of 16 lessons on eight cassettes), used with the company's plug-in **Educational System Master** cartridge ($18). These cassettes present material in lectures with graphic illustrations, and they stop periodically to test the knowledge you've acquired.

For younger children, Texas Instrument's **Speak & Spell** and **Speak & Math** programs ($30 each), when used with the TI-99/4A's voice synthesizer, let the child hear the word or math problem as if spoken by a teacher.

Adults could well use **Typing Tutor,** at $40 for the Apple computer and $30 for Radio

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Shack models. This touch-typing program checks your present speed and accuracy and suggests drills for you to practice.

Then there are the games. Lots of them. Everything from fantasy and adventure (see our story on the top video games), to old standbys such as chess and backgammon. One of the best: the **Sargon II** chess program by Hayden, priced at $35 for both Apple and Radio Shack computers. This program offers seven ascending levels of expertise, and even allows the computer to drop hints about your next move if you need them.

This sampling is just a small bite out of the software pie. Your choice depends on what you want or need to do with the computer. For instance, the day may not be far off when it'll cost you less, and be a lot faster, to order products and pay bills by computer. The programs and services are definitely on the way, and they are sure to revolutionize communication between the home and the outside world.

ALL THE NEWS THAT'S FIT TO PRINT, PLUS

Well, OK, so you *can't* take it into the bathroom. But you can, for $20 plus a $5-per-hour viewing charge, get *The New York Times, Los Angeles Times, The Washington Post, San Francisco Examiner,* seven other U.S. dailies and the AP wire delivered to your home through your home computer. You'll get selected news stories (no ads or cartoons), plus some custom-written technical and computer information. Among other services offered is "Shop at Home," through which you can order products from a catalogue of 30,000 items, some of them discounted up to 40 percent. The service is brought to you by **CompuServe,** an outfit in Columbus, Ohio, and it can be set up through local computer store outlets. For $100 plus an hourly charge (variable with time of day) a similar service—**The Source**—gives you 48 database services, such as UPI News, stock and commodity information and abstracts from 27 business magazines, plus communications services, among them electronic mail and travel club membership. Then there's **Dialog's Magazine Index,** which provides monthly indexing of 370 popular magazines. For more information, write:

CompuServe Information Services, Inc.
5000 Arlington Centre Blvd.
Columbus, Ohio 43220

Dialog Information Services, Inc.
3460 Hillview Ave.
Palo Alto, Calif. 94304

Source Telecomputing Corporation
1616 Anderson Rd.
McLean, Va. 22102

WHERE AND HOW TO BUY IT

The home computer used to be the exclusive province of computer specialists, of stores with names like ComputerLand, Computer Center or The Computer Factory. In the mid-Seventies, Radio Shack started selling them, and today department stores, chains and consumer electronics outlets are getting into the act. Even Sears is setting up a nationwide chain of Business System Centers to handle home computers.

While the computer specialty store is likely to have the broadest selection and perhaps the most knowledgeable sales help (they tend to hire home computer buffs as salespeople), you might find lower prices or better credit arrangements elsewhere.

Do some homework first. Think carefully about what you want to do with the computer now as well as what your long-term needs will be. Buy computer hobbyist magazines such as *Creative Computing* or *Byte* and talk to friends who already own computers to get an idea of the types of programming available for different models and what the machines' capabilities are. Analyzing your needs will also help you decide if you'll be depending primarily on preprogrammed software or if you will want to create your own programs, calling for a more complex (and more expensive) computer system.

Now, how much do you want to spend? You should be able to get a basic home computer for around $500, but adding peripheral attachments such as a *printer* to type out letter-quality reports or a *modem* (modulator/demodulator) to link you to larger computer banks (we'll get to these later) can quickly push the price above the $1000 mark. Computers already equipped with these peripheral features are in the $800 to $1200 range. If you're planning to put the computer in complete charge of your household and finances with your own customized programs, and perhaps use the machine for your business too, you may find yourself investing over $2000.

Finding a knowledgeable salesperson—one who has time to spend with you—is critical. Buying a personal computer is not an "impulse" purchase, so don't try to rush through it. You need time to have the machines thoroughly explained to you,

and to play around with them yourself until you find the one you feel most comfortable with.

