AT&T Enters The Market

AT&T has made the long-expected leap from communications to personal computing. This special report outlines the company's marketing strategy. It includes a critical look at the new AT&T Personal Computer and an on the record interview with key AT&T executive Jack Scanlon.

by Charles L. Martin, Editor

Like a classic science fiction thriller, the battle of the technological giants has begun. AT&T's long-expected entry into the personal computer marketplace has become a fact and the battleground, at least in the beginning, is in nothing less than IBM's solidly entrenched, PC-DOS backyard. According to James E. Olson, vice-chairman of the board of AT&T and chairman of AT&T Technologies, "We intend to play in the market, and play in it well."

What 'playing in it well' means to AT&T officials is that the company intends to lead the computer industry by offering the user a way in which to achieve complete integration of his computer resources—linking micros to minis to mainframes. To achieve that in the most cost effective—"and realistic"—way, AT&T will attempt to make its UNIX operating system the "industry standard," provide a personal computer that will allow users to run their existing MS-DOS software and, at some point in the near future, UNIX, and provide the means for those users to link together their personal computers with minis and mainframes. Not only that, they intend to turn a profit on their AT&T Personal Computer "in year one."

"We intend to be a leading provider and integrator of business office automation systems that enhance voice, data, office, building, factory and network management," says Olson. "Drawing on our historic strengths in voice and network management we are moving into the broader arena of information movement and management."

Yet, in what seems to be a major contradiction to its announced marketing strategy of turning UNIX into the "industry standard," AT&T's personal computer, (see review, page 72) is an IBM-compatible computer based on the MS-DOS operating system, a system which has become the de facto industry standard since IBM
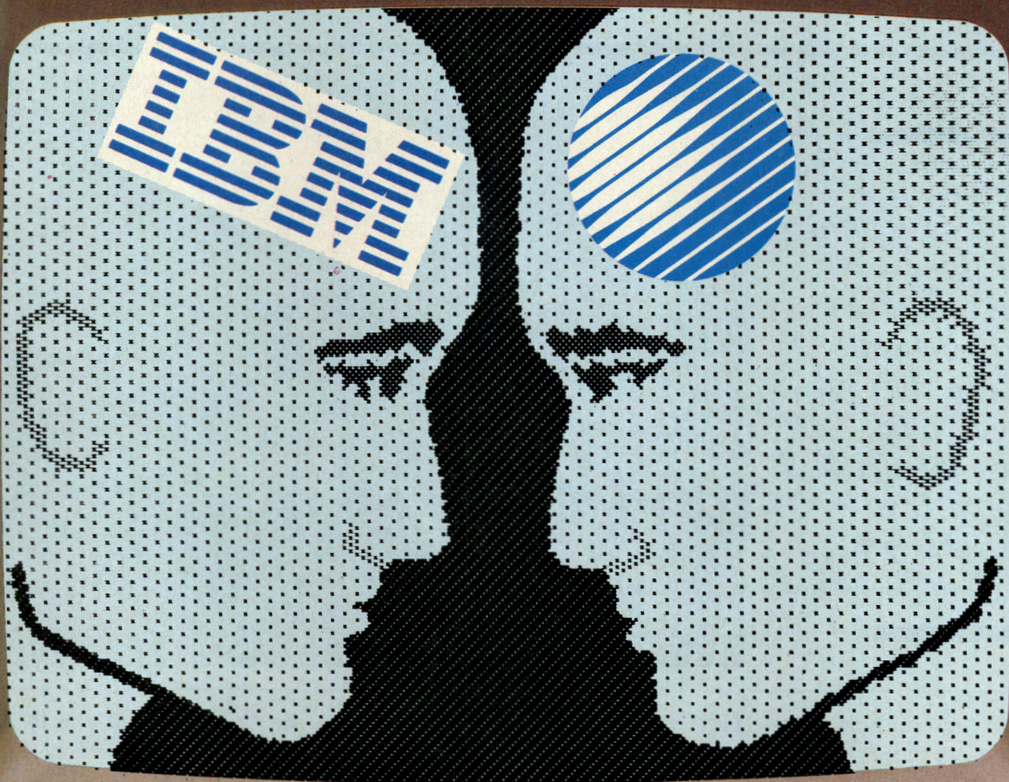
announced its Personal Computer in August 1981. In fact, the AT&T entry will be the only major player in the market with a machine that is 100 percent PC-DOS compatible. It is faster by 30 to 80 percent than a comparable IBM Personal Computer, has better graphics capabilities, and is equipped to connect to the UNIX-based line of 3B products, and will be, according to AT&T, "comparably priced." Nevertheless, the surprise here is that AT&T would produce what many will see as nothing more significant than an IBM look-alike.

In an effort to implement their marketing strategy of providing a way for users to run their existing MS-DOS software, and at the same time connect personal computers to both minis and mainframes, AT&T is also introducing a local area network (LAN—pronounced 'lane') which will allow personal computers to communicate with each other and share common resources; a 3B5 computer with an applications processor which will integrate the company's PBX systems 75 and 85 with office applications; new retail distribution channels for the 3B2 and 3B5 computers previously announced but only available through AT&T account teams; additional software for the 3B2 and 3B5 family of mini-computers; and, the beginning of AT&T software for the personal computer.

As of June 27, one day after the scheduled announcement, AT&T's personal computer was slated to be on sale in 500 retail outlets across the U.S. Although negotiations were not complete at press time, AT&T executives said their machine would also be available at selected stores of ComputerLand, Genra, Microage, Compushop, Americasource and Sears. According to John Boyd, national director of distributor sales for the AT&T Personal Computer, the company plans to have its product available in 500 stores at announcement time, 800 to 900 stores by the end of 1984, and on sale in more than 1500 stores by the end of 1985.

"We have a business plan that was initiated to show a profit in year one and our earliest indications are that we will exceed our expectations," Boyd says. "We didn't necessarily start out with that objective, but the plan we have in place will deliver

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Photograph by Michael Mella

positive return in year one and obviously to do that we need a great deal of volume. However, we don't have to go out and displace all of our major competitiors in the first 90 days of our product in production. We are on the verge of leading the computer industry."

Nevertheless, AT&T production goals are a closely guarded secret—"we don't want the competition to know how many we can produce" says one AT&T official—as are unit sales goals. Since IBM won't divulge the number of personal computers it sells annually, the number of units a manufacturer must sell to "lead the computer industry" is open to speculation. But since AT&T's personal computer is manufactured wholly by Olivetti in Italy, the company AT&T bought into in December of 1983 for $260 million, it is unclear whether Olivetti could deliver enough units to meet a serious demand for them. Indeed, Olivetti unveiled a personal computer of their own two days after the Hanover Trade fair (an international industrial fair held annually in

Hanover, W. Germany). The Olivetti machine is virtually the same machine being exported to the U.S. for sale under the AT&T name—except for a different case and cosmetics. According to Boyd, Olivetti will continue to sell and distribute their personal computer—with the Olivetti name—in Europe.

But the Olivetti connection does do two important things for AT&T and their larger strategy: it gives them a foot in the door in Europe and provides them with an international manufacturing base reputed to be one of the best-run companies in Europe. And AT&T's buy-in to Olivetti (they got 25 percent of the company in return for an agreement not to increase their holdings for four years) assures them of being able to compete for international market share against IBM and ITT's entry into the personal computing marketplace (see review, page 17), behind a marketing strategy built on voice and data integration.

Yet the battle lines for dominance in the personal computer marketplace seem oddly drawn. Indeed, they would seem weighted in IBM's favor since it is the company perceived to

be the keeper of the PC-DOS/MS-DOS "grail." Clearly, the question remains: Why would AT&T bother to introduce an IBM-compatible machine rather than wait for its own UNIX-based product?

"There's no adversity here," says Steven M. Bauman, executive director of AT&T's office information and terminals division. "We already have our UNIX machine (a reference to the 3B line of minis introduced earlier this year). The customers are sitting on top of an investment in software (for personal computers) and we have an open architecture to protect their investment." Says Boyd, "The software is already out there, so for us to come out with a machine that's all UNIX would be a serious marketing mistake. People would wonder about our sanity. We're taking a realistic approach to our marketing efforts. We understand what exists today. We want to take advantage of it. Then we have the ability to offer our customers the best of all worlds. To take advantage of what they've got today ties in with the strategy of protecting their investment and gives them options for the future."

Photograph by Michael Mella

> ❝We're selling to accounts that have invested in the IBM world. UNIX and MS-DOS strategies are complementary. To ignore the realities would be not understanding the market.❞
>
> —STUART MENCHER

Stuart Mencher, director of data systems marketing, heads the division that deals directly with companies rather than retailers. He calls AT&T's approach a "building block strategy; micro to mini to mainframe."

"We're selling to large and intermediate accounts that have already made an investment in the IBM world," Mencher says. "The MS-DOS and UNIX strategy are consistent and complementary. To ignore the realities of the world would be not understanding the marketplace."

Mencher sees the personal computer being used in a stand-alone environment as well as providing access to a system and central data base.

"We have an intelligent workstation strategy. A personal computer is nothing more than an intelligent workstation," Mencher notes. Jack Scanlon, vice-president, computer systems, who heads the group that developed the computer line, believes UNIX will be the bridge among all of AT&T's computers. Says Scanlon, "Achieving that (UNIX as the operating system standard) is critical to our strategy in the marketplace because our strategy is simple: Build a

UNIX marketplace and come in with the best UNIX hardware." As Scanlon sees it, UNIX will plug a major hole for companies by "glueing very dissimilar boxes on desk tops to very dissimilar big engines."

