Using the Version 6 SAS® System with Your Operating System: Helpful Information Sources for Your Host Environment
Dea Zullo, SAS Institute Inc., Cary, NC
Dee Stribling, SAS Institute Inc., Cary, NC

ABSTRACT
The presentation is a joint effort of the Host Systems Research and Development Division and the Documentation Development Department, and describes the combined effort of host developers, the publications group, and the technical support group at SAS Institute to produce host-specific documentation and information resources that meet customer needs. This discussion shows the user how to maximize the utility and versatility of Version 6 of the SAS® System by identifying where specific types of information are located with particular emphasis on host-specific documentation. The paper illustrates how the information interface and SAS software reflect the uniqueness of individual operating systems, while preserving the continuity of the SAS System across host environments.

INTRODUCTION
The SAS System is designed to work across a variety of host operating systems, including personal computers under MS-DOS® and OS/2®, minicomputers and workstations under VMS and UNIX, and mainframes under MVS and CMS. The features and functions of the SAS System are designed to be largely transparent to the user across all operating systems and to look as nearly the same as the unique characteristics of the vendor environment allow. It is our intent that those of you who work in a corporate or academic environment, using both personal computers and a mainframe system or multiple mainframe systems, be able to move between operating systems with little or no need to relearn SAS software characteristics. At the same time, however, SAS software continues to be developed to take full advantage of the services your operating system offers with respect to things such as file management, security, and display characteristics.

A software system that exhibits the versatility, performance, and adaptability of Version 6 of the SAS System requires an equally diverse and powerful set of support documentation to describe these characteristics. For this reason, the documentation has been developed through the close cooperation of the software and documentation development groups, with assistance of various support personnel throughout the Institute. The host division has worked very closely with writers and editors to coordinate and design the basic format for the host documentation, and to determine where and how information should be documented.

The SAS System user has three basic sources of host-specific information:
- hard-copy documentation, including the basic documentation set for Version 6 SAS software, as well as various auxiliary books, including technical reports, installation instructions, and so on
- online documentation, including the Help screens, SAS Usage Notes, SAS Sample Libraries, and the SUPPORT application
- customer support facilities, including the SAS Software Consultant, SAS Software Representative, and, through these on-site representatives, the SAS Institute Technical Support group.

This paper provides an overview of sources of information for your SAS software with particular emphasis on working within your host environment. The first portion of the paper describes the range of information sources you as a SAS software user have at your disposal. In the second half of the discussion, you learn in greater detail about the primary source of hardcopy information for the host operating systems, the Host Companion.

HARD-COPY DOCUMENTATION
Hardcopy documentation that contributes to successful work on your host is available to you from two primary sources:

1. The Companion book for your host environment
2. The installation instructions for your host environment via the SAS Software Representative.

The SAS System is a family of integrated software products that enable you to perform many tasks, including data entry, retrieval, and management; business graphics; statistical analysis; applications development; and so on. The variety of products that enable you to do these things are built upon a foundation of base SAS software. A new SAS Version 6 user learns the fundamentals of the base SAS software product by using SAS Language and Procedures: Usage, Version 6, First Edition. As the user's understanding of the SAS System and need to utilize its services expand, SAS Language Reference, Version 6, First Edition, and SAS Procedures Guide, Version 6, Third Edition provide complete advanced information regarding the portable features of the base SAS product.

In the SAS System, portable features are those that are common to all operating systems. However, in order to implement SAS software in any particular operating system environment, an elaborate software layer must be developed by the Host Systems Research and Development group. This interface layer provides host-specific features, such as Input/Output engines, windowing system interfaces, device drivers, and other host-specific components and procedures. Each host group designs, builds, tests, and supports this interface to function as an extension of the operating system, consisting of service routines that are called by the portable (non-host) code. Without this interface, the SAS System would not function because there is no single operating system that directly corresponds to the portable SAS software.

As those of you who have moved between operating systems well know, operating system characteristics vary widely. Fundamental tasks such as file specification and management, the use of command languages and control statements, storage characteristics, and so on may have little or no correspondence between a personal computer and a minicomputer or mainframe system. The look and feel of the display screen and keyboard may be entirely different and confusing to a new user. Despite these differences, Version 6 of the SAS System operates and appears in fundamentally the same way on all systems.