While software availability is the key factor to consider when buying a computer, some general pointers about the hardware itself are worth noting.

Compare models by testing similar programs on different computers. See how the keyboards are organized—if, for instance, you find the most common programming-command keys easy to use. Make sure the keys are large enough and far enough apart so your fingers don't hit more than one key at once.

If you plan to use your computer for business or financial purposes, a keyboard with a separate numeric pad in addition to the standard typewriter-style alpha–numeric arrangement will speed up your work considerably.

Then, check the graphics on the computer's video screen. Are they black and white or in color? If you expect to use your computer for number-oriented business tasks, you may want black and white, since the figures will be sharper. (Black and white models are usually cheaper, too.) However, if you plan to use your computer for game-playing, educational purposes or business tasks requiring graphs and charts, opt for a color model.

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Planning on creating your own programs? Then you need to find out exactly how difficult it will be to do that on each model you're considering, as well as determine what its "memory capacity" is. Memory is measured in "bytes," a byte being a group of binary digits operated on as one unit. 1K (K, for kilo, or 1000) is equal to 1024 bytes—or roughly the amount of information contained in 200 typewritten words. You'll find some home computers with 4K capacity—that's not very much. You'll need at least 16K for simple functions, 32K for budgetary and accounting tasks.

Be sure, too, to nail down what's included in a unit's base price. (Some computers, for instance, do not come with a viewing screen; you purchase that separately or hook the computer up to your television or to a separate monitor.) Find out if you can readily plug in peripherals—printers or disk drives—as you need them. You will probably want to hook up your computer to other data banks to take advantage of such services as CompuServe and The Source—personal information services that give you news, financial info, electronic mail, even airline schedules. For this, you will need a *modem*, which plugs into your telephone and costs $150 plus.

Next, look at the computer's instruction manual. Is it clearly written and easy to understand? All the computer capability in the world won't help you if you can't figure out how to take advantage of it. You might consider taking a computer course to thoroughly familiarize yourself with

programming. We know a number of parents who take such classes, to learn how to communicate not only with their new computer but also with their kids, who are already computer-literate.

Once you've narrowed the choice to one or two computers, ask the salesperson about warranties and how servicing is handled. A 90-day factory warranty on parts is common and separate service contracts are the norm. (These will cost you more, but they are usually well worth it.) Many computer stores do their own servicing; most department stores do not, so buying from them may mean sending the computer back to the factory if something goes wrong.

If you are shy of buying right away, you might consider renting a computer for a month or two. Be forewarned, however, that most manufacturers do not rent their computers. Some local electronics stores might, with average rates for monthly rentals ranging from $50 to $200, depending on the equipment.

WHICH ONE?

You can buy many small computers, but only a relative few are best suited—in terms of ease of operation, price and software availability—for home use. Here's a brief rundown on those you're most likely to come across. (All prices are estimates depending on where you live and where you shop.)

• One of the most popular home computers is **Radio Shack's TRS-80,** sold only through its network of more than 7000 nationwide outlets. (The TRS-80 is the only brand Radio Shack carries.) It comes in a variety of models, ranging from the Model PC-1 pocket version to the sophisticated Model II desk-top business computer. In between is the fully expandable TRS-80 Color Computer. Priced at $399, it's an excellent starter computer that plugs into your TV. The TRS-80 Model III, another home version, comes with its own 12″ black-and-white video display and is slightly more sophisticated (and a good deal costlier) at $999.

Radio Shack offers a host of peripheral add-ons you can plug into your system. If you want a printed copy of the work you do on the computer, buy one of six printer attachments, priced from $399 to $1960. Radio Shack also offers three different modems, for communicating by telephone with other computers ($149 to $249).

Since the Radio Shack TRS-80 is one of the bestselling home computers around, you'll find quite a bit of software available for it, from Radio Shack plus outside suppliers. Radio Shack's own programs are strongly business-oriented, although a variety of educational, entertainment and personal-management options are also available.

