

**IBM System 36/38
Work Station Emulation
Program Version 1.0
User's Guide**

Office Systems Family

IBM





International Business Machines Corporation

Hwy 52 N.W. 37th Street
Rochester, Minnesota 55901

Order Number
SC21-8072-0

Part Number
72X6151

Printed in U.S.A.

First Edition (June 1987)

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Preface

This manual explains how to use an IBM PERSONAL SYSTEM/2™ with the IBM System 36/38 Work Station Emulation Program when attached to a IBM System/36 or IBM System/38 that supports the 5250 Information Display System.

This manual uses the following conventions:

- The IBM System 36/38 Work Station Emulation Program is referred to as the Emulation program.
- The *IBM System 36/38 Work Station Emulation Program Technical Reference* manual is referred to as the *Technical Reference*.
- The Work Station Emulation Adapter is referred to as the adapter.
- Host refers to the IBM System/36 or the IBM System/38.
- *IBM Personal System/2* refers to any or all of the family of IBM Personal System/2s: Models 50, 60, and 80.
- References to the IBM 5224 Printer are also valid for the IBM 5225 Printer.

The Emulation program allows you to emulate either the IBM 3196 or IBM 5292 Model 2 Display Station and the IBM 5219, 5224, 5225, and 5256 Printer functions, and to use the functions of your host. Graphics functions and a plotter are also supported. The Work Station Emulation Adapter and this program allow the IBM Personal System/2 to perform the function of up to four work stations at the same time on one twinaxial cable.

Work Station Emulation requires the IBM Personal Computer Disk Operating System (DOS), Version 3.3. Chapter 1, "Getting Ready for Work Station Emulation" describes hardware and software needs. Other chapters provide information to allow you to customize the Emulation program for your particular requirements.

Before using the Emulation program, you should have some knowledge of your IBM Personal System/2, including the IBM Personal Computer DOS, the IBM 5250 Information Display System, and your host system. This manual will not teach you how to use host functions.

A file labeled READ_ME.TXT, located on Program Diskette 1 of 2, contains supplemental information. Please display this file and read its contents. Follow these steps:

1. Load DOS, if necessary.
2. Insert the program diskette into the A: drive.
3. Change drives to the A: drive, if necessary.
4. Type MORE <READ_ME.TXT and press Enter.

Organization of This Manual

Chapters 1 and 2 are intended for the person responsible for planning and installing your IBM Personal System/2.

Chapters 3, 11, and 12 are intended for the person responsible for configuring the Emulation program.

Chapters 6 through 10, the appendixes, and the Glossary are intended for the person who will be using the IBM Personal System/2 to emulate display stations and printers after the IBM Personal System/2 is connected to a host.

The following is a summary of each chapter and appendix:

- Chapter 1, "Getting Ready for Work Station Emulation," gives information for the planning necessary to attach an IBM Personal System/2 to a host.
- Chapter 2, "Installing the Emulation Program," gives instructions for installing the Emulation program on the IBM Personal System/2.
- Chapter 3, "Configuring the Emulation Program," gives instructions for required configuration.
- Chapter 4, "Operating the Emulation Program," describes how to load the Emulation program on the IBM Personal System/2 and how to use the functions of the Emulation program.
- Chapter 5, "Using the Display Screens," describes the displays during emulation.
- Chapter 6, "Using the Keyboard," describes how the Enhanced keyboard emulates the IBM 5250 keyboards.
- Chapter 7, "Emulating an IBM 5219 Printer," describes the emulated control panel for the IBM 5219 Printer and shows how the IBM 5219 Printer is emulated on personal computer printers.
- Chapter 8, "Emulating an IBM 5224 Printer," describes the emulated control panels for the IBM 5224 Printer and shows how the IBM 5224 Printer is emulated on personal computer printers.

- Chapter 9, “Emulating an IBM 5256 Printer,” describes the emulated control panels for the IBM 5256 Printer and shows how the IBM 5256 Printer is emulated on personal computer printers.
- Chapter 10, “Using Graphics,” describes considerations for using graphics.
- Chapter 11, “Advanced Configuration,” explains the advanced configuration options.
- Chapter 12, “Keyboard Customization,” explains how to create customized keyboard files.
- Appendix A, “Handling Error Codes and Messages,” lists error messages with their accompanying causes and recoveries.
- Appendix B, “Problem Determination,” describes how to diagnose and correct problems that might occur during installation and operation.
- Appendix C, “Updating the Emulation Program,” describes how to update the Emulation program.
- Glossary.
- Index.

Related Publications

This is a list of publications that are referred to in this manual. The following manuals accompany the Emulation program package:

- *IBM System 36/38 Work Station Emulation Program User's Guide*, SC21-8072
- *IBM System 36/38 Work Station Emulation Keyboard Templates*, SX21-9882
- *IBM System 36/38 Work Station Emulation Adapter Quick Reference*, SA21-9861

The following manuals are available from your IBM representative or IBM direct:

- *IBM System 36/38 Work Station Emulation Program Technical Reference*, SC21-8068
- *IBM System 36/38 Work Station Emulation Adapter Hardware Maintenance and Service*, SY31-9053
- *IBM System 36/38 Work Station Emulation Adapter Technical Reference*, SA21-9862
- *IBM 3196 Display Station User's Guide*, GA18-2482
- *IBM 5250 Information Display System Planning and Site Preparation Guide*, GA21-9337
- *IBM 5250 Information Display System Functions Reference Manual*, SA21-9247

The coordinator for your IBM host system should also be able to supply a list of books for the host system. You should refer to this list for any additional books you may require.

