
Personal Computers In the Security Assistance Office



By

Ernest McCallister



INTRODUCTION

There are three major areas of IBM compatible Personal Computer (PC) use as relates to the Security Assistance Office (SAO): hardware, software, and connectivity. A study by the General Services Administration and the Office of Personnel Management concluded that, "The work force is being transformed, as is society as a whole, by the increased use of information technology and jobs that reflect a growing need for more, faster and better information."¹ The House National Security Committee, in its fiscal 1996 *Defense Authorization Act*, proposed that the National Research Council undertake a two-year review of current and planned DoD command, control, communications, computer and intelligence systems (C4I), with a focus on cross-service and inter-service interoperability.² The Security Assistance Community accomplished much of this with the establishment of the Security Assistance Network (SAN), to include the Security Assistance Automated Resource Management System (SAARMS) and the Training Management System (TMS). Through standard software packages and coordinated software development these initiatives are further entrenched in the security assistance community. The SAO needs the right computer, software, and connectivity to take advantage of this technology.

HARDWARE REQUIREMENTS



Hardware is the first limiting factor to consider. The hardware requirements are driven by the application requirements. The software you use requires short term storage, long term storage, and data manipulation capabilities. You need to look at current and future hardware requirements. Your future requirements will depend on changes to off-the-shelf commercial software, changes to the specialized software, and any additional software requirements you will have.

Upgrading: There are three things you can do to upgrade a personal computer (PC) currently in the inventory. You can upgrade the overall capability of the PC, add memory, or

¹ *Government Computer News*, April 3, 1995, pp. 1&52, 94 percent of federal employees use computers but half say they're newbies.

² *Government Computer News*, March 6, 1995, p. 20, GUI databases.

surplus the PC and purchase a new one. What you do with an existing PC depends on what kind of computer you have.

a.  A 386 motherboard is probably not worth upgrading. You will not get true 486 performance from installing a 486 CPU, and the components you would need to install will soon be obsolete. The other area normally lacking in a 386 is memory: the hard drive and the Random Access Memory (RAM). These can be increased to allow you to extend the life of a 386 in today's environment. Four megabytes (MB) of RAM cost approximately \$150 and a new 850 MB Hard Drive cost about \$200. For less than \$400 you can upgrade a PC to run today's software but with less than stellar performance. The 386 will still run much slower than a 486 or Pentium™ but with the added RAM you will be able to run programs like Microsoft (MS) Access that requires a lot of RAM without using a Swap File, which results in decreased performance. The Swap File is a portion of your hard drive that your computer uses when it runs out of RAM. Adding additional memory is a short term fix that should be corrected in the long term by budgeting for a new PC.

b.  A 486 motherboard may or may not be worth upgrading. A 486SX is not much more upgradable than a 386 unless you change the CPU, and like the 386 you would need to add RAM and hard drive capacity. The 486DX, however, is worth upgrading. You can upgrade the CPU and add RAM and hard drive capacity at a lower cost than a new PC and get performance similar to the new Pentium.™ The hard drive and the RAM can also be upgraded as in the 386.

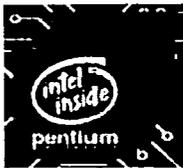
	Minimum	Economical	Recommended
Microprocessor	80386SX	80486DX	586DX / Pentium™
Clock Speed	33 MHz	66 MHz	75 MHz
Hardware Cache	128K	256K	EDO RAM or 256K
RAM	8 MB	8 MB	16 MB
Hard Drive	200 MB	500 MB	1 GB
Floppy Drive	1.44 MB 3.5" 1.2 MB 5.25"	1.44 MB 3.5"	1.44 MB 3.5"
Mouse	Microsoft Compatible	Microsoft Compatible	Microsoft Compatible
CD ROM	Not Required	4X	6X
Internal Expansion Slots	6/16 bit, 2/8 bit	6/16 bit, 2/32 bit	4/16 bit, 4/32 bit
Serial Ports	2	2	2
Parallel Ports	1	1	1
Keyboard	101 key	101 key	101 key
Monitor			
Screen Size	15"	15"	15"
Dot Pitch	.28mm	.28mm	.28mm
Resolution	1024X768	1024X768	1024X768
Video RAM	512 K	1 MB	1 MB

Table 1 - Hardware Requirements

Table 1 Explained: The following section discusses each part presented in Table 1.



New Buy: What you really need is a more difficult question than it may seem. Table 1 provides three general specifications for use in answering this question. The first specification is the minimum required to run the software with some degree of efficiency using currently owned equipment and a low cost improvement. It is also the minimum requirement listed in the SAMM. The second specification is for a new buy of an economical PC that is easily upgradable and that will run the software in today's inventory efficiently. The last specification is for a PC to be procured that considers what will be needed in the future. This is the most difficult specification to provide, because at the current rate of change in the ADP world it would require a crystal ball to accurately predict what will be required in the future.



Microprocessor: The microprocessor is an electronic microchip that performs all the arithmetic and data processing functions. It receives data that is input, manipulates the data, and provides an output of that data. Intel Microprocessors, the industry standard, are referenced by numbers 8088, 80286, 80386, 80486, and 80586. Most people however, generally leave off the 80 element of the designator, referring, for example, to 486 instead of 80486. The 80586 is commonly referred to as the Pentium.TM Typically, the higher the number the better the performance. For basic word-processing you will not notice much increased performance between the 386 and the 486. However in programs that rely heavily on math and data queries like SAARMS and TMS you will see a significant performance. The SX at the end of 80486 indicates that the microprocessor does not have a math-coprocessor resulting in reduced performance relative to the 80486. The DX indicates that the microprocessor has a separate math coprocessor. The DX performs better and is more easily upgraded than the SX. With today's heavy reliance on the Windows operating environment and multi-tasking it does not make sense to purchase anything new except a Pentium,TM but, as noted above, some of the older systems can be economically upgraded to provide adequate use for several more years.



Clock Speed: The clock speed is commonly referred to as the computer speed. The most common ranges are currently between 16 MHz and 200 MHz. A 16 MHz computer has a clock signal that oscillates 16 million times per second. A 66 MHz computer is fast enough for most applications currently run by most SAOs. However, the 75 MHz is a common speed for many PentiumsTM today and for most applications you will not see much noticeable difference in performance between the 75 MHz and 120 MHz computer except for programs like Computer Aided Design (CAD) and games. It should be noted that a 100 MHz PentiumTM will process substantially faster than a 100 MHz 486 PC. The faster clock speeds could become more beneficial as new programs are fielded. Depending on the cost, the 120 MHz or faster CPU could be a good investment, but do not sacrifice other features for anything over 75 MHz.



Cache Memory: Cache Memory is a special memory that serves as a buffer between the main memory and the CPU chip. Since the CPU chip can perform calculations so quickly, many times it is slowed down to wait for information to be read from or written to main memory. Cache memory is normally four times faster than main memory. The most common size is 256 kilobytes (KB). If your system has 8 MB of RAM and 256 KB of cache memory the cache memory will hold 256 KB of the most recently read or written data from the RAM. If the CPU needs to process the data again it is read from the faster Cache Memory. This will increase the overall performance of the computer.

RAM: RAM or Random Access Memory is the memory that is used when you are running a program. If there is not enough memory in RAM, your computer will use the memory on your hard drive or swap file, but this memory is slower and less efficient than the RAM. To efficiently operate in a Windows 3.x environment you need a minimum of 8 MB of RAM.



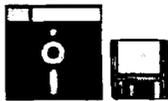
To efficiently operate in a Windows 95 or Windows NT environment you need a minimum of 16 MB of RAM. Several programs that you will be using also require between 4 and 16 MB of RAM (see Table 2). It is recommended that you get as much RAM as possible and purchase in quantities of 8, 16, or 32. You are better off sacrificing clock speed and even hard drive space to a certain extent for RAM.

Hard Drive: The hard drive is your main long term storage location. When you save your work it is stored on the hard drive or on a floppy. Your application programs are generally stored on the hard drive. Hard drive space is cheap so buy as much as you can, on a new computer at least 1 GB (1 GB =



1,000 MB). You would pay approximately \$37,500.00 for 1 GB of RAM but only about \$300.00 for a 1 GB hard drive. You will need 254 MB for your applications if you run Win 95 with Office 95 and the specialized applications listed in Table 2. An average Word document is 20 K, a large one is 1 MB. An average Excel file is 100 K and a large one over 1 MB. An average Powerpoint file is 2 MB and a large one between 10 and 20 MB. You will have used up close to 400 MB with your basic applications and just 10 each of the larger Word, Excel, and Powerpoint files. As time goes on, the applications you run will require more and more memory. There was a time when programmers had to minimize the amount of code and conserve memory. Memory is cheaper than programming time, so most programmers (including the author) just write the code the fastest way, not trying to conserve memory (including the author) and thus we continue to need more memory. Again it is better to sacrifice clock speed for hard drive space.

Floppy Drive: The floppy drive is used to get data on or off the hard drive of the



computer. The 5 1/4 inch floppy was the most common floppy in the past, but today the 3 1/2 inch floppy is more common. A high density floppy drive can either read or write to low density disks or high density disks. A low density 3 1/2 inch disk can hold 720 KB of data and a high density 3 1/2 inch disk can hold 1.44 MB of data. The 5 1/4 inch disks can only hold 360 KB and 1.2 MB respectively. The Security Assistance Specialized Software is distributed on 3 1/2 inch disks. Commercial software today is generally distributed on 3 1/2 inch or CD ROMs. The 3 1/2 inch disk is the recommended specification.

Mouse: The mouse is used to send commands to the computer by moving it on a hard surface and clicking on the buttons. The standard software package in the SAO community is Microsoft Office so a Microsoft Compatible mouse is the recommended mouse.

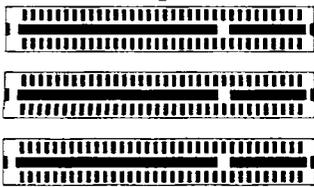


CD ROM: The CD ROM or compact disc read-only memory drive is another storage device and it is capable of holding 600 MB of data. There are CD drives that are both read and write but they are very expensive and unless you are sending out large amounts of data, (especially audio or video) or large application programs, they are not worth the expense. The CD ROM comes in various speeds, 2x, 4x, 6x and 8x being the most common. A 6x speed, 6 times as fast

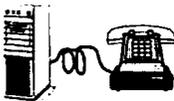


as the first CD-ROM, should suffice. It should be noted that the CD-ROM access time will also affect the speed of CD-ROM.

Internal Expansion Slots: The internal expansion slot is a standard connector to allow you to add additional products to your computer like a new video board or a sound card. The expansion slot is either 8 bit, 16 bit, or 32 bit. The 32 bit can process 32 bits of memory at a time. The 8 bit slots provide backward compatibility with older technology and the 32 bit slots allow you to take advantage of the faster processors available today. You can put an 8 bit card in a 16 bit slot. The recommended number of four 16 bit and four 32 bit slots should be sufficient.



Serial Ports: The serial port is used for asynchronous communications, sending one bit at a time. Serial ports are generally used for modems and mice. Serial is slower than parallel but it is better for sending information long distances. The recommended quantity is two.



Parallel Ports: The parallel port is used for synchronous communications, sending 8 bits or one byte at a time. Parallel ports are generally used for printers. The recommended quantity is one.



Keyboard: There are many keyboards on the market. The 101 key Qwerty keyboard is the most common. It looks like a standard typewriter keyboard with some function keys at the top and a number keypad on the side. The Dvorak keyboard is the keyboard that lays the keys out in what is considered to be a more efficient layout than the Qwerty. If you do not know how to type and have not memorized the key layout the Dvorak may be a better keyboard for you. We recommend the 101 key keyboard, however, if you have or are going to get Windows 95, since a Windows 95 compatible keyboard may be beneficial. This keyboard allows you to program a few extra keys that Windows 95 uses that are not available on the 101 key keyboard. A programmable keyboard would also allow you to configure the keyboard in the Qwerty or Dvorak layout.



Monitor Screen Size: The monitor screen size is generally 14, 15, 17, or 20 inches. The 15 inch screen is adequate for most uses. The 17 and 20 inch screen make things a little easier to read but their big benefit is in allowing the user to have multiple programs open at a time and are most beneficial for graphics art work, CAD/CAM, and programming.



Monitor Dot Pitch: The monitor dot pitch is the distance between the dots or pixels on your screen. The lower the number the closer the pixels and the clearer the displayed image. The recommended 0.28 mm is a common dot pitch and indicates that the pixels are 0.28 mm apart.



Monitor Resolution: The monitor resolution is the number of pixels (dots on your screen) that can be displayed in a horizontal line and the number of horizontal lines. We recommend 1024X768. That means you can display 768 lines with 1024 pixels in each line. This is a fairly high resolution and should be adequate for most uses except for very detailed graphics art work.



Video Ram: The monitor video RAM is the random access memory used to hold your screen's image. You will need 1 MB of RAM to easily handle the resolution we recommend in a windows-based program.



SOFTWARE REQUIREMENTS

Software is the second limiting factor to consider. Software includes off-the-shelf commercial software and specialized software. Commercial software includes the computer operating system, general application programs, and internet connectivity software. Specialized software is written for a specific user in mind like the Training Management System (TMS), the Security Assistance Automated Resource Management System (SAARMS), and the Security Assistance Network (SAN). Table 2 identifies some of the software programs used in the security assistance arena. The hard disk space required is indicated for a minimum installation and maximum for complete installation. The RAM required is also indicated. The second RAM number is for those using Windows NT.

Application	Hard Disk		RAM	Company
	min	max		
DATABASE				
dBASE 5.0	14	24	6-8	Borland International
Paradox 5.0	13	30	4-12	Borland International
Delphi				Borland International
FoxPro 3.0	15	80	8-12	Microsoft Corp.
Access 2.0	6	23	8	Microsoft Corp.
Access 95	14	42	12-16	Microsoft Corp.
Approach		8.5	6	Lotus Development Corp.
SPREADSHEET				
Lotus 1-2-3	11	27	6	Lotus Development Corp.
Excel 5.0	8	22	4	Microsoft Corp.
Excel 95	8	38	6-12	Microsoft Corp.
Quatro Pro 6.0	10	28	8	WordPerfect, Novel Applications Group
WORD PROCESSOR				
Ami Pro 3.1	4.5	19	4	Lotus Development Corp.
Word 6.0a	5	25	4	Microsoft Corp.
Word 95	8	35	6-12	Microsoft Corp.
WordPerfect 6.1	14	32	8	WordPerfect, Novel Applications Group
PRESENTATION				
Freelance Graphics		38	8	Lotus Development Corp.
Presentations Graphics		45	8	WordPerfect, Novel Applications Group
Powerpoint	11	33	4-8	Microsoft Corp.
Powerpoint 95	14	35	6-12	Microsoft Corp.
Windows				
Windows 3.x		15.5	4	Microsoft Corp.
Windows 95		40	8	Microsoft Corp.
Specialized Applications				
SAN		45	8	USG
SAARMS		7	8	USG
TMS		12	8	USG

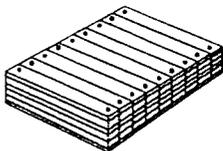
Table 2 - Software Requirements

Operating Systems: There are four main platforms that you can operate on, Macintosh, OS/2, MS-DOS, or DOS/Windows. Macintosh and plain MS-DOS users are getting less and less to choose from in the software arena. Generally choices are limited to earlier versions of current Windows programs or the standard Mac programs (except for graphics programs for the Macs which continue to be updated). Although some people still prefer character-based word processors for DOS without Windows because they use less memory and run faster, they also have fewer capabilities than the windows based programs. OS/2 is also limited in its acceptance in the office environment. This leaves us with the various Windows alternatives. There are several versions of Windows to consider: Windows 3.x (3.0, 3.1, etc.), Windows NT, Windows for Workgroups, and Windows 95. Any one of these should be a good choice either as a stand alone PC or in a network using one of several network operating systems or using the network capability of Windows NT, Workgroups, or 95. Win95 offers a lot of new features but also requires a big learning curve to use, as well as requiring about 40 MB hard drive space to run, and 16 MB RAM to run efficiently, although Microsoft claims it will run on 4 MB of RAM.

General Office Programs: There are four basic programs needed in the office, a word processor, a spreadsheet, a database, and a slide presentation program. This software can be provided by a host of sources in single applications or packaged as an office suite. Lotus Notes Suite includes Ami Pro word processor, 1-2-3 spreadsheet, Approach database, Freelance Graphics and Organizer personal information manager, with Lotus Notes for mail. Perfect Office Suite includes, WordPerfect word processor, Quatro Pro spreadsheet, Presentations graphics, and Paradox database. MS Office Professional includes Word word processor, Excel spreadsheet, Access database, Powerpoint graphics, and MS Mail for office mail.

Everyone has his/her own preference as to what programs he/she likes and it is usually what he/she learned first: however, each program has its own advantages and disadvantages. The best grouping would probably be made up of programs from several different manufacturers, if you used each program independently. We do not use our programs independently anymore, we use them as a package. A package allows for ease of use in integrating the programs together and learning the programs. Programs in a suite look and feel alike and are made to interact with each other with more ease than with other programs. A suite also costs less than purchasing the individual programs. Microsoft Office provides one of the best office packages. Word and Access were both selected (see below) as the top programs in their areas. Microsoft Office was selected as the standard office suite for the SAO.

Database: A database is used to store, retrieve, and manipulate large amounts of data.



There are a lot of commercial database programs available today but one of the best and most popular is Access, which is also included in the Microsoft Office Professional Suite. Access was ranked the best database among government users in a survey conducted by *Government Computer News*.³ FoxPro, Delphi, and Approach are three other very good databases. Paradox and Visual dBase are also good programs, but there are indications that Borland is putting most of their resources toward enhancements of Delphi and probably will not be doing much in the way of future enhancements to Paradox or even the new release of Visual dBase. This makes Paradox and Visual dBase poor choices for new database programs. This should not be considered a primary reason to migrate an existing dBase program to another platform, however. Access is very user friendly. It is being used to develop TMS and the three modules in SAARMs and any new database programs for the SAO. The use of Access throughout the SAO community will decrease the education

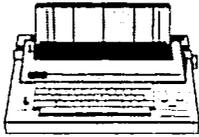
³ *Government Computer News*, March 6, 1995, p. 20, GUI databases.

requirements, increase the compatibility among programs, and enhance the maintainability of these programs.

Spreadsheet: A spreadsheet is used to store, retrieve, and manipulate data in a linear fashion in an accounting worksheet-type format. Lotus was once the premier program in this area but today Excel, Lotus 1-2-3, and Quatro Pro are all very similar in capability. You will even notice that most of the functions are the same for each of these programs. Any one of these three would probably be a good choice. Excel is the spreadsheet of choice in the security assistance area because it is part of the Microsoft Suite.



Word Processing: A word processing program is like a typewriter except you can make corrections on-screen before printing and you can do a lot of specialized formatting. You can change the style of the letters, darkness of the print, and add pictures and graphs. There are several commercial word processing programs available today but the two most popular are Word and WordPerfect.



Word was ranked the best word processing program among government users in a survey conducted by Government Computer News.⁴ Ami Pro is also a good word processor, but not as popular as the other two. Word is the word processor of choice for the SAO because it is provided in the Microsoft Office Suite, but some military organizations use WordPerfect for their USG work, so WordPerfect will be required by many SAOs in addition to Word. Fortunately the programs are somewhat similar and Word provides on screen help for users of WordPerfect to learn Word easier. These programs also allow you to save a document in the WordPerfect (.WPD) extension, Word (.DOC) extension, Ami Pro (SAM) extension or as a text file with the (TXT) extension.

Presentations: Presentation programs are used to develop slide presentations for briefings and limited graphics art work. Powerpoint, Freelance Graphics, and Presentation Graphics are the programs included in the three major office suites. Any one of these three would be a good choice. Using Powerpoint with Microsoft Office would provide the suite benefits mentioned above.



Special: Special programs are those programs developed for a specific use. They are developed using commercial software packages or computer languages like FORTRAN, C++, Visual Basic, or a combination of these. TMS, SAARMS, and the SAN are all specialized programs. The special applications are dictated by the job to be done and are developed based on those requirements. They are tailored to the specific job at hand. These products do what the developer intended them to do and the developer can only develop a system as good as the requirements defined by the user. The



developer should help the user identify the process that needs to be automated and then design the system to automate the process the way it should work in an automated manner as opposed to automating the current manual system.

⁴ Government Computer News, April 3, 1995, p. 18, Server Databases.



a. **SAN:** The Security Assistance Network is the electronic wide area network that connects the security assistance world. Communications capabilities become more important every day. A survey by the General Services Administration and the Office of Personnel Management stated that "though 31 percent of survey respondents said they have the tools they need to do their jobs, they want additional technologies, specifically, on-line services, voice mail, and bulletin board systems."⁵ The current version of the SAN provides E-mail access throughout the world, access to various security assistance databases like CISIL, MISIL, and SAMIS, and access to the DSAA Bulletin Board. The new SAN will change from the current DOS based application to a Windows oriented system. The features of the new SAN are beyond the scope of this paper to describe, but the SAN will be more powerful and easier to use than the current version.



b. **SAARMS:** The Security Assistance Automated Resource Management System was initially developed 7 years ago and has evolved over time to the current FoxPro developed version in use today. SAARMS is looking at many changes in the near future. The SAARMS budget execution module is currently being rewritten in Access with a planned release date of August 1996. The SAARMS budget preparation module will be developed and released in late Fall 1996. The SAARMS property management module is in development but no release date has been established. A SAARMS personnel module will also be developed sometime in the future.



c. **TMS:** The Training Management System has been rewritten in Access and TMS Version 4.0 is now being released to all SAOs at the current TPMRs.

d. **Other:** There will undoubtedly be other specialized programs developed for use by the SAO as new requirements are identified. Please contact DISAM if you currently have procedures that you feel could be better done with a specialized computer program. We will look at those requirements and try to work with you to provide a better way of doing things, especially if it impacts a large number of SAOs.

CONCLUSION

There is no easy answer as to what you should buy in the ADP world. This paper has addressed some of the key issues to consider when planning to upgrade or purchase a new computer. It has also examined some of the software requirements. Table 1 summarizes the computer specifications needed to perform your mission today and in the future. You have to weigh these requirements against a finite number of dollars available to support the Security Assistance Office. The Pentium™ with a large amount of RAM is the best long term choice for the SAO with funds to purchase new computers. Microsoft Office is the software suite chosen to standardize the SAO community and is a very good choice for this purpose. There are several specialized programs utilized by the SAOs and more will be developed as requirements are identified.

⁵ *Government Computer News*, April 3, 1995, p. 1&52, 94 percent of feds use computers but half say they're newbies.

ABOUT THE AUTHOR

Ernest McCallister is an Instructor at DISAM, and a software developer currently developing SAARMS 5.0. He is a graduate of The Ohio State University and holds a Masters of Business Administration from the University of Toledo. Mr. McCallister has been involved in Security Assistance since 1991.