"The key issue in the single-user area," Scanlon says, "is that with the next generation of chips coming out, you have a real engine. You essentially have a microprocessor that's got a mini-computer in it. So what you need is an operating system in a single-user environment to take advantage of the kind of bang you get in that micro."

Since AT&T's personal computer interface will allow the personal computer to link to the 3B series of mini-computers, AT&T believes users will get the biggest bang from their micros by having a personal computer on their desk with both MS-DOS and a way in which to tie in to a network which uses UNIX.

Says Mencher, "One of the complaints we get (from customers) is they get an IBM Personal Computer or compatible and they come to us and complain that they're isolated,

they can't run things together." Installing UNIX in a personal computer would solve that problem—and a host of others. For one thing, it would allow the user to do multitasking—have several programs running at once on a computer. Not only that, since it is an operating system designed to be machine-independent, UNIX as the industry's operating system standard would mean that when users were ready to buy other—or another—personal computer, software compatibility would not be an issue. Since UNIX is already used as the operating system on some minis and mainframes, UNIX on a personal computer would mean that the user would be able to access both the mini and the mainframe.

Until recently however, the idea of UNIX running on a personal computer simply didn't make sense in light of the technical problems to be overcome. An offshoot of Multics, a larger, more cumbersome operating system designed to run Bell Labs computers and a system without the capability to support multiple users, UNIX was born in 1969, the product of Ken Thompson and Dennis M. Richie, two Bell Labs scientists who

were searching for a viable alternative to the by then defunct (as far as AT&T's Bell Labs was concerned) Multics system. In fact, according to Richie, the name UNIX—an acronym with no meaning—was suggested in 1970 by a Bell Labs scientist, ". . . in a somewhat treacherous pun on Multics . . ."

Says Richie, "UNIX will need some improvements before it can successfully reach the desktop level." For one thing, he points out, "UNIX has grown enough so that it's fairly difficult to squeeze it back down into smaller machines. I'm sure that things will have to be put on top of it to make the (user) interface different." Scanlon concurs that the system will need modification before it can become, at least for the personal computer user, the operating system industry standard. ". . . it will be necessary to put a different shell interface in front of UNIX to make it look like something they're used to in the personal computing world rather than the mini world," he says.

But with the new generation of hardware entering into the marketplace—including AT&T's Personal Computer—many of the problems which prohibited UNIX from being used as a personal computer operating system would seem to have been solved. In the past, one major problem centered on the amount of addressable memory available to an 8-bit processor—which was 64k. The amount of memory needed by UNIX was much greater—about 512k, according to one Bell Labs UNIX expert—which needed a true 16-bit processor to address that amount of memory.

The problem left, really, is the communications channels by which the hardware is linked together, something that AT&T's recently announced PC Interface may overcome. The PC Interface, a hardware-software combination, allows the linkage of several personal computers through a central minicomputer, use of the minicomputer's data bases and other resources, access to AT&T's 3B Net, an Ethernet-compatible local area network, and access to 3B's Electronic Messaging System (AT&T's Videotex system). According to AT&T executives and technical staff, the PC Interface performs all the necessary translations to allow moving files between the UNIX operating system and MS-DOS.

But perhaps a more significant announcement centers on the introduction of the AT&T Context Switch, a piece of software designed to allow their Personal Computer to be used as a terminal with the 3B series of minicomputers. With the Context Switch, a user will be able to retrieve data from a 3B computer and, by pressing a few keys, switch back to the MS-DOS environment.

Communications hardware will no doubt fill some of the empty slots in the AT&T personal computer. A future communications device may also fill AT&T's version of a "mystery slot" —an empty 32-pin socket located next to the asynchronous communications chip on the motherboard, the main board of the computer. AT&T executives would not disclose what that particular socket is for, but there have been hints that it might have something to do with serial port-based networking, perhaps a low-cost version of the PC interface.

One report from inside AT&T is that an "options board" will be made available by the end of 1984 or early 1985. That board, reportedly in prototype form now, would allow a telephone to be plugged into it and allow the computer to manage (autodial, tracking, etc) telephone communications, what AT&T refers to as "voice management."

"All of our strategy is to include voice and data," says Larry F. Dooling, executive director, general products and systems division. Says Scanlon, "Digital processing of voice is something we kind of wrote the book on, so I think you would expect us to bring that kind of dimension to the business."

But there is another way to move UNIX into the personal computer environment and that is perhaps the simplest way of all. It is to put UNIX onto the processor chip. AT&T itself is a major player in the chip business.