You should have some knowledge of how to use your IBM Personal System/2, including the IBM Personal Computer DOS. Therefore, it is important that you read and understand the following manuals:

- *IBM Personal System/2 Quick Reference*
- *IBM Personal Computer Disk Operating System*

The person responsible for installing your IBM Personal System/2 needs to read the *Work Station Emulation Adapter Quick Reference* which is included with the emulation hardware. This person may also want to consult the *Technical Reference*.

The person responsible for running the more technical portion of the configuration program or modifying the host or local programs should become familiar with the *Technical Reference*.

Data Security

CAUTION

There is a potential data security risk if you assign identical addresses to multiple devices in the address search list. When using the address search list, the work station addresses can be automatically assigned to sessions on the IBM Personal System/2. If the IBM Personal System/2 or the host system has a failure, the IBM Personal System/2 user may get a different work station address assigned during recovery than was assigned prior to the failure. As a result, the user may be allowed access to another user's application after recovery.

To minimize the potential data security risk, you should do the following:

- If you write your own application program(s), the program should require each user to sign on with a security password before the host system will reestablish a session.
- If you use an application program that does not require a security password before reestablishing a session, you should always have the system operator do the following:
 - Cancel the job if either the IBM Personal System/2 or host system failure occurs during the session and the session is lost.
 - Cancel any spool writer job for a printer session, when applicable.

The Emulation program and adapter, in conjunction with an IBM Personal System/2, is a powerful and useful tool to help you with your personal and business information processing needs. As with any information system, inadvertent errors may occur and information may be misused. It is recommended that when processing sensitive or highly valuable information, you take steps to ensure that your data and programs are protected from accidental or unauthorized disclosure, modification, destruction, or misuse. Simple measures, such as removing diskettes when not in use, keeping backup copies of valuable information, or installing the equipment in a secure facility, can go a long way to maintain the integrity and privacy of your information.

Technical Assistance

Technical assistance questions should be directed to your IBM Marketing Representative or to your support personnel.

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Introduction

This chapter is intended for the person who does the planning for your host system and the attachment of IBM Personal System/2s to the host system.

The Emulation program enables the IBM Personal System/2 to emulate IBM 3196 and 5292 Model 2 (5292-2) Display Stations and IBM 5219, 5224, 5225, and 5256 Printers. The adapter and this program allow an IBM Personal System/2 to perform the functions of one to four work stations at the same time on one twinaxial cable. Each work station is addressed as a session. The work stations may be displays or printers. Any display session may be configured to provide graphics and plotter support. You can use only one plotter per session.

Each display session or printer session uses a unique work station address to the attached host.

A Hot Key function allows you to change sessions. Each time you use a Hot Key function, the session switches either to the next session (display, printer, or DOS) in a circular fashion (rotation) or directly to a specific session. The emulation sessions remain online while the IBM Personal System/2 is in the DOS session.

Warning: Do not attempt to attach your IBM Personal System/2 to a host system without the proper authorization and instructions from the person responsible for the host system.

Requirements for the Emulation Program

Host Computers

The minimum requirements for the host system include appropriate cables and connectors. The host computer can be either of the following:

- IBM System/36 (one of the following):
 - System Unit 5360
 - System Unit 5362
 - System Unit 5364
- IBM System/38 (one of the following):
 - System Unit 5381
 - System Unit 5382

The IBM Personal System/2 can also be connected to a host computer through the IBM 5294 Remote Work Station Controller.

This controller has eight device addresses and four twinaxial connectors available. If you are using all four emulation sessions on an IBM Personal System/2, you can attach two IBM Personal System/2 computers to this controller.

Software requirements include the following:

- If the IBM System/36, System Unit 5360 or 5362 is used, Release 5, Modification Level 1 or later of the System Support Program (5727-SS1)
- If the IBM System/36, System Unit 5364 is used, Release 5, Modification Level 1 or later of the System Support Program (5727-SS6)
- If the IBM System/38 is used, Release 8 or later of the Control Program Facility (5714-SS1)
- If graphics are being used, a graphics support package such as the *IBM System/36 Business Graphics Utilities (Program 5799-BNW)*

Requirements for IBM Personal System/2

The minimum requirements for an IBM Personal System/2 are:

- One IBM System 36/38 Work Station Emulation Adapter

Note: Each IBM Personal System/2 connected to the host using twinaxial cables must have the adapter.

- IBM Personal Computer DOS, Version 3.3
- If a printer session is to be used, one of the following printers is required:
 - IBM 5152 Graphics Printer (Model 002)
 - IBM 5216 Wheelprinter

Note: The 5216 requires a parallel or serial attachment interface to be installed on the printer before connecting it to an IBM Personal System/2.

- IBM 5201 Quietwriter
- IBM 5202 Quietwriter III
- IBM 4201 Proprinter
- IBM 4202 Proprinter XL
- IBM 3812 Pageprinter
- User-defined printer

If you want to use the IBM 3812 Pageprinter or the IBM 4202 Proprinter XL, you must configure for a user-defined printer and specify the printer function table (IBM3812.PFT or IBM4202.PFT on program diskette 2). See Chapter 3, "Configuring the Emulation Program" for information about configuring. See Chapter 4 in the *Technical Reference* for additional information about defining printers with a printer function table.