• Another popular home computer—this one likely to be found in most computer stores—is the **Commodore PET** (for Personal Electronic Transactor). This model, the first self-contained microcomputer sold, has been around for five years; the newest version of the PET 4000 series offers a full typewriter keyboard, a numeric pad for figure calculations and a 12″ green phosphor display mounted right above it. Cassette storage area and power supply are built in.

The basic PET model starts at about $800, but Commodore also offers such add-ons as printers and more memory-storage capacity.

Commodore's latest computer, the **Commodore 64,** $595, accepts software written by other companies if it's compatible with CP/M (Control Program for Microcomputers), a standard operating system. You can program this versatile computer for many purposes, including word processing, financial planning, music synthesizing and games.

• Apple Computer is a young company that got in on the ground floor of the personal-computer business and has been going gangbusters since. Its most popular home model is the **Apple II Plus,** which starts at $2175; a disc drive is included.

If you buy the Apple II Plus you'll have to supply your own video monitor; because its color graphics are so good, you'll probably want to hook it up to a color TV set. Like the Radio Shack TRS-80, the Apple II Plus offers a variety of peripheral add-ons: a printer, a modem, a graphics tablet for video artistry and speech and music synthesizers, among others.

Since the Apple model is so popular, the programming choices—both from Apple itself and from other firms—are broad, with an emphasis on education, personal-finance applications and small-business information processing. Apple also offers games.

Last November Apple began marketing its hardware and software together in one package called the Family System. For a little less than $2500 you get the Apple II Plus computer with 48K of user memory, one disc drive, a modulator for hook-up to a TV set and two game paddles. Also included are several personal-business and game programs, a basic "how-to" program to walk you step by step through the computer's functions, a very thorough manual, a directory of software compatible with the Apple system and a library of user manuals.

• Like the Apple home computer, the **Atari 400** requires you to provide your own TV set or video monitor. The unit, from a company better known for its video games, comes with a flat, touch-sensitive keyboard and four sound synthesizers, which can be used for foreign-language programs. The Atari 400 is priced at about $400; a more expensive model, the $899 **Atari 800,** comes with a more elaborate keyboard and larger memory. Programming for Atari computers leans heavily in the direction of games and education.

• A pioneer in the handheld calculator field, **Texas Instruments,** has gotten into personal computers as well, with its sophisticated **99/4A,** at $525. This unit, too, requires hookup to your TV set or video monitor. A peripheral speech synthesizer allows you to intersperse spoken commands into a program, and plug-in modules can expand its vocabulary. A printer and a modem are among the other peripherals available. Owners of the 99/4A now
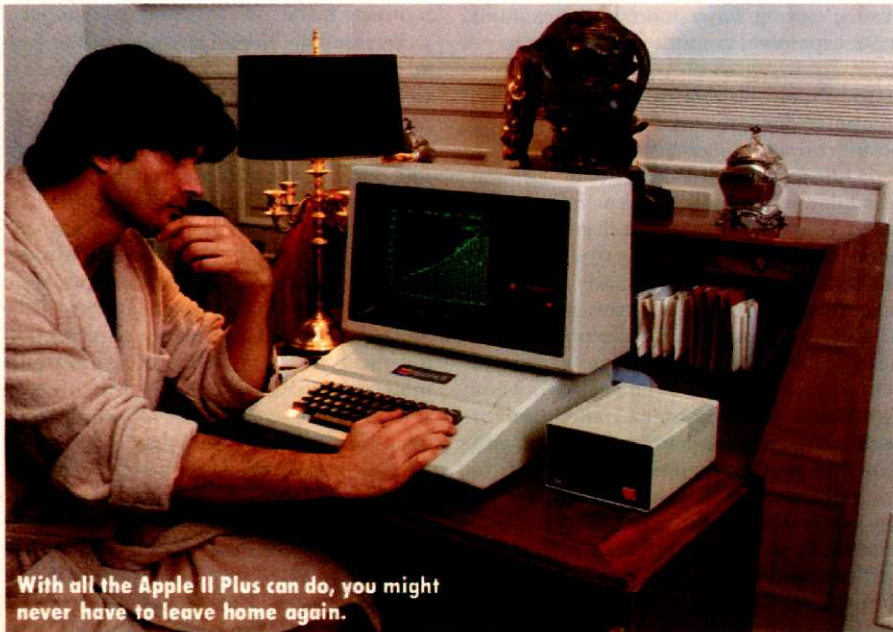
With all the Apple II Plus can do, you might never have to leave home again.

have access to a new service called Texnet, a home information network developed by The Source especially for this particular computer.