WHAT'S IN A NAME?

In an industry of well-guarded secrets and cutthroat competition, computer hardware and software developers often give their projects code names. The working title for the IBM PCjr, for example, was "Peanut," and the Hewlett-Packard 110 went under the code name "Nomad," while dBASE II was referred to by Ashton-Tate insiders as "Trinity."

During its development stages the AT&T Personal Computer was code-named "Safari III." The name is reported to have come from inside Bell Labs while several senior executives were on safari. Another theory on the origin of the name is that the frequent trips by the computer's developers to outside vendors in California gave rise to the name "Surf and Safari," later shortened to Safari.

Of course, some products never outgrow their code names, and go into the world with the often cryptic labels given to them by their creators. Examples: the Apple Lisa and the Macintosh.

Chip technology—and cost—are not static, and according to Scanlon, the market will have all the chips it needs within 12 months.

AT&T officials claim that every major chip maker is currently working on putting UNIX on the processor chip. Some AT&T technical sources say there is no longer any "real technical reason" to prohibit UNIX from running on a stand-alone personal computer.

AT&T is aggressively seeking "value added" software developers to translate their existing software onto a UNIX operating system. According to John R. Rowley, president of Digital Research, Inc., "It's the most aggressive third-party software (recruiting) movement I've ever seen." Digital Research, Inc., (DRI) has been chosen by AT&T to publish the UNIX standards, providing one route to the market for software vendors.

"I think the UNIX market is going to take off," says Mencher. "We're going to have one UNIX standard to allow vendors to write packages but that's not going to happen overnight."

Not every industry watcher agrees with Mencher's assessment. Says Richard Ross, an analyst for the Gartner Group, "I think (UNIX) will catch on, but not be the de facto standard." Software distributor Adam Green, who has made a training aids industry (primarily for dBASE II) out of his Arlington, Mass., SoftwareBanc firm, geared up to offer UNIX seminars, books and videotapes several months ago—then promptly pulled back. "It just doesn't look like it's going to be as popular as we first thought," Green says.

Nevertheless, it is interesting to note that a licensed version of UNIX is already supplied to IBM by Interactive Systems of Santa Monica, California. Known as PC/IX, it became available through IBM Product Centers in late April—considerably after

IBM's original January announcement. IBM is supporting it primarily as a multitasking system for single-user business applications—although a company spokesman did indicate recently that it is possible for experienced programmers "who can keep their files straight" to handle multiuser PC/IX applications. The same spokesman also noted that the system's multitasking capability is a dimension that PC-DOS cannot offer to IBM Personal Computer users.

UNIX is already a $260 million market (in 1983) and industry watchers predict that by 1987, it will reach $2 billion. The sheer momentum of a market that size would seem to assure it some kind of success.

As to IBM's anticipated reaction to AT&T's entry into the personal computing market, Dooling says he does not view IBM as a reactionary company. "I don't know that IBM will respond, per se. I think IBM has anticipated for some time how they will differentiate themselves in the market. I think they see UNIX as a much more critical issue.

"We have the potential to displace IBM but IBM has been in that game for a long time. We're a principal alternative to IBM. We want to be the vendor of choice. We're marching into an environment where people want to tie (computers) together over time. We offer an easy transition," says Dooling. "It would arrogant of us to go into the marketplace and not protect the customers' investments. Customers will be pleased that we did not feel we should ignore the money they already spent. We're not looking at first-time users of personal computers."

According to AT&T's Boyd, his retail group is targeting the personal computer at both segments of the market, "however, our primary interest initially is the new user and most

of our marketing effort from an indirect standpoint will be aimed at the third-party retailer. It is this brand new user of personal computers who is most likely to be shopping at retail stores.

"Three-fourths of all potential users today don't have a personal computer and I believe that over the next 12 to 18 months at least one-fourth of those potential users will be making personal computer decisions. I think the potential end user will look at all of his options and say: 'which one makes the best sense for me?' and 'which organization represents the best computer strategy for me to take advantage of, so if I see an organization that's citing flexibility, reliability, communications capability and protection of my investment, I think that's the reason you make a decision. You don't worry about whether it looks like something else."

Apple is clearly gearing its near-term strategy to capturing this second wave of new users, and is launching a two-pronged attack with the Apple II family and Macintosh.

Having repackaged its Apple II into the compact IIc, Apple looks to use this product to gain dominance in the high-end home market, as both Commodore and IBM are currently floundering. More problematic are the future prospects for Apple in business markets. Here the company's hopes ride on Macintosh. In a bold move, Apple alone among the major players has turned away from PC/MS-DOS in an attempt to set its own standard. Whether the move will work depends in part on whether a strong software base evolves for the current Macintosh, and whether the next generation, the 512k Macintosh, will overcome performance limitations of the first version. Apple has also turned back to its retail outlets, having squandered time and effort fruitlessly in attempts to sell directly to Fortune 1000 companies.

IBM entered the home market in

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>
> —JAMES E. OLSON

November 1983 with its long-awaited PCjr, which has been anything but a resounding success. But that home market is one AT&T is choosing to ignore, at least for the moment. So while IBM and Apple are strongly marketing their business and home machines, AT&T is entering the market with a personal computer aimed *only* at business.

"I think we are viewed today as very strong in the corporate environment," says Boyd. "We relate best, perhaps, to the Fortune 500, and others, and an individual end user probably doesn't have a great deal of experience in dealing with us and doesn't know what wonderful people we are. Surely if they got to meet me and Dick (an associate) they'd buy tomorrow. But we can't obviously meet all of them and we haven't had that opportunity over the last 100 years. So that's a conscious part of our merchandising plan."

This merchandising plan encompasses an "impressive, expensive campaign" to support the retailer and value-added resellers. "I think it will rival any advertising campaign and I don't say that as a marketing statement. I think it's going to substantial-ly change the image of AT&T."

Still, the criticism of AT&T's marketing ability persists, both inside and outside the industry. The image that needs to be changed may not be that of a company known for its technological and manufacturing excellence. As Gartner Group's Ross points out, "I've heard people say they'd buy just because it was AT&T." The 'image-changing' work that may need to be done is that of a company able to sucessfully market products.

So how bold a move is it for AT&T to move into the market with an MS-DOS personal computer rather than waiting for UNIX? It comes back to marketing strategy, an interesting switch for a formerly technology-driven company, since the personal computer decision clearly was a marketing one based on the enormous installed base of PC-DOS/MS-DOS software.

Can AT&T pull it off? On the day after the announcement the personal computer is slated to be on sale in about 500 stores. There are approximately 3500 computer specialty stores in the U.S., according to Future Computing, the Texas-based company that certified the Olivetti Personal Computer (i.e., the AT&T) IBM-compatible. There are currently some 1800 authorized Apple dealers and approximately 1400 authorized IBM Personal Computer dealers. AT&T executives claim they can import enough personal computers from Olivetti to keep up with sales. Its promotion campaign promises to be heavy and highly visible. Nor does the company see the lack of one, highly visible "person in charge" (IBM has Philip Estridge, Apple has Steve Jobs, etc.) as hurting its efforts. The sheer size of the big two (AT&T's 1983 sales were $64 billion; IBM's 1983 sales were $39 billion) is staggering. In the background, of course, waits the other potential force, Japan.

So the questions for time to settle are: Does the world *really* need another IBM-compatible? Will the American consumer buy AT&T's integrated office approach to personal computing?

And perhaps, most importantly, what will the other "giant" do while all this is going on? ∎
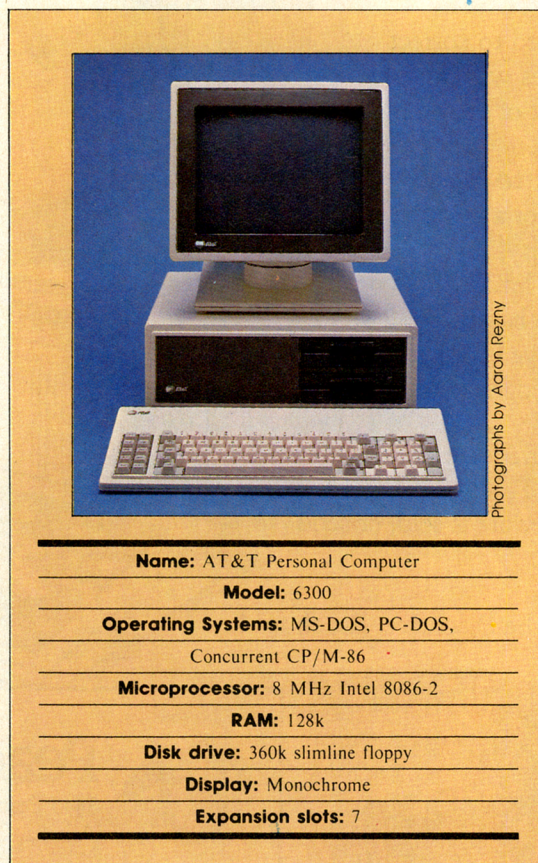
The AT&T Personal Computer

AT&T enters the personal computer marketplace
with a solid business machine that incorporates
high processing speed and intelligent design

by Paul Bonner, Senior Editor

The new AT&T Personal Computer introduced June 26 is an IBM-compatible which features high processing speed, solid design, good graphics capabilities, and integration with the AT&T line of mini and supermicro computers. AT&T imports it from its Italian manufacturer, Olivetti, which markets it in Europe.

