

IBM's NEXT GENERATION

The IBM PC-AT had claims made for it on its release that it not only harnessed the most advanced technology (hence the 'AT') but also surpassed the original PC in both power and speed (not hard...). Since then there's been a fair bit of controversy about how good the AT is, and claims that it's suffering from too many bugs to be commercially useful. Lloyd Borrett took a look at one of the new machines.

On August 14 1984, three years after the introduction of the first IBM Personal Computer, IBM US released the Personal Computer AT (for Advanced Technology). The PC-AT is an Intel 80286-based microcomputer that dwarfs the original PC in computational speed and power.

But not only did IBM release this new-generation microcomputer, it also announced three new operating systems (PC-DOS 3.0, PC-DOS 3.10 and XENIX), a local area network (PC Network), and a windowing environment (Topview). In the months since August there have been more announcements: Virtual Device Interface, Enhanced Graphics Board, and Professional Graphics Controller are just a few.

That is a *lot* for the industry to think about. To this day the sages of the microcomputer world are still trying to assimilate it all, but let me give you my brief version of what it all means. I'll start from scratch with the IBM PC-AT.

IBM Listened

This is one very fast, well thought-out machine. I've had one since early November and I'm impressed. IBM has listened to many of the criticisms levelled at the original PC and done something about them.

A lot of people thought the original PC should have been based on the Intel 8086 chip instead of the 8088. Actually I thought it was a wise move at the time; the 8086 wasn't readily available, and more importantly nor

were the 16-bit bus support chips required. The chips necessary to build an 8-bit bus system based on the Intel 8088 were not only available, but a lot cheaper. The real criticism here is that IBM should have released an 8086 or 80186-based system twelve to eighteen months ago when the market was ready for it. Its opposition did.

Well, IBM has answered the opposition by leaping ahead to an Intel 80286-based system, the PC-AT. Forget that IBM says you can only have three megabytes of memory, because the 80286 chip can address 16M of memory, and AST Research has already announced a multi-function board with 256K, expandable to 3M. In fact, running in its native mode the 80286 can support four tasks, each of which can use one gigabyte of virtual memory; the chip has all the instructions necessary to perform the required memory management. But let's come back to earth.

The Frilly Bits

The keyboard has been changed! Shock, horror! As a two-finger-and-thumbs typist, I actually *liked* the old keyboard. Quite a few people expressed other opinions, and IBM changed it. With over two years pecking out letters on the old keyboard the new one takes a little getting used to, but it *is* better. So there are now three keyboard layouts in use within the IBM's Personal Computer family: on the original PC, the 3270/PC, and the PC-AT.

Two of the really nice touches are the two-speed, temperature-controlled cooling fan and the lock. The new fan makes this system a lot quieter than any other member of the PC family, and in many office situations that can be a real blessing. When locked the PC-AT can be switched on but not used. The operating system won't boot, and the cover can't be removed. Once you're up and running, locking the system makes the keyboard inoperative.

Yes, I know these are but little frilly bits to many of you, but to those who use a computer for extended periods in the typical office environment they are quite important.

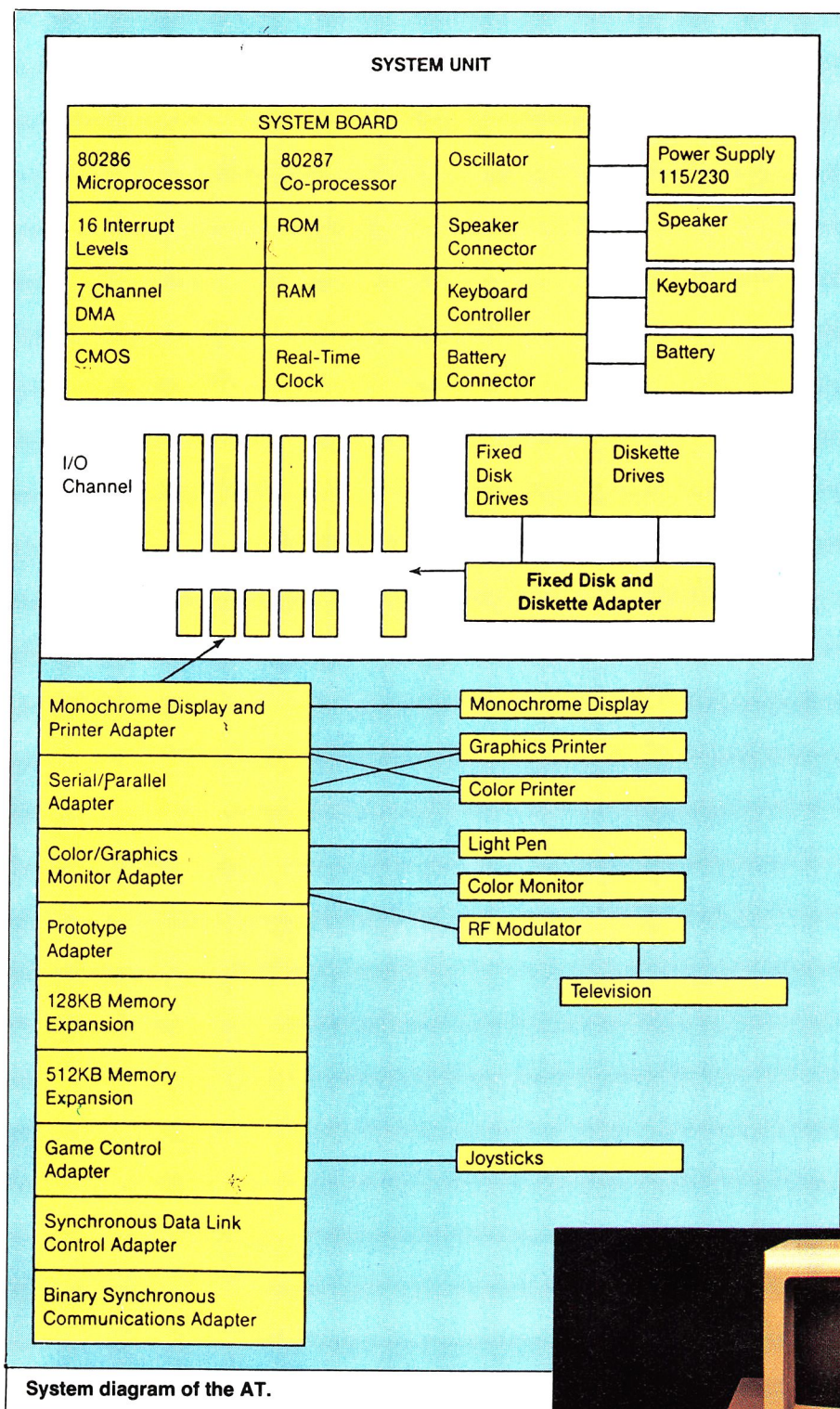
The Meat in the AT

Okay, let's get to the meat of it. The PC-AT comes as two models. The base model gets one half-height 1.2M diskette drive and 256K of memory, while the up-market one gets an additional full-height 20M fixed disk drive, serial and parallel ports, and a total of 512K of memory.

Disk storage can be further extended by adding a second 20M fixed disk drive, or your choice of a second 1.2M diskette drive or a half-height 320/360K diskette drive. (There is every chance that someone will come up with a way to add a half-height 20M fixed disk drive when two half-height diskette drives are already installed.)

This next bit isn't as confusing as it may first sound: you can use the 1.2M diskette drive to read and write to 1.2M diskettes with the 1.2M format, but you can't read these diskettes in existing 320/360K diskette drives. Well, you'd expect that, wouldn't you? But get this. You can use 1.2M diskette drives to read and write to 320/360K diskettes with the 320/360K format. Now for the catch. Once a 1.2M diskette drive has written on a 320/360K diskette, that diskette *can't* be read in a 320/360K diskette drive.

As the PC-AT I'm using doesn't yet



base memory. To get 640K of base memory, as in the PC and PC-XT, an additional 16-bit bus 128K memory expansion card must be purchased. The 512K memory 16-bit bus memory expansion cards available from IBM go into the *extended* memory area above the one megabyte limit of an Intel 8088. Extended memory will be fully exploited by XENIX when it becomes available. PC-DOS 3.x can only use it as a RAM disk.

There are eight full-length expansion slots in the PC-AT. Six support both the old 8-bit and the new 16-bit bus, two support only the 8-bit bus. Some of the current option boards can only be used in the two 8-bit bus slots, while others can't be used at all. The IBM colour graphics adapter board is an example of one that must be in the 8-bit bus only slots.

The new combination parallel and serial adaptor uses the same 25-pin connector for the parallel port, but a 9-pin connector for the serial port! If only they were the other way round! I'll rarely use that parallel port, but now I've got to get special communications cables made up for the serial port.

The PC-AT uses a CMOS RAM and a rechargeable battery to store the hardware configuration, instead of switches on the motherboard. This saves having to open up the box and reset switches when different combinations are being tested. Believe me, there are times when you really wish you didn't have to keep taking the cover off and putting it back on. The battery also keeps the built-in calendar clock going.

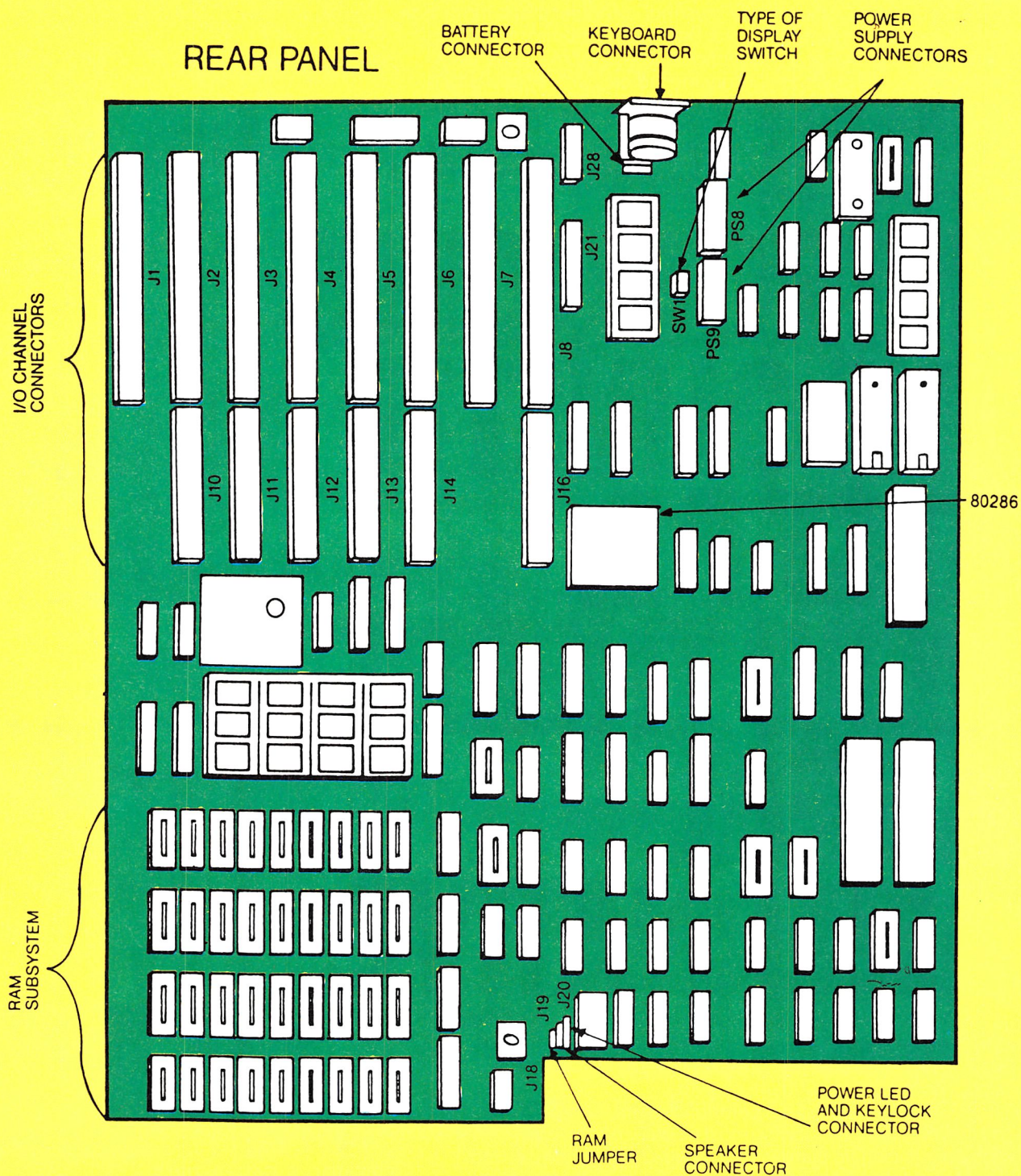
The Software

Now for the *really* important stuff, the software. To use the PC-AT, PC-DOS

have a 320/360K diskette drive, and I like to move my work around between the various systems based on availability, that often eliminates the PC-AT from contention. Think carefully as to whether you should add a 320/360K diskette drive if buying a PC-AT; I would be very hesitant about adding a second 1.2M diskette drive.

The 512K of memory available on the motherboard is referred to as





The AT's system board.

3.0 is required. It has the changes necessary to support the new 1.2M diskette drive, the 20M fixed disk drive, the calendar clock, and so on. There are a few nice additions to DOS 3.0, such as an IBM-supported RAMDISK driver, a change volume labels command, and an enhanced print command. The one I like the

most is the ability to use the COUNTRY= option in the CONFIG.SYS file to specify Australia. Most of the DOS commands then display the time and date in our format instead of the usual US format.

If you're an existing user of DOS 2.0 or 2.10, I wouldn't rush out and buy DOS 3.0; the few extra nice bits

aren't really worth the additional expenditure. Okay, you would get a few new features, but it also uses more memory. Wait, and buy DOS 3.10 when you want PC Network support later on.