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The Host Companion Documentation

In the same sense that host system development provides the interface between the SAS products and your operating system environment, the host companion books provide the interface between you and SAS software on your operating system. As you will learn in greater detail in subsequent sections of this manual, the host companion provides a user who is familiar with the SAS System with greater detail in subsequent sections of this paper, the host companion provides a user who is familiar with the SAS System with the expertise to use SAS software in a particular operating environment. Like the SAS software product, the companions have been structured and designed to appear fundamentally the same across operating systems, with the same general layout as a combined usage and reference guide, using consistent terminology and covering similar topics in approximately the same location throughout the books. But, also like the software, each host companion has been customized to reflect the unique nature of the operating system to which it pertains. For example, the SAS System under VMS has been implemented to take full advantage of DECwindows® for those users who have this capability; the VMS host companion has, therefore, an extensive discussion of the SAS System in the DECwindows environment. The upcoming release of the SAS System under OS/2 has been implemented within the application interface provided by Presentation Manager; this relationship will be addressed within the OS/2 companion. In the MVS and CMS companions, chapters are devoted to the display manager interface, use of the windowing system, and running the SAS System: on the newer mouse-equipped terminals, as well as the more familiar techniques traditional mainframe users are likely to employ. Similarly, users of AOS/VS, PRIMOS, and the multiple UNIX platforms will have companions that are designed as an orientation to the SAS System within the unique environment provided by their particular operating system.

As you might expect, because the SAS System capitalizes on the characteristics and advantages of particular operating systems, each operating system has host-specific SAS features, including various procedures and options. In general, these are designed to enhance SAS software on your host by taking advantage of the unique features of the operating system. These host-specific features are documented in your host companion. In addition to these, there are many more procedures that are operable on all systems and are, therefore, documented in the portable documentation, but have host-specific attributes of which you must be aware; these attributes are also documented in the host companion.

Cross-references are used extensively in books to point to other books in the series where further information can be found. The portable SAS Language books (Reference, Procedures, and Usage) have numerous references to both host documentation and SAS documentation for your host. The term host documentation identifies material that pertains directly to your operating system rather than the SAS System on your operating system. This may mean specific operating system documentation, or it could mean something site-specific, such as how your operating system is configured.

On the other hand, when you see the term SAS documentation for your host in the portable documentation, it is a reference to the SAS Host Companion for your operating system. However, by definition, not all portable features identified as having host-specific attributes have these host-specific attributes on all systems. Therefore, when you see a reference of this type in the portable documentation, you should consult the index of your host companion to determine whether or not this item is a matter of concern in your host vendor environment.

The Installation Instructions

In addition to the companions, another source of information for the user is available through the discretion of the SAS Software Representative. When the SAS Software Representative (or the individual user, in the case of the PC product) receives Version 6, an installation packet, which is produced primarily by the host development group, is included. Included in that packet is information enabling the individual installing the SAS System to customize and tailor the installation for the site location. In most cases, the customization of the installation process is designed to maximize the performance efficiency of SAS software on your host, as well as to tailor your installation to whatever site-specific devices, peripherals, and network systems you may utilize. Although the average users do not have access to all the same materials that the software representative who performs the installation does, they should be aware that performance and efficiency, in particular, are affected by the customization process.

The SAS Software Representative has the option of making the SAS Usage Notes available to users. The Usage Notes, which are periodically updated by SAS Institute, include:

- corrections to the documentation
- known software problems
- available fixes
- common errors and misconceptions
- information not included in the various manuals
- differences between releases of the SAS System.

Should you encounter a problem or something not covered in hard copy documentation, the Usage Notes are a logical step in seeking a solution.

The SAS Software Representative also controls, through the installation process, your access to SAS Sample Libraries. A sample library is provided for each SAS software product. These are designed to assist you in learning SAS programming techniques by providing you with specific examples of SAS applications and the different approaches one might take to particular problems. At installation, the software representative has the option of installing the sample libraries or conserving space by not including these in the installation. Typically, the software representative makes that decision based on the requirements of the majority of users at a site. A site that has a large number of new users should consider using the sample libraries, because often the easiest technique for learning new material is by example.

ONLINE SOURCES OF INFORMATION

In Version 6 of the SAS System, users have access to the most extensive online help facility ever provided by SAS Institute. On each host system when you are operating under the SAS Display Manager System, SAS System Help is available for portable components of the system. In addition, Host System Help is accessible for more information on host-specific options, procedures, functions, formats, and statements. In addition to the help facility, another primary source of Information for the user is the SAS log. The log lists SAS source statements with notes about each step in your SAS program and warning and error messages. Selected error messages that are specific to the SAS System in your operating environment and their solutions are detailed in the Host Companion to your operating system.

A third source of information available at installations with dial-up terminals is the Online Customer Support Facility. This facility enables customers, through the SAS Software Representative, to
This service is available 24 hours a day, 7 days a week and is
updated weekly.

Lastly, a new source of information for Version 6 is the SUPPORT
application, which is available to all SAS System users. This is a
menu-driven system based on SAS/AF® software that enables you
to
- browse the SAS Usage Notes
- generate an index of the sample programs provided by SAS
  Institute
- edit and execute the sample programs
- access a tutorial that documents major changes to SAS
  software between Version 5 and Version 6 on a per product
  basis.

A full discussion of how to use the SUPPORT application, the Online
Customer Support Facility, the SAS Notes, and the SAS Sample
Library is included in Technical Report U-112, A Guide to the SAS
Notes, Sample Library, and Online Customer Support Facility.

CUSTOMER SUPPORT AS AN INFORMATION
SOURCE

Frequently a primary source of information and expertise are your
fellow users; often the same difficulties that you encounter will have
occurred previously and you may well benefit from that prior experi­
ence. We have already discussed the role that the SAS Software
Representative plays in making decisions that affect performance
and access to information at your installation. In addition to the SAS
Software Representative, the SAS Software Consultant is available
on-site to provide you with direct user support. The SAS Software
Consultant has access to the SAS Usage Notes and any other infor­
mation provided by the Institute relating to your installation. If the
software consultant cannot provide you with the assistance you
require, he or she may contact the Technical Support Division
directly for further information. If you don't know the name of your
consultant, you can obtain this information, as well as other site­
specific data (such as the version you are using, products installed,
and so on) from the SITEINFO window. Instructions for accessing
the SITEINFO window, as well as information you should provide
to the consultant when you have a problem are described in detail
in the Host Companion to your operating system.

SUMMARY OF INFORMATION SOURCES

There are many sources of information available to users of Version
6 of the SAS System. The most complete is the Host Companion
to your operating system, which provides you with information to
maximize the utility of SAS software within your operating environ­
ment, and a more detailed description of how and where other
sources of information are available. To provide you with a more
complete introduction to the SAS companions as a resource, the
second portion of this paper takes you on a tour through this pri­
mary source of information.

INTRODUCTION TO THE HOST COMPANIONS

This section provides information that can help you make efficient
use of your operating system companion. Topics include how the
companions are organized in terms of both structure and content.
Different companions are used as examples to illustrate how various
host-specific topics are addressed for particular host environments.
This portion of the paper is organized as follows:
- understanding companion organization and purpose
- using parts and chapters
- putting it all together.

Understanding Companion Organization and Purpose

As noted earlier in this paper, each companion follows general
design principles developed for the companions to each host sys­
tem. Companions serve as both usage and reference documents
by providing background material, and syntax and function descrip­
tions for specific features. Host-specific aspects of portable compo­
ments of the SAS System are covered, as well as features unique
to the SAS System in the particular host environment.

Whenever you encounter a reference to host-specific information
in the basic documentation set, you can look to the Host Companion
for more information. Once you are familiar with the basics of Ver­
ison 6 of the SAS System you can use the companion as a primary
reference. However, since the SAS System offers many diverse fea­
tures and procedures, you will want to use the companion in con­
junction with the base SAS documentation set whenever you need
host-specific information concerning a procedure, system option, or
other SAS System component.

The information presented here, in general, parallels information
organization and content for all operating system companions. As
noted earlier, differences between companions occur primarily in
areas where documentation reflects aspects of a host system that
are unique to that system, such as the specifics concerning the com­
mand language used in a particular host environment. Those differ­
ences aside, you can expect the material in the companion for your
host environment to be similar to the information presented here.

Most companions are organized into five parts. Each part groups
topics related to a specific area of interest in using the SAS System
under the particular host environment. These parts are

Part 1: Running the SAS System under the Host Environment

introduces the SAS System in the host environment and
explains the methods of processing (interactive, batch)
available in the host environment.

Part 2: Using Files and Routing Output

describes how to use SAS files and external files in
your SAS programs, as well as how to route log and
procedure output in the host environment.

Part 3: Reference: Host-Specific Features of the SAS Language

provides information in reference format for system
options, windowing considerations, data set options,
procedures, and other language features.

Part 4: Application Considerations

provides information of interest to application
programmers, such as optimizing performance and
problem determination.
Part 5: Appendices

Cover additional aspects of running the SAS System related to the host environment, for example, "JCL Specifications" is an appendix in the MVS companion.

Each companion is written to help you use the SAS System in your host environment regardless of your level of experience with that environment. It is assumed that you have some experience with the SAS System, but, if not, examples and references to other documentation are provided to help you get started. In addition, the companions include many items to help you find your way to the information you need, such as a glossary and detailed index.

Understanding Parts and Chapters

To help you understand the organization and content of your particular companion, each companion includes a section in the beginning of the book called "Using This Book." In addition to providing an overview of the book's contents, it contains sections on typographical conventions (important to understanding the syntax diagrams), conventions used for examples and output, and references to additional documentation available from both SAS Institute and the host vendor.

Some companions also include a second introductory section called Changes and Enhancements to the SAS System, Release 6.06, under (MVS, VMS, ...). "Important information concerning new SAS System features available in the host environment and features that have changed are presented here. You should read this section if you are familiar with previous releases of the SAS System for your operating system.

The remainder of this section discusses why the companion chapters are organized as they are and how their contents reflect information you need to use the SAS System under your host operating system.

Part 1: Running the SAS System Under Your Host Environment

These chapters provide background information on both the host system and the SAS System, and explain the different methods of running your SAS programs under your host environment. Typical chapters are

- Introduction to the host (MVS, CMS, VMS, etc.)
- using the SAS System under the host
- working in the windowing environment.

Chapters will vary according to operating system. For example, the MVS companion devotes several chapters to the different methods of running the SAS System (interactive line mode, batch, and so on). The VMS companion devotes a chapter to using the DECwindows interface to the SAS System.

For most companions, the first chapter ("Introduction to the Host Operating System") focuses on the host environment apart from the SAS System. This chapter includes an introduction to concepts and terminology used with respect to the host environment, methods of operation, and data management. Chapter 1 introduces the host environment information necessary to understand the material in the chapters that follow.

The second chapter "Using the SAS System Under (MVS, CMS, ... )" discusses the methods of running the SAS System in the host operating system and how to tailor the process of initializing the SAS System for your sessions. An example is introduced that is used to illustrate different methods of running the SAS System. This example is used in many of the companions to illustrate how the same procedures work across operating systems.

The third chapter in most companions is devoted to explaining how to work in the SAS windowing environment. Topics include how to activate and size windows, and how to use PMENUs, icons, and function keys. The chapter also provides details on host-specific display manager windows, commands, and options.

Regardless of your host environment, the companion for your system covers these same basic topics: host background and using the SAS System in your host environment with examples of the different methods of operation valid on your host.

Part 2: Using Files and Routing Output

The chapters in this section cover host-specific aspects of using SAS files (files managed by the SAS System) and external files (files managed by the host system), and routing output. Understanding the material in this section is important to running SAS applications in your host operating environment because there are many new concepts concerning the structure of SAS files under Version 6, as well as new options and features available for input and output operations.

Typical chapter topics for this part of the companion include

- using SAS files
- using external files
- routing output.

The chapter covering SAS files reviews the concepts of SAS data libraries and Multiple Engine Architecture as they apply to your host and describes how to access SAS files, including older versions, on both disk and tape.

The companion chapter on using external files provides information on how you work with files whose format is determined by your host operating system, such as raw data files. Topics cover accessing external files using the FILENAME, INFILE, FILE, and %INCLUDE statements and the INCLUDE command. In addition, topics pertinent to your host system are addressed. For example, the UNIX companion discusses reading input from a Shell command, while the VMS companion discusses accessing remote external files.

Typically, the chapter covering routing output covers the information you need to route SAS log and procedure output files to a terminal, printer, or disk device in your host environment.

Part 3: Reference: Host-Specific Features of the SAS Language

Part 3 begins the reference section of the companions. This information is organized so that someone familiar with the SAS System can quickly find host-specific details for the following:

- system options
- windowing considerations
- data set options
- procedures
- other features of the SAS System.

Host-specific information about SAS system options is provided with respect to system options affecting many aspects of your SAS session, including output destinations, program execution, and the attributes of SAS files and data libraries. Details are provided on how to change SAS system option settings, as well as, in some of the companions, configuration and autoexec file details.
Most companions group information on system options into sections appropriate for that environment as well as into tables to provide quick reference information. For example, the MVS companion includes "Options for MVS SAS Users," which is an alphabetic listing and discussion of all the SAS system options that are host-specific or whose values are MVS operating system dependent, and Summary of SAS System Options, which is a tabular listing of all SAS system options available under MVS.

Reference information on host-specific features of the windowing environment is included as a chapter for some of the companions. When present, this chapter includes information on terminal and special device support (such as using a mouse) for the SAS System under the host. The MVS and CMS companions include this chapter to summarize windowing information in reference format. The MVS companion includes sections on MVS windows, aspects of the FORM subsystem, command-line commands, and options.

Other host companions may include chapters related to host-specific windowing environment topics. For example, the UNIX companion addresses Graphical User Interfaces with respect to the SAS System.

SAS data set options specific to the SAS System in the host environment are also included in the reference section for most companions. A summary of both SAS data set options and system-dependent data set options is usually provided.

The procedure reference chapter for the companions provides reference information on host-specific features of base SAS procedures. If a procedure is also described in the SAS Procedures Guide, that information is not repeated here. Instead, there is a "Host Specifics" section that gives the details of how the procedure behaves under the particular host environment with appropriate references to the SAS Procedures Guide. For those procedures that are not described in the SAS Procedures Guide, the syntax and a full description are given.

Other system-dependent features of the SAS language are covered in the last chapter in the reference section. These are details of SAS language features that are specific to the host. This chapter does not provide details of the portable features of the SAS language. SAS Language: Reference provides complete documentation for the portable features of the SAS language. As with all chapters in the companions, if you are not familiar with a particular topic, references are provided so you can review the appropriate sections of other documentation for the SAS System.

For the companions in general, host-specific aspects of the language are covered with respect to:
- statements
- functions
- CALL routines
- formats and informats
- expressions
- macro facility variables, statements, and functions.

Part 4: Application Considerations

The fourth section of the companions covers topics of general interest to anyone doing applications programming using the SAS System under a particular host. Topics commonly addressed include:
- optimizing performance of the SAS System under the host
- understanding host aspects of file conversion and coexistence
- problem determination and resolution.

In most companions, a number of techniques are covered that you can use to optimize the performance of your SAS programs on your host system. Some of these techniques, such as using the performance statistics reported in the SAS log to tune your SAS program or writing efficient SAS programs, apply to any operating system. Other techniques discussed have many host-specific aspects.

When applicable, companions include host-specific information related to conversion, coexistence, and, to some extent, transportation of SAS files. Information in this chapter explains conversion, which is the process of converting a Version 5 SAS file into a Version 6 SAS file. It also explains coexistence, how you can use Version 5 SAS data libraries and load module libraries that contain Version 5 SAS formats and informats when running under Version 6 of the SAS System. Some companions, MVS for example, include an additional brief description of transporting SAS files, which is the process of moving SAS files to a different operating system environment.

Each companion presents information to help you solve problems you may encounter while running your SAS job. As noted earlier, SAS Technical Support is available to assist your SAS Software Representative and SAS Software Consultant with problems you encounter. This type of chapter offers suggestions as to how you can resolve problems and, if you cannot, what information you need to provide to your SAS Software Consultant to pass on to SAS Technical Support.

In most companions, the last section of the "Problem Determination and Resolution" chapter includes information about some of the host-specific messages that may be displayed during your SAS sessions.

Again, additional chapters may be included in this section as appropriate for your operating system. For example, some of the companions have a "Question and Answer" chapter where answers are provided for questions SAS users most frequently ask SAS Institute's Technical Support staff with respect to performing tasks under a particular host environment. When present, this chapter includes discussions on topics such as:
- specifying work areas
- rerouting output
- submitting batch jobs
- working with Version 6 SAS data libraries
- using formats
- using system options.

Part 5: Appendices

Many of the companions include appendices. Companions include appendices to provide additional information for topics pertinent to using the SAS System in that environment. For example, like the VMS companion, the MVS companion includes an appendix on estimating data set size. However, the VMS companion also includes an appendix covering aspects of the VAX Language-Sensitive Editor (VAXLSE) while the MVS companion includes an appendix on the basics of JCL (job control language).
What You Should Read

In each "Using This Book" section at the beginning of all the companions, there is a table outlining the chapters you should read depending on your level of experience with the SAS System and the host environment. In general, these tables can be summarized as follows.

If you are a user who has no experience with the SAS System or MVS, you should read Chapters in Part 1 (SAS Software under your host), chapters in Part 2 (using files and routing output), and scan other chapters as needed.

If you are an applications programmer who has no experience with the SAS System or MVS, you should review chapters in each part of the book.

If you are an applications programmer who is familiar with the SAS System but not with MVS, you should review the first chapter in Part 1 (introducing the host system), skip the second chapter in Part 2 (introducing the SAS System), and continue with other sections as needed.

If you are an applications programmer who is familiar with MVS but not the SAS System, then you can omit the first chapter in Part 1 (introduction to the Host), and review chapters in other sections of the book as needed.

If you are a System Manager review the entire book, paying special attention to chapters in the "Applications Considerations" section and the appendices.

PUTTING IT ALL TOGETHER

The Host Companion for your operating system is a guide to the essential information you need to run the SAS System under your host. Like all good guides, the companion points the way to many other sources of information, such as the following:

- the Version 6 documentation set
- the SAS Notes
- the online help facility
- the Online Customer Support Facility
- the sample library
- the SUPPORT application
- and real people:
  - your SAS Software Representative
  - your SAS Software Consultant
  - SAS Institute Technical Support.

This paper introduces you to your new companion; it is our hope that you will quickly and easily become working partners on Version 6 of the SAS System.

ADDITIONAL SOURCES OF INFORMATION

You may find the following documentation helpful when you are using the SAS System under your host environment.

SAS Documentation

There are many SAS System publications available. To receive a free Publications Catalog, write to the following address: SAS Institute Inc., Book Sales Department, SAS Circle, Box 8000, Cary, NC 27512-8000.

The books listed below should help you find answers to questions you may have about the SAS System in general or specific aspects of the SAS System, such as SAS/FSP software.

- **SAS Companion for the CMS Environment, Version 6, First Edition**
- **SAS Companion for the MVS Environment, Version 6, First Edition**
- **SAS Companion for the VMS Environment, Version 6, First Edition**
- **SAS Introductory Guide, Third Edition (#A5685) gets you started if you are unfamiliar with the SAS System or any programming language.**
- **SAS Language and Procedures: Usage, Version 6, First Edition (#A56075) is a user's guide to the SAS System. It shows you how to use base SAS software for data analysis, report writing, and data manipulation. It also includes information on modes of execution and accessing SAS files.**
- **SAS Language: Reference, Version 6, First Edition**
- **SAS/FSP Software: Usage and Reference, Version 6, First Edition (#A56001) shows you how to use the FSBROWSE, FSEDIT, and FSVIEW procedures.**
- **SAS Technical Report P-195, Transporting SAS Files between Host Systems, Version 5 and Version 6 describes how to move SAS files from operating system to operating system, in the context of both Version 5 and Version 6 SAS files.**
- **SAS Guide to the SQL Procedure: Usage and Reference, Version 6, First Edition (#A56070) shows you how to use the SQL procedure, which implements the Structured Query Language on Version 6 of the SAS System. You can use the SQL procedure to join and manipulate SAS/ACCESS views and other SAS data sets.**
• SASjACCESS® Interface to SQL/DS: Usage and Reference, Version 6, First Edition (#A56063) explains how to create SAS/ACCESS descriptor files so that you can directly access data managed by SQL/DS. It gives examples of using descriptor files in SAS programs.


• SAS/CONNECT Software: Usage and Reference, Version 6, First Edition describes how to use SAS/CONNECT under CMS and other operating systems.

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