In its basic configuration, the AT&T Personal Computer will be equipped with 128k of RAM, parallel and serial ports, a monochrome monitor, a high-resolution color graphics video interface, a battery back-up clock/calendar, one slimline 5¼″ floppy disk drive and seven expansion slots.

Among the options that AT&T has announced for its Personal Computer are expansion up to 640k of RAM (on the motherboard), a color monitor, an additional floppy disk and an internal 10Mbyte hard disk. An expansion box for hard disks of up to 50Mbyte capacity with streaming tape back-up will also be available, as well as Ethernet and Omninet interface boards, AT&T's own PC Interface network interface, a Z8001 co-processor, and an 8MHz 8087 math co-processor.

Photographs by Aaron Rezny

Name:	AT&T Personal Computer
Model:	6300
Operating Systems:	MS-DOS, PC-DOS, Concurrent CP/M-86
Microprocessor:	8 MHz Intel 8086-2
RAM:	128k
Disk drive:	360k slimline floppy
Display:	Monochrome
Expansion slots:	7

Processing speed

The AT&T Personal Computer is powered by Intel's 8086-2 microprocessor. This chip uses the same instruction set as the 8088 used in the IBM Personal Computer and most IBM compatibles, but because it is a true 16-bit microprocessor and runs at a higher clock speed than the 8088, it allows the AT&T Personal Computer to execute programs 30 percent to 80 percent faster than the IBM. In our tests, it ran such "compatibility tests" as Microsoft's Flight Simulator and Lotus 1-2-3 nearly twice as fast as the IBM Personal Computer. (For a full explanation of the differences between the 8086-2 and the 8088, and the results of benchmark comparisons of the performance speed of the AT&T Personal Computer and the IBM Personal Computer, see "How Fast Is It?", page 76.)

The system architecture of the AT&T Personal Computer reflects its use of the 8086-2. Sixteen-bit datalines are used throughout the motherboard. In addition, although all seven expansion slots will accept IBM-compatible expansion boards (which are based on 8-bit technology), three of the slots also have special connectors to allow the use of 16-bit cards, which should enhance the performance of the AT&T Personal Computer in applications such as high-speed networking.

Styling

Generally, the AT&T Personal Computer is an attractive and intelligently designed system, both inside and out. The system unit is small—15″ wide by 16.5″ deep by 6″ high—closer to the size of an Apple II than the IBM Personal Computer. The front of the system unit features both a green "power-on" indicator light and a re-set button that initiates a complete hardware reset, including a complete run-through of the power-on system diagnostics.

The unit we saw was equipped with a monochrome monitor on a tiltable, rotatable base. The monochrome monitor has a single cord which connects to the video display interface on the system unit. It receives both video signals and power through that cord. The optional color monitor will have a separate power cord.

The keyboard, which has a responsive feel, is virtually identical to the IBM Personal Computer keyboard, with function keys on the left and a numeric/edit keypad on the right. There are LEDs on the numbers-lock and capitals-lock keys. The back of the keyboard has a socket into which you can plug a mouse.

The keyboard has a 4′ cord (about half of which is coiled), which connects to a socket at the back of the
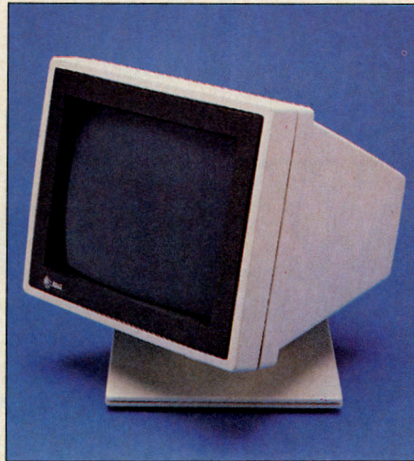
The AT&T Personal Computer's monitor can be tilted and rotated.

system unit. That arrangement doesn't give you as much freedom in positioning the keyboard as does one in which the keyboard cord socket is on the front of the system unit, but due to the length of the keyboard cord and the fact that the socket for the keyboard is near the edge of the system unit, there is half a foot or more of leeway in positioning the keyboard before any tension is put on the cord. In addition, the keyboard-to-system unit connection can be by-passed altogether by plugging the keyboard into a socket on the back of the AT&T monitor. With this ar-rangement, the system unit can be

placed on the floor or anywhere within reach of the long cord on the monitor, leaving your desk top clear except for the keyboard and monitor. Plugging the keyboard into the monitor also results in more freedom in positioning the keyboard.

This attention to design extends to the internal layout of the AT&T Personal Computer. Everything in the basic configuration model (i.e., 128k memory, the disk controller, the parallel and serial ports, and the clock/calendar) is included on the computer's main circuit board (motherboard). In addition, you can add many of the options (including up to 640k of RAM, an additional floppy disk, and a color monitor) without using any of the computer's expansion slots. Thus, with the basic AT&T Personal Computer, or even with one equipped with 640k of RAM, a color monitor, and two disk drives, there are still seven empty expansion slots. A similarly equipped IBM Personal Computer would have two empty expansion slots (and possibly less if you do not use a multifunction card in one of the slots).

The 8087 math co-processor can also be installed on the motherboard of the AT&T Personal Computer, as it can be in the IBM Personal Computer.

A slimline 5¼″ floppy disk drive comes with the AT&T Personal Computer. A second floppy drive or hard disk are optional.
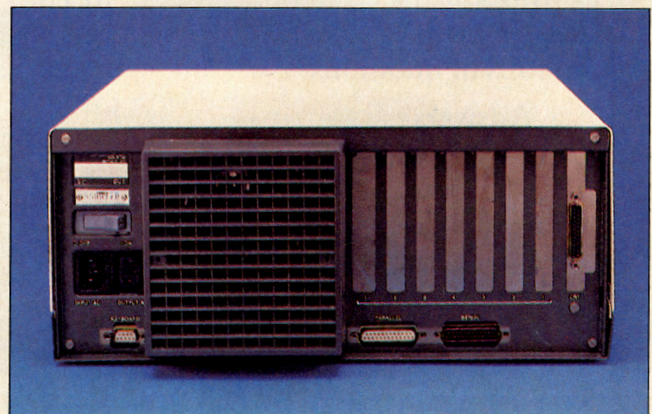
On/off switch, keyboard socket and parallel and serial interface sockets are located at the back of the disk drive.

How Fast Is It?

To the casual observer, the most obvious difference between the AT&T Personal Computer and the IBM Personal Computer is speed. AT&T's new entry executes programs signficantly faster than its competitor. In a series of comparative tests performed by *Personal Computing*, the AT&T Personal Computer operated from 30 to 82 percent faster than the IBM Personal Computer. This dramatic difference in performance speed is not a magical matter of smoke or mirrors. It is a logical and direct result of the Intel 8086-2 microprocessor, running at 8 MHz, that AT&T has used in its machine. The slower IBM Personal Computer, and most IBM compatibles, use the Intel 8088 running at 4.7 MHz.

Since a microprocessor's job consists mainly of performing calculations and addressing memory—to either store the results of its calculations or to receive its instructions—there are two reasons why the 8086-2 gives the AT&T Personal Computer such a large performance edge. First, the higher clock speed of the 8086-2 means that it processes instructions and performs calculations some 50 percent faster than the 8088. In addition, the 8086-2 is a "true"16-bit microprocessor, while the 8088 is what is known as a 16/8-bit microprocessor. That is, the 8088 has only an 8-bit address line, and thus must perform two operations to address a memory location, while the 8086-2 has a 16-bit address line and can address any memory location with only one operation.

To put this theory to task, we began our comparative tests with a couple of programs written in BASIC (which we ran with GW BASIC on the AT&T Personal Computer and BASICA on the IBM Personal Computer). The first of these was a series of programming steps that determined the sine, cosine and tangent of each number from one to 250, and then divided the sine by the cosine, multiplied by the tangent. The results of the calculations were not displayed on the screen in this test. The AT&T Personal Computer completed this programming loop in 11 seconds. In contrast, an IBM Personal Computer took 19 seconds to complete the loop, a 72 percent difference.

The speed difference was less dramatic when we modified the program to have it display the result of each calculation on the screen. For a loop performing and displaying those calculations for each number between one and 100, the AT&T Personal Computer took 20 seconds, while the IBM Personal Computer took 26 seconds, a 30 percent difference.

Next, we modified the pie chart demonstration program from the IBM PC-DOS disk to automatically draw a pie chart with eight slices. The AT&T Personal Computer took 2.8 seconds to run the program, while the IBM took 4.26 seconds, or 52 percent longer.

We then tested the effect of the AT&T's faster microprocessor on a pair of popular applications programs: Lotus 1-2-3 and PFS: WRITE. Running on the AT&T Personal Computer, it took Lotus 1-2-3 2.6 seconds to recalculate a 52 by 26 worksheet in which each cell other than the first cell contained a formula which multiplied the value of the cell above it or to its left by 1.1. On the IBM machine, the program took 4.8 seconds.

These results range rather widely, but a few conclusions can be drawn from them. While the AT&T Personal Computer consistently outperformed the IBM Personal Computer, the magnitude of its superiority seemed to depend upon the nature of the task it was asked to perform. For tasks greatly dependent upon calculation and memory-addressing speed, one can expect a 50 to 80 percent advantage in the speed of execution on the AT&T Personal Computer compared to the IBM Personal Computer. But for operations in which screen display and scrolling speed plays a more important part, the speed difference seems to be less: from 30 to 50 percent. For example, the tremendous 82 percent speed difference seen with the large Lotus 1-2-3 worksheet described above would be reduced with a one-page worksheet, since on a smaller worksheet the results of every calculation must be displayed. On the larger one, only about one-fifth of the worksheet shows up on the screen.

To whatever degree, the AT&T Personal Computer will execute any program faster than a computer equipped with a 4.77 MHz 8088. Yet, the importance of this difference would seem to depend on the concerns and computer experience of the user. Is there much difference between waiting three seconds for a spreadsheet to recalculate—rather than five seconds? Perhaps not. The difference, in fact, may be of greater significance as a representative milestone of personal computer technology and those who are shaping it. When the IBM Personal Computer first appeared it was a blindingly fast advance compared to its predecessors. Now a new performance leader is on hand.

—*Paul Bonner, Senior Editor*

Graphics

The computer's graphics capabilities are impressive. The standard graphics interface provides all the graphics modes of the IBM color graphics adaptor (including 320×200 four-color graphics and 640×200 monochrome graphics), plus an additional 640×400 monochrome mode. This means that it will run any software intended for use with either the IBM monochrome adaptor or the IBM color or video adaptor, and that a higher-density 640×400 monochrome mode will be available. All of its graphics modes are faster than those of the IBM, due to the faster overall speed of the AT&T Personal Computer.

The optional graphics enhancer planned for later release will provide color graphics in the 640×400 mode, as well as a more extensive color palette and the ability to display text and graphics simultaneously. (Text and high-resolution graphics can be displayed simultaneously on the IBM only by using bit-mapped text characters, which slows down the text display considerably.) The AT&T Personal Computer appears to have capabilities similar to those of the third-party enhanced graphics adaptors for the IBM Personal Computer, including those from Tecmar, Quadram and Plantronics. Its 640×400 resolution (a total of 25,600 pixels) is higher than that of the Texas Instruments Professional (700×320 for a total of 22,400 pixels). But by making this color mode available only as an option, it seems less likely that AT&T will be successful in attracting support for it from software developers (for the same reason that the 640×200 monochrome mode on the IBM Personal Computer has largely been ignored: software developers want to add color or shading to their programs).

Integration and communication

AT&T is providing a number of ways
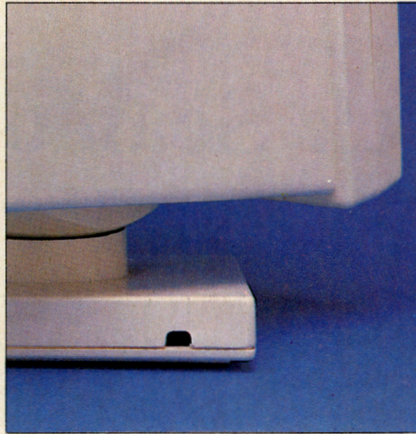
Rear view of monitor shows socket for connecting mouse.

for its Personal Computer to communicate with other computers in the AT&T product line. These include both a software option called Context Switch that allows you to use the AT&T Personal Computer as a terminal for the 3B series of minicomputers. With this software, a user can exit MS-DOS to retrieve files from a 3B computer, then return to the MS-DOS system to work on it—all in a matter of a few keystrokes. In addition, a hardware/software option called the PC Interface allows the AT&T and other IBM compatible computers to be networked through a 3B5. There are also Ethernet and Omninet interfaces for the AT&T Personal Computer. Additional communications functions are a good bet to be on whatever is made available in the future to fill what is now an unused 32-pin socket next to the asynchronous communications chip on the computer's motherboard.

AT&T also expects to offer a full range of peripheral cards which are being developed with third party hardware manufacturers.

All in all, the AT&T Personal Computer should serve well as both an alternative to the IBM Personal Computer and its compatibles, and as a component of AT&T's plan for an integrated office information system. It's a solid machine that should be considered by anyone in the market for a professional quality personal computer.
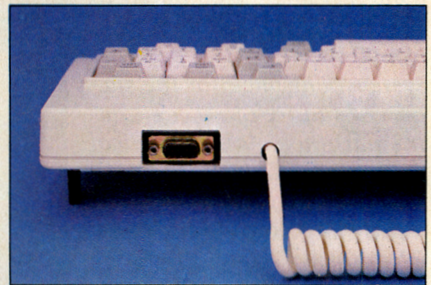
The keyboard has function keys on the left and a numeric/edit keypad on the right. Four-foot cord connects to the back of the keyboard (inset).