Incompatibility?

Currently there is one big problem

with the PC-AT: not all the existing PC software will run on it. In fact quite a fair amount of it won't. But, in the words on the cover of that infamous book, DON'T PANIC.

This is a problem that has been coming for a long time. When a manufacturer provides the programmer with an operating system to access the hardware, it is expected that the programmer will use the interface defined by the operating system. But there are always programmers who are smarter than that, and for various reasons decide to bypass the operating system. In the case of the PC they either use the BIOS code in ROM on the motherboard, or go direct to the hardware itself.

These programmers can always justify why they do this. Strangely enough, they are also the first to complain when the manufacturer changes the rules, and their software stops working. In the PC-AT, IBM has made some significant hardware changes, and also changes to the ROM on the motherboard. Result scratch quite a few programs.

In most cases the reason the programs no longer work is that they are doing direct ROM BIOS and hardware calls in order to implement various copy protection mechanisms. The 1.2M diskette drive and 20M fixed disk drive required some major changes that have brought such programs unstuck. Those of you who already know my opinion of copy protection mechanisms will understand how this is giving me a warm feeling inside. I try to avoid programs that are protected, or can't be unprotected – all the programs I have in day-to-day use run on the PC-AT.

New 'fixed' versions of most programs that don't currently run on the PC-AT are in the pipeline;

examples include Framework, dBase III and Symphony. But what's the bet these programs will still bypass the DOS interface? That means they are likely to get caught again real soon.

One good thing programs bypassing the DOS interface do is provide compatibility tests. Programs such as Microsoft's Flight Simulator and the Norton Utilities have been used by reviewers as the classic test as to how compatible XYZ's new lookalike really is. These same reviewers have used the fact that such programs have problems running on the PC-AT to write nice sensational stories about how incompatible the PC-AT is.

Apparently there have been problems with the 20M fixed disk drives on a few PC-ATs in the US, and that too makes great copy. Because IBM has such a long-standing reputation for not having such problems, any that surface are given wide coverage. At the same time, some rather fundamental problems with other systems are quite often glossed over. I know a number of other users of the PC-AT in Australia, and only one has had a problem – a faulty memory chip.

It's Fast

Okay, I've already said the PC-AT is fast, and those who have used it would certainly agree. But how fast is it?

Well, all the benchmark tests I've done indicate that the AT outperforms the XT and PC by three to one on memory or calculation-intensive tasks. A specific example is a Lotus 1-2-3 spreadsheet that took 300 seconds to recalculate on the XT and only 110 seconds on the AT.

When comparing the I/O performance of the 20M fixed disk drive on the AT against the 10M fixed disk drive on the XT, the ratio is two to one. A read/write test of 5000 random records took 415 seconds to finish on the XT and 190 seconds on the AT.

IBM's Local Area Network

I believe the most significant parts of the August announcements are PC Network and DOS 3.10. The network is an important strategic move for IBM, notable for what it does and doesn't do. First, it's not Ethernet. Second, it's not compatible with any of the other major contenders for the network crown. Third, it's a network

for PCs and true PC compatibles, not for other microcomputers. Fourth, it's not supported by XENIX. Finally, it's IBM's own interface.

PC Network is not IBM's planned overall token-passing network. It is a broadband-based PC network specifically designed to interconnect personal computers. IBM has promised there will be a gateway between the PC Network and the token-ring, cabling system-based network, and IBM has traditionally made good on such promises.

The broadband-based IBM PC Network was mostly built by Sytek, a Californian LAN specialist, but significant parts of the network's design are IBM's.

The board components are separated by the logical function they perform, roughly along the lines specified for the different layers of the open systems interconnection (OSI) model now being defined within the International Standards Organisation (ISO). By replacing the coaxial-cable electronics with circuitry for twisted-pair interface, and CSMA/CD control with token-passing, a similar board could accommodate IBM's proposed token-ring network.

It is significant that only layers three to five of the OSI model (network, transport and session levels) are Sytek-developed. While the network is open to software developers, the communications protocol embedded in layers three to five is the property of Sytek. Sytek technicians say there is no way anyone can build an interface card to the PC network without a licence to use that protocol or the IBM PC Network board itself.

The all-important layer seven (user/device/application interface level) is implemented via an 8K Network Basic Input/Output System (NETBIOS) ROM which IBM defined. So be wary of the recent Sytek advertisements which claim buying their product now is the same as buying IBM's PC Network.

IBM's PC Network is obviously aimed at its large competitors. Going with Ethernet or some *de facto* standard would have aided Xerox or another large vendor, so IBM chose to go its own way. It's not hard to guess they're hoping PC Network will become the new *de facto* standard.

What does this mean? Well, finally

APPLICATION LAYER
PRESENTATION LAYER
SESSION LAYER
TRANSPORT LAYER
NETWORK LAYER
DATA LINK LAYER
PHYSICAL LAYER
The ISO System Interconnection Model.

we have a network standard. With the 17-odd NETBIOS commands and the PC-DOS 3.10 interface, IBM has defined how application programs should interface to a network. Until now each LAN supplier has had its own version of such an interface, even though many used the same hardware. Now IBM has turned the tables and said, in effect: "Here is the software interface, it will work regardless of the hardware we use".

Now the software developers can start writing programs which make use of a LAN's features. In my opinion we need effective networks a lot more than we need multi-user operating systems.

XENIX – the PC-AT UNIX

XENIX is Microsoft's implementation of UNIX version 3. IBM has picked it up, fiddled with it a bit, and will make it available for owners of the PC-AT.

XENIX is not a multi-user PC-DOS; PC-DOS programs such as Lotus 1-2-3 will not run under the XENIX operating system. This is not the way to have three PC users running Lotus 1-2-3 and sharing the same disk files. The other two users on a XENIX-based system use a normal asynchronous terminal. That means *slow* screen updates.

XENIX does not support PC Network, and IBM has not announced any applications software to run under XENIX. These two points are most significant, and I believe IBM is not serious about XENIX. Why should it be? If IBM and others produce XENIX programs they will run on a host of other manufacturer's boxes, which is the last thing IBM wants.

IBM has released a lot of good software in the US which will run under PC-DOS and later make use of IBM's window solution, Topview – but it's released no XENIX software. XENIX has been made available for those educational institutions and software houses which have said they will use an IBM Personal Computer if they can have UNIX. Currently they mostly use a multitude of AFUBs (Another F..... UNIX Box) based around the Motorola 68000 chip. XENIX will bring them gradually into the IBM/Intel fold.

Topview Is The Future

Another significant announcement back in August was IBM's windowing product, Topview. Note that once again it's IBM's product. IBM had a host of networking interfaces it could have used, but chose to develop its own. IBM could also have used other

windowing products, such as Microsoft Windows or Digital Research GEM, but once again developed its own.

Topview is one of the few windowing interfaces which does not require a graphics screen. This means the two-thirds of all PCs which only have a monochrome display can use Topview. How many PC owners would now pay out the money to buy another window program, as well as the graphics gear?

Topview allows a form of multi-tasking, communication between applications, and the use of a mouse. It provides the user with a consistent and productive interface (and I'll do anything to avoid that term 'user friendly').

IBM is pushing Topview. It has already announced programs that will run using Topview, and copies have been handed out to major software developers for evaluation. That hasn't happened with any previous PC product. All the comments I've seen from those who have used Topview are most favourable.

Software developers will now write their programs to use the I/O interface defined by Topview. As a result we will see better-quality programs, and a consistent user interface across all programs.

The Next Generation

My prediction is that IBM will eventually drop support for Microsoft's DOS and XENIX some time after introducing a multi-user, multi-tasking PC Network and SNA-supporting version of Topview. Then IBM will have its own PC operating system. The compatible market will be in deep trouble.

In the past I've scoffed at predictions by others that something like this could happen, but the indications are now too clear. Microsoft will continue to put more and more effort into the Apple Macintosh, and will drop out of the PC market. The compatibles could be saved by a version of Concurrent DOS from Digital Research which has support for PC Network and Topview; I believe DR is the only software house with the expertise necessary to do it. What worries me is that DR is currently concentrating on UNIX development with AT&T, and there are rumours that AT&T may buy out DR.

IBM has shown us the next generation in hardware, and it looks good. I believe it has also indicated what the next generation in software will be. It too looks good, but a few people are going to get both themselves and others in trouble if they continue up the XENIX/UNIX path. □

AT Under Attack

NEWS FILTERING from the US seems to suggest there is some discontent with IBM's whiz-bang AT (Advanced Technology) computer. The AT uses the Intel 80286 chip with up to three megabytes of user memory and 41.2M of on-line storage, and is supposed to be compatible with most existing IBM Personal Computer hardware and software.

Complaints about the AT have centred around a high number of system crashes and software incompatibility with the IBM PC. IBM denies there is a software compatibility problem, but has admitted there are problems with the hard disks which have been shipped.

Ric Einstein, IBM's Australian Product Manager, Personal Computers, says there has been a "higher than expected" failure rate with the hard disks. "IBM has a policy of zero defects, which is why we are known for our reliability. We are working on the problem and a solution is expected soon." It's not too clear if the solution will be found before the AT is released in Australia. IBM does not like to give advance dates of product releases, and when asked if the Australian version will be free of the known disk defects, Mr Einstein didn't wish to comment on whether the release date would be dependent on a solution being found, saying: "Even if the AT is released here before the solution has been found, we will be aware of the problem and prepared to act." This will be comforting news for prospective purchasers . . .

As far as software compatibility goes, Mr Einstein suggested problems reported from some sources in the US might be due more to a lack of understanding on the part of users, rather than any hardware or software problem. "The AT has been designed for highly complex tasks, including scientific and engineering applications, PC-Net, Topview and Display Writer," he said. "If someone tries to take a program like Lotus and run it under Topview, it's quite likely they might have problems working with the software in that new set-up." He added that the vast majority of "well-written" (his words, not defined) programs for the IBM PC which are not timing dependent should run on the AT. □