• Perhaps more appropriate for business and scientific uses than for strictly home computing, the **Hewlett-Packard HP-85** computer depends more heavily on user programming than on prerecorded software. This compact unit, priced around $2750, includes a typewriter keyboard plus a separate numeric keypad, a built-in 5" black-and-white display and a built-in printer.

• **Intellivision,** the home computer produced by **Mattel,** a company best known for its toys and electronic games, is actually a cross between a programmable video game and a personal computer. The unit combines a master component, which sells for between $240 and $300, with a separate keyboard component ($500–$600); the keyboard component went on sale in only a few cities last year, but is expected to be available nationally sometime in 1983.

Both the master component and the keyboard hook up to a TV set. The master component includes two handheld controllers with control discs to move objects on the TV screen; sound effects and lifelike color graphics are built in for all preprogrammed cartridges.

When hooked to the keyboard to form a computer, Intellivision uses preprogrammed cassettes. Currently, suitable computer software is still limited. Once more programs are available, the unit will be ideal for language instruction, since it possesses two-way speech-synthesis capabilities. Mattel is also expected to make Intellivision user-programmable. Peripheral attachments are soon to come.

• The most recent entry into the home computer field is the company many of us think of first when the subject of computers comes up: IBM. The **IBM Personal Computer** is being sold through the 170-plus Computerland specialty stores around the country, through Sears' new network of Business Systems Centers and through the 15 IBM Product Centers. Prices start at about $1565 for a basic model without a video display; the usual peripherals, including a printer, are available. Since this computer is so new, only a limited amount of software is available, but the selection is expected to grow during the coming year.

Other names you're likely to see lining the shelves of computer stores are Ohio Scientific, Compucolor, Bally and Exidy. Since each offers specific features, it pays to take your time and shop around carefully.

And, remember, prices may shift drastically up or down. Like the handheld calculator and other products of modern microprocessor technology, the personal computer may drop in price due to mass-production efficiencies, competition and increased demand. Then again, in these inflationary times almost everything is going up in price, and the personal computer could too.

The Sinclair ZX81, a personal computer that travels well, is small enough to go to your office or your patio.

THE WHOLE COMPUTER IN YOUR HAND

just as there is a gray area between the most sophisticated video games and the simplest home computers, crossover technology exists between the most complex handheld calculators and the newly emerging handheld computers.

The true handheld computer, however, is a giant step beyond the portable calculator it superficially resembles. It provides many of the same functions as larger personal computers, though so far the software is much more limited than that for its big brother. But these micro portable models could well become the fastest growing segment of the personal computer field, expected to pass desk-top home computers in sales by 1985.

One of the first true handheld computers was introduced by **Panasonic.** Sometimes called **The Link,** because it links the user to a home office or another computer via telephone lines, this modular computer system comes stashed in its own customized briefcase. The 2K model will be $500, the 4K, $600.

Virtually identical is the model marketed under the **Quasar** brand. Quasar is a sister company of Panasonic within the Japanese conglomerate Matsushita Elec-

tric Company (the Quasar 2K model is $525; the 4K model, $595). The tiny central unit, about the size of a paperback book, is powered by a rechargeable battery and is designed primarily for business applications because of its telephone-link capabilities. However, it allows you to work at home or in a hotel room while maintaining a constant connection with your home office's computer.

Programming available for the Panasonic and Quasar computers is being developed separately. Programming for both, however, comes on tiny snap-in cartridges the size of a stamp; a few business-oriented programs were available when the unit first went on sale last year, and others are following.

Another tiny computer model is the **Sinclair ZX81 Personal Computer** (about $150). To use this small, lightweight unit, you hook it up to your TV set and provide your own cassette recorder for information storage as well. Programming for this unit comes on cassette tapes; look for plug-in peripherals soon.

Other manufacturers of handheld computers are Sharp, Infone, Osborne, Hewlett-Packard and Radio Shack. The microchip has truly taken over.

GLOSSARY

*i*t always helps to speak the language. And computers have a language all their own—actually, several languages, used by humans to talk both *to* and *about* the computer, and by the computer to talk to itself.

Most home computers are programmed to understand a language called BASIC, which you use to talk *to* the computer. But the would-be computer purchaser may find that in talking with other home-computer owners or to sales clerks in a computer specialty store, another, totally different, vocabulary is required.

Here are some terms you're likely to encounter:

access time/the time it takes the computer to retrieve information from its memory or to store new information there.

address/the location in the computer's memory where a specific piece of information is stored.

bit/one of two characters used in binary notation, representing an on or off stage in digital electronics, or a 1 or 0 in the binary number system.

byte/a group of eight bits, which the computer handles as one word or command.

chip/a common term for an integrated circuit or microprocessor.

clear/to reset a memory or register in the computer to zero.

code/the representation of data and instructions in symbolic form, i.e. the machine language.

CPU (Central Processing Unit)/the heart, or brains, of a computer, containing the circuits and components that do the work of interpreting and carrying out instructions.

CRT (cathode ray tube)/a video-display device similar to a television screen.

cursor/a symbol on a computer's video display indicating where the next character will appear.

data/all the numbers, alphabetic characters and symbols the computer uses to convey information.

debugging/finding and correcting the errors in a computer program.

disc/a round, flat magnetic device for storing information.

display/where the computer's program is shown to the user, usually either a video screen or a light-emitting diode (LED).

floppy disc/a flexible magnetic record for storing information.

hardware/the term used for all the physical equipment of the computer: circuits, keyboard, video display, modem, etc.

input/the information fed into the computer. (Computer buffs use the term "GIGO," which stands for "Garbage In, Garbage Out," to describe the principle that faulty input gives faulty results.)

input/output devices/the hardware used to put information into the computer and to get it back out (also called "peripherals").

instruction/a basic command to the computer.

interface/any hardware or software that links the computer's microprocessor to peripheral units, such as a keyboard or modem.

joystick/a control lever, usually used for video games, that can be moved in any direction.

keyboard/a device similar to a typewriter, with pushbuttons used to transmit instructions to the computer.

language/the computer has its own language, called "machine code language," based on a binary code using the numbers 0 and 1. High-level languages such as BASIC and COBOL are English-like languages used in programming; they translate words and symbols into the code language the computer understands.

library/a collection of computer programs or data files.

loop/a sequence of instructions to the computer that is repeated automatically until a specified condition is reached.

mass storage/a holding area for a large amount of digital information, usually a cassette tape or a disc.

memory/the place where the computer stores its information and instructions (see RAM and ROM).

microcomputer/a complete computer system that uses a microprocessor as its central processing unit and also has memory and input/output devices.

microprocessor/originally used to designate the CPU of a microcomputer. The silicon chip, the minuscule piece of circuitry hardware in a CPU, is responsible for the "micro" sizes of computers today. Microprocessor is now commonly used as a synonym for microcomputer.

modem (modulator/demodulator)/a device that allows a computer to communicate with another computer over ordinary telephone lines.

MPU (microprocessor unit)/a microprocessor chip.

peripheral/any external device that communicates with the computer, such as a printer, speech synthesizer or mass storage device.

printer/an automatic typewriter used to produce a record of the computer's output on paper (the paper record is called "hard copy").

program/a sequence of instructions given to the computer to perform a specific task or function. Programs are called "software"; preparing the instructions is referred to as "programming."

RAM (random access memory)/a storage device within the computer that allows fast, direct access to its information, and to which information can be added or deleted; if not put into "mass storage," the information vanishes (is automatically erased) when the computer is turned off.

ROM (read only memory)/the information permanently stored in the computer that cannot be removed, destroyed or erased.

software/the programs and procedures used in interacting with the computer.

speech synthesis/artificial "talking" aloud by the computer, produced by converting written symbols into audio signals that mimic the human voice.

terminal/an input/output device, usually a video screen, keyboard or automatic typewriter, that allows the user to communicate with the computer.

video display/an output device similar to a TV screen; it can be either color or black-and-white.