- If graphics support is used, one of the following plotters can be used during a graphics session:
 - IBM 7371 Plotter (two pen)
 - IBM 7372 Plotter (six pen)
 - IBM 6180 Plotter (eight pen)

Notes:

1. A plotter requires the use of an asynchronous communications adapter.
2. A plotter cannot be supported when both an asynchronous communications adapter and a synchronous data link control (SDLC) or binary synchronous communications (BSC) adapter are being used at the same time.

If you are using the graphics support functions, the following limitations are imposed in addition to the limitations imposed by the basic Emulation program functions.

- The same asynchronous communications adapter may not be used in a DOS session while the graphics functions are being used to plot a chart in another session.
 - The printer cannot be used to support the graphics feature. Graphics orders are responded to as though a printer is not attached.
 - Interrupt vector hex 59 is reserved for Virtual Device Interface (VDI) routines.
- Memory requirements:

A minimum of 128K of memory is needed to load display or printer emulation.

Figure 1-1 on page 1-6 shows the specific use of memory for loading, initializing, and running Emulation program functions. The final column shows how much memory is released to the IBM Personal System/2.

Notes:

1. The Emulation program requires 100K at startup time. After initialization is complete, approximately 64K will be resident, regardless of the number of active sessions. Graphic sessions require additional memory.

2. Memory requirements for graphics support do not include the VDI buffer space. See “VDI Buffer Size” on page 11-11 for more information.
3. Memory requirements for DOS are in addition to any other memory or application requirements. Refer to the appropriate manuals for the memory requirements of DOS and the application programs you plan to use.

Function	Load	Initialize	Run	Memory Usage
DOS 3.3	56K	N/A	50K	See DOS 3.3 manuals
Function Control program	50K	N/A	50K	50K after execution
Configuration program	170K	N/A	101K	101K after execution
Graphics configuration program	256K	N/A	70K	70K after execution
4 monochrome display sessions	128K	90K	51K	39K after initialization
4 color display sessions	128K	90K	51K	39K after initialization
1 color graphics session	230K	100K	86K 7K 20-64K 50K	Session buffer VDI buffer Function Control program in DOS session
Each additional color graphics session			7K 20-64K	Session buffer VDI buffer

Figure 1-1. Emulation Program Memory Usage

Emulation Program Components

The IBM System 36/38 Work Station Emulation Program package includes this *User's Guide* and the following items:

- IBM System 36/38 Work Station Emulation Program with Graphics Support Licensed Program Diskettes
- *IBM System 36/38 Work Station Emulation Program Keyboard Templates*
- Proof of License
- *IBM System 36/38 Work Station Emulation Adapter Quick Reference* and diagnostic diskette
- IBM System 36/38 Work Station Emulation Adapter
- Integrated Cable Assembly

Planning for the Installation

The attachment of an IBM Personal System/2 to a host requires careful planning. This planning includes decisions about how and where the IBM Personal System/2 is to be connected. The person who is responsible for the physical planning of the host should also be involved in the planning for the installation of the IBM Personal System/2, adapter, and Emulation program.

Attaching to a Host System

Following are rules you must follow when attaching an IBM Personal System/2 to a host.

- Up to seven work stations can be connected in series on a local work station line.

Notes:

1. Each IBM Personal System/2 must have a work station address for each session that it uses. Each address used by a display session or a printer session counts as one of the work stations allowed on a work station line.
 2. The IBM System/36, System Unit 5364 supports six local work stations and attached personal computer printers. With memory expansion installed in the 5364, up to 16 work stations can be supported.
- When attaching a work station to the line, there must be at least one meter (3.3 feet) between any of the following:
 - Two T-connectors
 - Two Integrated Cable Assemblies
 - A T-connector and an Integrated Cable Assembly
 - Any work station line can have a maximum of 11 junctions. Each display, printer, IBM Personal System/2, cable splice, or station protector is a junction.
 - If the last work station on a line (other than an IBM Personal System/2) does not have the Cable Thru feature, it must remain the last work station on that line. You cannot add an IBM Personal System/2 to the end of that line.
 - The maximum cabling distance between the host and the last work station or IBM Personal System/2 on the twinaxial cable is 1525 meters (5000 feet).

Configuring the Host for the Emulation Program

When you configure the host for the Emulation program, enter the following device codes:

Type of Emulation	Device Code
Display	PC emulating 3196
Graphics	5292-2
Printer	Any combination of 5219, 5224, 5225, or 5256

Planning for Implementation

Considerations for Using DOS and Application Programs

The Emulation program runs under DOS, Version 3.3.

Warning: The Emulation program should only be used with the IBM Personal Computer DOS. Any use of an IBM Personal System/2 without DOS, any modification to the IBM Personal Computer DOS by the user or by any DOS extension software may cause unpredictable results.

Note: The memory requirements for the IBM Personal System/2 must be considered to ensure that the Emulation program and any application programs can run at the same time. See "Requirements for the Emulation Program" on page 1-3, for memory requirements.

The Emulation program works with most IBM Personal Computer application programs. However, some programs, such as one that overlays the Emulation program, are not compatible.



Chapter 2. Installing the Emulation Program

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Introduction

This chapter explains how to install the Emulation program from the program diskettes to the IBM Personal System/2 hard disk. Installation includes these basic steps:

1. Backing up the program diskettes.
2. Selecting the files necessary for your configuration.
3. Installing a new codepage (optional).
4. Installing the emulation files.
5. Installing graphics if you plan to use Host Graphics Support (HGS).

Backing Up the Program Diskettes

It is recommended that you create a backup copy of the program diskettes. Use the backup copies for all work.

The DISKCOPY program prompts you to insert source and target diskettes. *Source* diskettes are the program diskettes, and *target* diskettes are the backup diskettes. You can use formatted or unformatted diskettes. The DISKCOPY command will format the diskette, if necessary.

Backing Up with Two Diskette Drives

If the IBM Personal System/2 has two diskette drives, use this procedure to back up:

1. Insert the first program diskette into the A: drive. Insert a backup diskette into the B: drive.
2. Type `DISKCOPY A: B:` and press Enter. The program diskette is copied to the backup diskette. You are then prompted to copy another diskette.
3. Remove the diskettes and label the backup diskette.
4. Repeat these steps for the second program diskette.
5. Store the program diskettes in a safe place.

Backing Up with One Diskette Drive

If the IBM Personal System/2 has one diskette drive, use this procedure to back up:

1. Insert the first program diskette into the drive.
2. Type `DISKCOPY A: A:` and press Enter. The program prompts you to insert a diskette.
3. Remove the program diskette from the drive, and insert the backup diskette, as prompted.
4. Remove the diskettes and label the backup diskette.
5. Repeat these steps for the second diskette.
6. Store the program diskettes in a safe place.

Selecting the Emulation Program Files

The program diskettes include all files necessary for any configuration of displays, printers, and graphics use. You need to copy only those files appropriate for your system.

Note: Do not use a DOS editor to edit the Emulation program files. You should only use the configuration program to edit these files.

Required Files

The following files are required for emulation. These files are on the first diskette.

WSE.COM	WSEHLP.MRI
WSEBOOT.LEX	WSEHLP.CTL
WSECARD.LEX	WSEMAST.KBD
WSECNFG.LEX	WSEPAN.CTL
WSEEMD.BAT	WSEPAN.MRI
WSEE2A.TBL	WSEPATCH.COM
WSEFCP.LEX	WSETSF.LEX

Graphics Files

The following files are required for HGS. These files are on the first diskette.

CONFIG.SYS	WSEGHLP.MRI
INIT_VDI.EXE	WSEGPAN.CTL
WSEEMG.BAT	WSEGPAN.MRI
WSEGCNFG.LEX	WSEGRAPH.LEX
WSEGHLP.CTL	WSEVDI.LEX

VDI Files

The following file is required for HGS. This file is on the second program diskette.

VDI.SYS

From the following table, select the VDI device driver for the type of graphics display you want to use. These files are on the second diskette.

VDI Device Driver	# of Colors or Shades	Resolution	CPL
VDIDY011.SYS	2	640 by 480	80
VDIDY012.SYS	16	640 by 480	80
VDIDY013.SYS	16 or 256 (see Note)	320 by 200	40
VDIDYAF1.SYS	16 or 256 (see Note)	640 by 480	80
VDIDYAF2.SYS	16 or 256 (see Note)	1024 by 768	80
Note: The number of colors depends on the type of hardware adapter in the IBM Personal System/2. See your hardware reference for more information.			

Figure 2-1. VDI Files

Printer Function Table Files

The following files are required for printer function table support. These files are on the second diskette.

DEFAULT.PFT	PFTx0100.PG1
IBM3812.PFT	PFTSETUP.COM
IBM4202.PFT	PFTWS.PRN
PFTx0100.HLP	IBM5202.PFT

Note: x indicates a country-dependent file. This character will be different for each language supported.

Sample Emulation Program Utilities

The Emulation program includes the utilities described below. These files, located on the second diskette, are optional.

- WSEUL.BAS** This program is an example for transmitting files from the IBM Personal System/2 to the host.
- WSESS.BAS** This program copies the contents of the emulation session screen to a diskette file without displaying the screen as it copies.
- WSESS2.BAS** This program copies the contents of the emulation session screen to a diskette file, displaying the screen as it copies.
- WSESUBS.BAS** This subroutine checks if the Emulation program is loaded and initializes access pointers into the Emulation data segment.
- WSEASO.BAS** This sample program allows you to sign on automatically to the host from a BASIC application program.
- WSESVD.BAS** This program selects the drive name to be used with a virtual diskette in conjunction with the File Support Utility, PRPQ.

Installing a New Codepage

A codepage is a set of displayable characters assigned to the 256 ASCII code points. You can change the codepage you use with the Emulation program when you install it.

Following are considerations for changing the codepage:

- Codepage 437 is the personal computer ASCII codepage. 850 is the multi-language codepage. Other national language countries use other codepages, such as Portuguese (860) or Canadian French (863).
- The Emulation program defaults to codepage 437.
- If you need to use any other codepage, include the MNL parameter when you run the install program (explained in “Installing the Emulation Files” on page 2-7).
- You must use the same codepage as DOS. (See your DOS manuals for instructions on changing the DOS codepage.)
- All sessions use the same codepage. To switch the active codepage, see the instructions in Appendix D, “Changing the Codepage.”
- If you are using PC Support/36, you must use the 437 codepage.
- If you use a printer session with a codepage other than 437, you must download the proper fonts and define the proper printer initialization string for the printer.

Appendix A in the *Technical Reference* lists all codepage character sets.

Installing the Emulation Files

The Install program builds the emulation directory, \WSE, and then copies the files. You indicate which files you need with these parameters:

G driver.SYS

Copies the files for HGS. Enter the VDI device driver you selected from Figure 2-1 for *driver.SYS*.

P Copies the files necessary for using printer function tables.

A Copies the sample Emulation program utilities.

MNL Copies the files necessary for using the multi-language codepage. This is the same as installing the 850 codepage. See "Installing a New Codepage" on page 2-6 for information about codepages.

You can include any combination of these parameters. If you do not include any, the Install program copies only those files necessary for basic display and printer emulation.

The following procedure assumes you are using the first hard disk (C:). If you have more than one, you can change drives to another drive specification such as D: or E:.

1. Change the default drive to the hard disk where you want to store the emulation files. At the DOS prompt type C: and press Enter.
2. Insert the first program diskette into the A: drive.
3. Type A: INSTALL followed by the desired parameters. The Install program copies the indicated files. If you requested files from the second diskette, the program prompts you to insert it.
4. Remove the diskettes and store them in a safe place.

Installing Graphics

If you do not plan to use HGS, proceed with "Ending Installation" on page 2-9.

If you will be using HGS, you need to edit two system files, CONFIG.SYS and AUTOEXEC.BAT. If you have already created these files, you need to include additional information for graphics support. If not, you need to create them. Or, you can use the CONFIG.SYS file the install program copied to the emulation directory and create only AUTOEXEC.BAT. These files must be in the root directory (\).

Use any DOS editor (such as EDLIN or Personal Editor) to create or edit these files.

Editing CONFIG.SYS

The CONFIG.SYS file must contain two commands:

```
DEVICE=c:\WSE\driver.SYS
DEVICE=c:\WSE\VDI.SYS
```

where *driver.SYS* is the graphics driver you selected from Figure 2-1. For example, if you want to use 16 colors with 640 by 480 resolution, include the following lines in CONFIG.SYS:

```
DEVICE=c:\WSE\VDIDY012.SYS
DEVICE=c:\WSE\VDI.SYS
```

Editing AUTOEXEC.BAT

You must include the following command in the AUTOEXEC.BAT file:

```
INIT_VDI
```

If you include the command to run the Emulation program in the AUTOEXEC.BAT file, it must follow INIT_VDI.

For example, include the following lines to run the Emulation program with graphics support:

```
INIT_VDI  
WSE M=master.dat
```

where *master.dat* is the name of the master profile. You can include other commands in AUTOEXEC.BAT. See "Loading from AUTOEXEC.BAT" on page 4-4 for examples.

Ending Installation

The following steps assist you in ensuring that you installed correctly.

1. Check the contents of the emulation directory. At the DOS prompt, type `DIR \WSE` and press Enter. Check that all files you selected are in the directory.
2. If you installed graphics, you must reset the IBM Personal System/2 to reload DOS. Press the Alternate, Control, and Delete key sequence.

When you have completed installation, continue with Chapter 3, "Configuring the Emulation Program."



Chapter 3. Configuring the Emulation Program

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Introduction

Before you can use the Emulation program with an IBM Personal System/2, you must perform the required configuration: creating one master profile and a session profile for each session you will run.

Chapter 11, "Advanced Configuration" explains the advanced configuration options.

This introductory section contains information you should understand before you begin, including the purpose of the emulation profiles and work station addresses. You should then complete the "Configuration Program Checklist" on page 3-6, before you run the program.

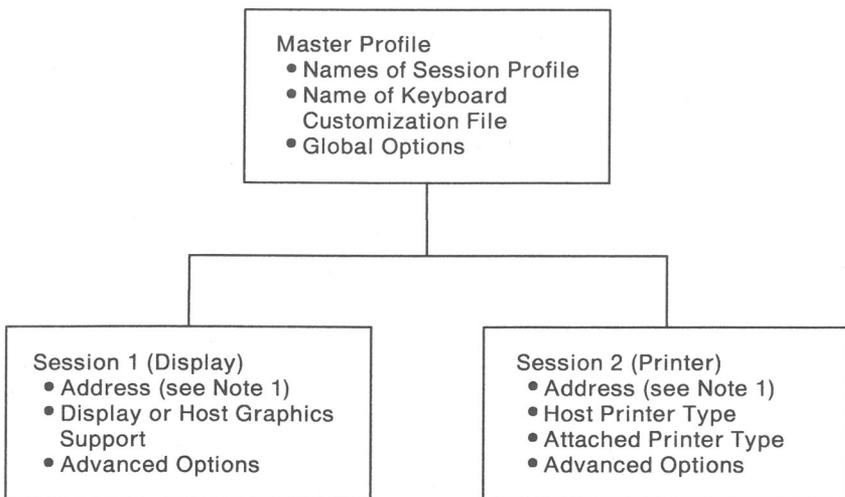
Emulation Profiles

Each work station session is like a separate terminal attached to the host system. An IBM Personal System/2 with four sessions gives you the capabilities of four separate devices attached to the host. Since four separate pieces of hardware do not exist, you must describe the type of hardware each session emulates.

Profiles tell the Emulation program the types of sessions that will be run. The Emulation program requires one master profile for an IBM Personal System/2 and a session profile for each session to be used.

The configuration program allows you to create the profiles and saves them on an IBM Personal System/2 disk(ette). The profiles are read from the disk during the Emulation program load procedure. The information is used by the Emulation program to configure the IBM Personal System/2 before executing the program.

The following diagram shows the relationship of master and session profiles.



Configuration Profiles for Two Sessions

RB4F002

Notes:

1. The station address is the only field required. All other fields have default values.
2. User-defined printers require a printer function table. See the *Technical Reference* for information.

Master Profile

The Emulation program uses one master profile for an IBM Personal System/2. This profile contains the following information:

- The name of a keyboard file.

A keyboard file describes an emulated keyboard layout. You may choose the default keyboard definitions provided with the configuration program, or customize your own. See Chapter 12, "Keyboard Customization" for assistance in assigning your own character and function keys.

- A list of the session profiles you will use.
- Global options that apply to all sessions, such as the automatic dimming feature.

Session Profiles

Session profiles contain information describing each session, including the station address and other optional information. This allows sessions to be independent of each other. For example, you can set the background color of session 1 to black and the background color of session 2 to blue, to help you easily distinguish sessions.

Printer Sessions: You must provide the following information to configure a printer session:

- Type of host printer to emulate
- Type of printer attached to the IBM Personal System/2

Type of Host Printer: Select the IBM 5256 Matrix Printer for data processing work. Select the IBM 5224 Printer if you want the host to control lines per inch and characters per inch. Select the IBM 5219 Printer for word processing.

Type of Personal Computer Printer: The following figure shows the personal computer printers that are supported by the Emulation program for each of the host printers being emulated.

IBM 5224	IBM 5219	IBM 5256	Personal Computer Printer
Yes	No	Yes	IBM 4201 Proprinter
Yes	Yes	Yes	IBM 5201 Quietwriter
Yes	Yes	Yes	IBM 5216 Wheelprinter
Yes	No	Yes	IBM 5152 Graphics Printer Model 002
Yes	No	Yes	IBM 4202 Proprinter XL
Yes	Yes	Yes	IBM 3812 Pageprinter
Yes	Yes	Yes	User-defined printer

If you want to use an IBM 3812 Pageprinter, 4202 Proprinter XL, or a printer not supported by the Emulation program, you include a printer function table (IBM3812.PFT, IBM4202.PFT, DEFAULT.PFT) in the printer session profile. The Printer Function Table Setup program allows you to create and modify these tables. See Chapter 4 in the *Technical Reference* for more information.

Addressing Work Stations

The only information you must enter when configuring is the station address. The configuration program provides defaults for all other information.

Station addresses identify the location of devices to the host. A device can be either a display or a printer. The host does not allow displays and printers to share the same address. The host must define an address as either a display or a printer.

There are seven addresses on the cable that attaches the IBM Personal System/2 to the host. During configuration you assign an address for each session. (An advanced configuration option allows you to define an address list with up to six other addresses for one session. See "Station Address List" on page 11-5 for more information.)

The host system planner must provide you with a list of 1 to 7 work station addresses and the type of device (display or printer) for which each address is configured.

The Configuration Program Checklist

The following checklist may be copied to assist you in planning or to record the entries as you configure. The tables provide information that closely follows the screens presented to you in the configuration program.

You do not have to create names for the master and session profiles. The configuration program provides default names for all profiles. You can use the default names and record them on the checklist as you execute the configuration program, or you can assign your own names.

The checklist is divided into sections for host information and IBM Personal System/2 information. The host personnel must provide the information about how the host is configured for sessions. You provide the IBM Personal System/2 information, based on its hardware configuration.

Host Information

The host personnel must provide this information:

Session	1	2	3	4
Station address				
Session type: Display Printer				

Master Profile Information

For the master profile, you provide the following information:

Option	Possible Choices	Your Choice
Master profile name	MASTER.DAT User-defined	
Keyboard style	Enhanced Create your own	

Chapter 12, "Keyboard Customization" explains how to create your own keyboard file.

Session Profile

The following information is needed for session profiles.

Option	Possible Choices	1	2	3	4
Session name	SESA.DAT SESB.DAT SESC.DAT SESD.DAT User-defined				

Display Session: For a display session, you must select a display type:

Option	Possible Choices	1	2	3	4
Display type	Standard Graphics Graphics with a plotter				

Printer Session: If the session is a printer, you must specify the type of host printer to emulate, the type of printer attached to the IBM Personal System/2, which port the attached printer uses, and communications information.

Option	Possible Choices	1	2	3	4
Host printer	5256 Printer 5219 Printer 5224 Printer				
Attached printer	Proprinter Quietwriter Wheelprinter Graphics Printer User-defined				
Async port name	COM1 COM2 COM3 COM4				
Parallel port name	LPT1 LPT2 LPT3 LPT4				
Baud rate	110 to 9600				
Number of data bits	7 8				
Number of stop bits	1 2				
Use of parity bit	None Odd Even				

Graphics Session with Plotter: If you selected a graphics session with an attached plotter, you must specify the following:

Option	Possible Choices	1	2	3	4
Plotter address	00 to 30 (see Note 1)				
Async port name	COM1 COM2 COM3 COM4				
Baud rate	110 to 9600				
Number of data bits	7 8				
Number of stop bits	1 2				
Use of parity bit	None Odd Even				
Plotter type (see Note 2)	7371/6180 7372 six-pen				

Notes:

1. Plotter address 00 is reserved and must not be used.
2. The 7371 is a two-pen plotter. The 6180 is an eight-pen plotter, but is supported by the host as a 7371 with six of the eight pens accessible.

See "Configuring for Host Graphics" on page 11-10 for instructions on additional configuration of graphics.

Using the Configuration Menus

There are three types of panels in the configuration program:

- Menu Panels list options for you to select from. For example:

```
Select a keyboard layout
>1. Default keyboard layout
 2. Create your own keyboard customization file
 3. Use an existing keyboard customization file
```

The > symbol points to the currently selected option. The option is displayed in reverse image. To select a menu item, point to an option with the cursor movement keys and press Enter, or type the number preceding the menu option.

- Entry Panels ask you to type information into a field without a list to choose from. For example:

```
Enter a master Profile name
[MASTER.DAT          ]
```

In this example, you type the master profile name in an entry panel.

Note that in most fields in which you type your choice, the configuration program provides a default value.

- Selection Panels allow you to select one item from a list of possible settings for a given option. These panels are presented in one of two ways:

1. Option with entry field and list of possible choices. For example:

```
                Choice    Possible Choices
Column Separator .... [ ]    any character
```

In this example, the possible choices for the entry field for column separator are any character. You type the character you want to separate columns in the Choice field.

2. Option with two choices. For example:

```
Monitor Type ..... >color
                    monochrome
```

In this example, you must indicate if the monitor is color or monochrome. The > symbol points to the default. To select a value:

1. Use the cursor movement keys to highlight the desired value (it appears in reverse image).
2. Press the Spacebar. The > symbol moves to the highlighted value, indicating that it is the selected value.

Function Keys

You can use the following function keys with the configuration menus:

- Enter** Saves values on the current panel; displays the next panel.
- Esc** Quits this function without saving changes.
- F1** Displays help text explaining the item at the cursor.
- Ctrl-F2** Quits without saving changes; displays the previous panel.

Help Text

Help text is provided for every panel in the configuration program. It contains information not included in this manual. When you press F1, help text appears which describes the item you are pointing to. You can scroll through the help text to view information about the entire panel.

- Press PgDn or PgUp to see the next or previous page of help text.
- Press the cursor movement keys to scroll through the help text one line at a time.
- Press Esc to remove the help text.

Configuring for Emulation

Configuring involves three basic steps:

1. Starting the program and creating the master profile
2. Creating and saving a profile for each session
3. Saving the master profile

The only information you must provide is a station address for each session. The configuration program provides default values for all other options, features, and file names.

You can configure an IBM Personal System/2 for emulation before the adapter is installed. You do not need to wait until the IBM Personal System/2 is connected to the host.

Starting the Configuration Program

Use this procedure to start the configuration program and create the master profile.

Note: The files WSEE2A.TBL, WSEMAST.KBD, WSEPAN.MRI, WSEPAN.CTL, WSEHLP.MRI, and WSEHLP.CTL must be in the emulation directory when the configuration program is executed.

1. Type `CHDIR \WSE` and press Enter to change the directory to the emulation directory.
2. Type `WSE` and press Enter. The WSE main menu appears. The configuration program is an option on this menu.
3. Select the option, *Configure a session*. The configuration program menu appears.
4. Select the option to create a master profile. (Use the second option if you need to make changes to a master profile you have created.)
5. The program prompts you to enter the name of the master profile. Press Enter to accept the default name. Or, you can type the master profile name and press Enter.
6. Select the default (Enhanced) keyboard for keyboard type. (If you want to use a customized keyboard layout, refer to Chapter 12, "Keyboard Customization.")

Creating Session Profiles

After you create the master profile, you create session profiles for each session. The only information you must enter is the station address. However, if you are using printers or host graphics support (HGS), you must enter additional information. Use this procedure:

1. Select the option to create a session profile.
2. The program prompts you to enter the name of the session profile. Press Enter to accept the default name. Or, type the master profile name and press Enter.

3. The screen that appears contains defaults for all information except the station address. You must supply the station address. (See host personnel for station addresses.) Select the option, *Station Address*. Type the station address and press Enter.
4. Select the type of session. The session profile defaults to a standard display session. If the session is for a standard display (without HGS), continue with step 5.

If you plan to use HGS, execute these steps:

- Select the session type option.
- Select the display option.
- Indicate if you will be using a plotter with HGS.

If you are configuring a printer session, execute these steps:

- Choose the session type option.
 - Indicate the host printer you want this session to emulate.
 - Indicate the printer type attached to the IBM Personal System/2.
5. Select the option to save the session profile. If you want to use the default session name, press Enter. The program allows you again to change the profile name. Press Enter to continue.

If you do not want to use the default session profile name, type a session name and press Enter. Include the drive and \WSE directory.

6. The program asks if you want to add the session to the master profile. Select yes to add the session to the master profile.
7. Enter the session number. Or, press Enter to accept the default session number.
8. Press Esc to exit the panel.
9. Repeat these steps to create profiles for each session you will use. Then, continue with "Saving the Master Profile" on page 3-15.

The configuration program automatically creates sequential names for the session profiles (SESA.DAT through SESD.DAT) and session numbers for the default values.

Saving the Master Profile

After you create the profiles for each session, you save the master profile and exit the program. Use this procedure:

1. Select the option to save the master profile. A message appears stating that the master profile has been saved.
2. Select the option to exit the configuration program.



Chapter 4. Operating the Emulation Program

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Introduction

Chapters 4 through 10 are intended for the person who is using an IBM Personal System/2 with the Emulation program. This chapter explains how to load and operate the Emulation program. Chapters 5 and 6 explain how to use the display screen and keyboard. Chapters 7, 8, and 9 explain how to emulate host printers. Chapter 10 explains how to use a graphics session.

Make sure all devices attached to the IBM Personal System/2 system unit are turned on before loading the Emulation program. The READ_ME.TXT file contains additional information. See the "Preface" for help in accessing this file.

Loading the Emulation Program

Before you can begin, you must load DOS. Refer to the appropriate DOS manuals for instructions. You must also have created profiles with the configuration program.

After you load DOS, you start the WSE Function Control program.

Starting the WSE Function Control Program

You can start the Emulation program with or without starting sessions. You can also load it automatically from a batch file.

During installation, you copied the Emulation program and data files into the emulation directory (\WSE). Change the current directory to this directory with the CHDIR command.

Note: The files WSEPAN.MRI, WSEPAN.CTL, WSEHLP.MRI, and WSEHLP.CTL must be in the emulation directory when you load the Function Control program.

Starting Sessions

If you want to start all sessions listed in a master profile, type the following command at the DOS prompt, and press Enter:

```
WSE M=filename
```

where *filename* is the file name of the master profile. This will start the Emulation program, start all of the sessions specified in the master profile, and display the first session (unless you chose the configuration option, *Automatic Hot Key to DOS*). Select this option if you are ready to begin using sessions (you have configured, you want to use all sessions in the master profile, and you are not using graphics).

You can include the optional service keyboard parameter with this command:

```
WSE M=filename /s
```

This will override any keyboard customization file specified in the master profile with the default Enhanced keyboard file. (This option is provided primarily for service personnel who want to run the Emulation program with a known keyboard layout.)

Starting the WSE Function Control Program Only

If you do not want to start all sessions, type `WSE` at the DOS prompt and press Enter.

This will start the WSE Function Control program and display the WSE main menu without starting any sessions. From this menu, you can start sessions. Use this option if you need to use options from this menu such as configuring, starting individual sessions not in the master profile, and using graphics. See "The WSE Function Control Program" on page 4-7 for more information.

```
WSE Function Control Program
-----
Select an option
> 1. Start a session
   2. Stop a session
   3. Configure a session
   4. Update the Emulation program
   5. Terminate the Emulation program
   6. Enable host graphics support
   7. Exit
-----
Enter   Esc=Quit
```

Figure 4-1. The WSE Main Menu

Loading from AUTOEXEC.BAT

You can load the WSE Function Control program from the AUTOEXEC.BAT file. (If you installed graphics, you have already created or edited this file.) If you want to run the Emulation program from AUTOEXEC.BAT, you must include the command to change the current directory to the emulation directory (CHDIR \WSE). Then enter the WSE Function Control program command.

The following is an example of an AUTOEXEC.BAT file supporting graphics. On the WSE line, *filename* is the name of a master profile.

```
INIT_VDI
CHDIR \WSE
WSE M=filename
application program name
```

This sequence initializes the VDI interface, changes to the emulation directory, loads the WSE Function Control program, and brings the host online without further operator involvement. The presign-on screen appears (unless you configured to bypass it). A personal computer application program is then loaded automatically.

Notes:

1. You must include the `M=filename` parameter on the WSE command line when you load from a batch file. Otherwise, the WSE main menu will appear and interrupt the batch processing.
2. This AUTOEXEC.BAT file assumes that you configured the automatic Hot Key option. See "More Display Options" on page 11-6 for instructions.
3. INIT_VDI is required in the AUTOEXEC.BAT for graphics support. You must run INIT_VDI to initialize the VDI device drivers before you can run graphics.

Loading with PC Support/36

If you are using the PC Support/36 installation program to load the WSE Function Control program, you must perform the following steps:

1. Select the *Other* option when the program prompts you for the emulation program.
2. When prompted for the program name, enter this command:
`WSE M=filename`

where *filename* is the name of the master profile.

Note: You must include the `M=filename` parameter on the WSE command line when you load from the PC Support/36 installation program. Otherwise, the WSE main menu will appear and interrupt the processing.

Activating Sessions

After you load the Emulation program, the presign-on screen appears; however, the IBM Personal System/2 is not yet online with the host. The presign-on screen identifies the program and the engineering change level and displays the copyright notice.

The Emulation program attempts to communicate with the host using the addresses in the profile. The message *Waiting for System Available* is displayed while the activity is in progress. After the IBM Personal System/2 comes online with the host, an alarm sounds. Press Enter. The presign-on screen is replaced with a host screen. The keyboard is now in emulation mode and is defined by the keyboard file.

Notes:

1. If a fixed-function terminal (such as the 5291, 5251, or 5292-1) is turned on and its address is already in use, the device using this address has its session interrupted and the work station starting up is unable to establish its session (address contention).
2. If the Emulation program is loaded within an 8-second period on more than one IBM Personal System/2 using the same work station address, the host (or controller) may quit talking to both devices. If this occurs, reload the Emulation program on the first IBM Personal System/2, wait at least 8 seconds, then load the Emulation program in the second.

If an error is detected by the host during online operation, a 4-digit error code appears at the beginning of line 24. Refer to Appendix A, "Handling Error Codes and Messages," for descriptions of error codes. Errors not defined there may be found in Appendix B, "Problem Determination."

When you have successfully loaded the Emulation program, the IBM Personal System/2 emulates the devices specified in the session profiles. To support hosts and controllers using the auto-configuration feature, the Emulation program must be loaded and brought online before the host or controller is turned on. You must ensure that every IBM Personal System/2 on the work station line has a unique work station address for every session. When the *System Not Available* message appears, select the *Ignore* option (3).

Signing On to the Host

If the adapter is operational, and contact has been established with the host, the System Available indicator comes ON, and either the cursor appears in the upper left corner of the display or a sign-on screen appears. Otherwise an error message appears on the presign-on screen (see Appendix A, "Handling Error Codes and Messages" for further information).

If contact has not been made with the host, the System Available indicator is OFF and the cursor is in the upper right corner of the display.

You may need a password to sign on to the host system. See the person with the appropriate host system authority.

The WSE Function Control Program

The WSE Function Control program is a menu-driven program that allows you to access Emulation program functions. These functions include the following:

- Start a session
- Stop a session
- Configure a session
- Graphics configuration
- Update the Emulation program
- