The arrival of SAS software on the IBM PC was a major cause for celebration for those of us who had long used various SAS products on larger computers. As Westat's Software Consultant for the PC SAS system, I have found that supporting this product has been an exciting, educational, and at times frustrating experience. I hope that our experiences may be of some help to those of you who are in similar situations.

Since many decisions concerning training and support within an organization depend upon such factors as its size, structure, and personnel, this paper begins by describing both Westat itself and our previous experiences with SAS software. It then discusses our first few months of using the PC SAS system. Some possible ideas are suggested for customizing the PC SAS software for a particular installation, and the results of a recently-conducted user survey are presented.

Knowing Your Situation

Westat is an employee-owned statistical survey research firm, which was founded in 1963. Our annual revenues are approximately $25 million, and we have a staff of several hundred employees. Most of these employees work in our main office in Rockville, Maryland.

SAS software has been an important tool at Westat since the late 1970's. In addition to its extensive analytical capabilities, we have found that it is able to meet many of our data management and reporting requirements. Of the 75 or so members of the data processing staff, most know the SAS language and use it extensively. In addition, the SAS package is also used by many of our researchers, economists, and statisticians.

At first, all of our experience with the base SAS package was on large IBM mainframes. Many of our U.S. government contracts provided computer time on such systems. For some of our other contracts, we purchase computer time from an outside vendor. In an effort to minimize these time-sharing costs, we purchased our own VAX 11/780 superminicomputer in 1981. Naturally, we purchased the SAS package for our VAX as soon as it became available - in fact, we served as one of the original alpha-tester sites for the VMS version of SAS.

Nearly all of our SAS software experience has been in batch mode, rather than interactive. We use very little TSO or CMS; most of our communication with IBM mainframes is carried out using some version of WYLBUR, a software package which provides capabilities for text editing, job submission, and job retrieval. In addition, many of our data files are large enough to make interactive processing impractical. While we do, of course, have the capability to run SAS interactively on the VAX, we have discouraged this method of operation because of the heavy load on our system.

Recently, microcomputers have started to play a more important role at Westat. We currently have over one hundred personal computers in the company. Most of these are IBM PC/XT models; we also have a considerable number of AT's, along with some Compaq models and a few Macintoshes. Those of us who are Macfanatics are hoping that this number will increase. Many of these machines are principally used for word processing. We also use these micros for such purposes as budgeting, staff management and scheduling, and receipt control.

Because of this increasing use of personal computers, we eagerly awaited the arrival of SAS software on the IBM PC. We felt that the SAS package would provide a good complement to our other microcomputer software, such as Lotus 1-2-3 and dBASE III. In particular, we expected that the arrival of SAS on the PC would mean that we could move some entire projects (at least those with relatively small files) to microcomputers from larger systems, saving either money, turnaround time, or both. Since so many of our staff members already knew the SAS language, we expected that the learning curve should be quite rapid.

In spite of our anticipation, we recognized that our use of SAS software on personal computers would start out at a relatively low level. Even with recent increases in the speed and storage capacity of micros, many of our projects involve such large data files that they would be impractical to transfer to PC's. Since nearly all of our personal computers are currently single-user workstations, rather than being networked, we also realized that data files that needed to be accessible to many different users might better be kept on a larger system.

Deciding Who Does What

Before you can plunge into planning and developing PC SAS training programs and support systems, you will need to decide which individual or individuals within the company are going to be responsible for these areas. SAS Institute speaks of three distinct support "roles" at the user level - the SAS Software Representative, the SAS Software Consultant, and the SAS Training Coordinator. In addition, separate consultants may be designated for specific SAS products, such as SAS/GRAPH® or SAS/ETS®.

At Westat, we decided to designate a single individual to fill all three of these roles. In our view, the primary advantage of this approach was to have a single person serve as the interface to SAS Institute on all noncontractual matters. My primary
qualifications for this post were six years of SAS software experience, some familiarity with the IBM PC, previous (and continuing) service as SAS consultant/installation rep/training coordinator for our VAX 11/780 system, and a certain amount of difficulty in saying the word "no." When I'm not tearing my hair out over someone's latest SAS-related misadventure, I serve as Group Manager for one of our programming teams.

Although I'm the officially-designated Installation Representative, I don't actually install and patch SAS products on our microcomputers myself. Instead, I arrange with our indefatigable two-person PC support team (Karl Alsheimer and Joanne Finnin) to install new and updated products, make patches, and maintain the official list of SAS-blessed machines. (We now have the base SAS product installed on 18 machines, most of which are IBM PC/ATs.) In return for this honor, Karl and Joanne refer all PC users having SAS-related problems to me for fatherly advice and a shoulder to cry on. We have found that the person or persons who actually install the SAS products should, if possible, have at least a moderate amount of previous PC experience. Knowledge of the SAS software itself is not as crucial.

Becoming an "Expert"

The SAS software consultant, on the other hand, should be thoroughly familiar with the SAS product in general and the PC SAS software in particular, in addition to being familiar with the basics of the IBM PC and PC-DOS. In my case, since I had had a considerable amount of previous SAS background as well as some experience with the IBM PC, my primary goal at the beginning was to become as familiar as possible with how SAS software ran on the PC - in particular, what the differences were between the mainframe, minicomputer, and microcomputer implementations of the SAS base product.

Since we received copies of the three principal manuals for SAS software on the PC a few months before we received the product itself, I started by reading through these as carefully as I could, paying particular attention to differences between the PC version and the existing versions of SAS to which our users had become accustomed. (Appendix I in the SAS Language Guide for Personal Computers provides a good starting point for such a survey, although it is by no means all-inclusive.) The section on the SAS Display Manager was of special interest: since nearly all of my previous SAS experience had been with batch jobs, I had not had the opportunity to use this product before on other systems.

Once we finally received the long-awaited package of floppies from SAS Institute, I spent most of the next few days and evenings exploring the system's actual capabilities and operation. I had an especially good time with the Display Manager, moving and resizing windows and changing screen colors with abandon. I also ran some production-type jobs to get some idea of the system's performance level, made edits to files and programs it could gracefully handle.

Introducing the Package

The experience I gained through my own personal "immersion" approach to the PC SAS product helped to shape our approach to introducing the software to other staff members at Westat. First, we decided that a large-scale, formal training program would be neither necessary nor appropriate, given our particular set of circumstances. We expected that most of our potential PC SAS users would have previous experience with SAS software on either an IBM mainframe or on our VAX. My initial use of the product confirmed our original impression that the syntax of the DATA step and of most procedures was extremely close to that of SAS Version 5. This similarity, we hoped, would minimize the amount of staff time that we would have to invest in consulting for the PC SAS product. We were also aware that a large-scale training program would run into significant scheduling and resource constraints, both for instructors and students. Finally, we were aware that staff members would begin to use the PC SAS package on a gradual, ad hoc basis, depending on their own schedules and project requirements. We have found that formal classroom instruction, on the other hand, works best when there exists a "cohort" of students who will immediately be using the material covered as part of their day-to-day duties.

Although we decided that we would not immediately offer a formal program of classroom instruction, we still wanted to provide some introduction to the PC version of SAS. Since both our data-processing group and our statistical group have periodic lunchtime seminars, we used these forums to provide an overview of the PC version and its operation. Because of space limitations, I made two separate one-hour presentations of the material, although the presentations were virtually identical. One presentation was made as part of our "DF Exchange" series, while the other was incorporated into our statistics group's lunchtime seminar series. The first session was attended by about 30 people, while approximately 20 attended the second.

Since the previous SAS experience of most of our staff members had been strictly with batch programs, we wanted to provide an actual demonstration of the SAS Display Manager as part of the introductory sessions. To do this, we used a Compaq 286 microcomputer with a video output jack. This was then connected to an Electrohome video projector, which projected a greatly enlarged view of the computer monitor onto a projection screen. The only disadvantage of this combination was that, in graphics mode, the Compaq uses shading to simulate different screen colors. Since this shading made the projected image difficult to read, I spent a frantic few minutes fiddling with the Display Manager's COLOUR command in an effort to get readable text in each of the available windows.

As a part of these introductory sessions, and as an aid to later users who may have missed them, we developed a short handout to serve as a quick introduction and reference to the product. Because of the high level of SAS experience within the company, we geared the handout to experienced SAS users who would be
transferring their previous knowledge to the microcomputer environment. Thus, we emphasized (1) differences in syntax and features between the Version 6 PC product and other versions of SAS software currently in use, and (2) the use of the Display Manager, including a keyboard template and a listing of commonly-used commands.

Providing Ongoing Support

Although I serve as the official SAS Consultant at Westat, I actually receive plenty of help with the job. Most novice SAS users are able to get assistance from their more experienced compatriots within the same project group. Consequently, I serve as more of a "last resort" for problems that have managed to baffle a number of other people. One of the first things that I discovered when exploring the SAS software itself is that the INPUT statement should move to the next record.

An additional input-related problem was discovered when we attempted to read in some data for which there were multiple records for each case. The pound sign (#) on the INPUT statement, which is advertised as the way to handle this situation, did not work properly. We had better luck using aliases to indicate that the INPUT statement should move to the next record.

We also encountered some problems in other areas. PUT_INPUT did not function. Using a LINESIZE of 132 for printed procedure output caused us to get garbage characters rather than page numbers. (A shorter value for LINESIZE corrected the problem.) I was also unable to get PROC DBF to open a dBASE III file that contained a memo field. With another CHAR file, PROC DBF was one column off when it attempted to bring the data into SAS.

I have also had some reports of the PC SAS system "locking up" and requiring the computer to be restarted, although I have not yet been able to trace these episodes to a specific cause. When such abnormal exits from the SAS system occur, work files used by the system are not closed, and a considerable amount of hard disk space may be wasted. Therefore, the PC SAS user should use the PC DOS "CHKDSK" command frequently to discover and recover such space. This is another point that needs to be mentioned much more prominently in the documentation.

I'm still attempting to find the best way of letting PC SAS users know about bugs and other new releases related to the product. Such old standbys as login messages, system MAIL messages, and the SAS NEWS option aren't particularly well adapted to a standalone microcomputer environment. Even keeping track of all current users presents some difficulty, since many of our PCs are shared by a number of staff members. The only solution may turn out to be a periodic newsletter, which could be circulated both to project group supervisors and to known PC SAS users.

Customizing the PC SAS Package

One area which we did not explore ourselves, but that may be of potential interest to other sites, is the possibility of customizing the PC SAS software during installation. The SAS Display Manager offers an unusual degree of flexibility in such areas as window size, location, and color, and function key definitions. A standardised company-wide set of enhancements could be developed when the product is received and then applied to each machine as the SAS product is installed. Users could then make further changes, or even return to the SAS Institute defaults, as they desired.

There are five primary tools for accomplishing such customization. The first is the file
PROFILE.SFS, which contains function key definitions and window configurations. The second is the AUTOEXEC.SAS file, which contains a set of SAS statements which are executed whenever the PC SAS software is invoked. The third is the DM statement, which allows Display Manager commands to be included within a SAS job. Such commands can thus be included part of AUTOEXEC.SAS. Fourth, since particularly useful HELP screens can be accessed directly by number (e.g., HELP 70 provides help for the Program Editor Window), function keys could be defined to provide instant access to the most frequently needed HELP information. Finally, the NOTEPAE window allows such possibilities as providing installation-specific "help" screens.

Fortunately for those of us who lacked the time to develop such customization procedures, the developers of the PC SAS Display Manager did an exceptionally good job in designing the "standard" configuration. Once my initial urges to play around with everything had subsided, I found that the default window locations and sizes, augmented by the ZOOM command, were adequate in nearly all situations. Similarly, the supplied keyboard configuration suits those of us who prefer mnemonic control-key combinations, as well as those remarkable individuals who can keep track of the F1 through F10 keys in all their natural, shifted, controlled, and alt-ed glory. My one quibble with the use of the keyboard relates to the use of the END key on the numeric keypad. The first-time user who expects this key to do something innocuous, such as move the cursor to the end of the current line, will be rudely awakened, since the actual effect is to delete all text from the cursor position through the end of the current line. Fortunately for those of us who preferred the cursor to the end of the current line, will be rudely awakened, since the actual effect is to delete all text from the cursor position through the end of the current line, will be rudely awakened, since the actual effect is to delete all text from the cursor position through the end of the current line, will be rudely awakened, since the actual effect is to delete all text from the cursor position through the end of the current line, will be rudely awakened, since the actual effect is to delete all text from the cursor position through the end of the current line, will be rudely awakened, since the actual effect is to delete all text from the cursor position through the end of the current line.

Surveying The Users

Since I do, after all, represent a survey research organization, I thought that it would be appropriate to conduct a survey of Westat employees who had used the PC SAS product. The survey form (see Figure 1) was given on January 31 to 15 staff members whom I knew had been using the PC SAS system. By February 5, 10 completed forms had been returned, although not all individuals answered every item.

The responses were asked to rate the PC SAS product on a scale of one to ten, as well as to assign specific ratings in the following areas: performance, Display Manager, other features, freedom from bugs, ease of learning, ease of use, and documentation. They were also asked how often they used the product, as well as about their previous SAS and PC background.

This survey produced several interesting results (see Figure 2). First, it confirmed our expectations regarding the background of our PC SAS users. Eight of the ten respondents had had at least some previous SAS software experience, and seven of the ten had had at least some background on the IBM PC. Six of the ten had been making frequent use of the PC SAS product, while the other four had used it less often.

In general, our users seem to be reasonably satisfied with the product. The mean overall rating was 7.5, with only one or so scores below 7. Nearly all of the means for the more specific rating categories fell in a range from 7.3 to 8. The only exception was "freedom from bugs," for which the mean score was 5.6.

The final item on the survey asked users to provide a "wish list" for future releases of the PC SAS system. "Statistical procedures" and "cleaning up the bugs" were both listed by more than one user. Other items mentioned were increased speed, a full-fledged macro language, and matrix algebra facilities.

Conclusions

In many ways, supporting SAS software on microcomputers is not all that much different from providing support on larger machines. The installation process is certainly quite different, but consulting and training requirements are very similar.

Version 6 of the SAS language is extremely close to Version 5. Moreover, the PC SAS Display Manager provides an operating environment that is both easy to learn and easy to use. Consequently, we found that experienced SAS users with some PC background were able to be "up and running" with the PC SAS system without any formal instruction. We did find it useful, however, to prepare a summary handout and to conduct a one-hour screen demonstration of the Display Manager in action.

Most of our difficulties in using Version 6.01 of the PC SAS system have been caused by bugs in the software, rather than by any fundamental limitations in the product design. In particular, our users found numerous booby traps when attempting to get their data into the SAS system. Once these problems are solved, and the SAS/STAT package appears, we expect the PC SAS system to become an even more valuable tool.

Acknowledgments

SAS, SAS/GRAPH, and SAS/ETS are registered trademarks of SAS Institute Inc., Cary, NC, USA.

SAS/STAT is the trademark of SAS Institute Inc.

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PC SAS USER SURVEY

Please return to Mike Rhoads in Room 102 by Tuesday, February 4th.

Please rate the PC SAS product in each of the following areas, using a scale of 1 (awful) to 10 (superlative):

1. Performance (speed)  
2. User interface (Display Manager)  
3. Other features  
4. Freedom from bugs  
5. Ease of learning  
6. Ease of use  
7. Documentation  
8. Overall rating  

9. How much have you used SAS software on the PC? (circle one)
   Very seldom  Occasionally  Frequently  Heavily

10. Before you started to use SAS software on the PC, how much previous SAS experience did you have? (circle one)
    None  Very little  Some  A considerable amount

11. Before you started to use SAS software on the PC how much previous PC experience did you have? (circle one)
    None  Very little  Some  A considerable amount

12. What's your personal "wish list" for future releases of SAS software on the PC?

Figure 1
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Figure 2 - Results of PC SAS User Survey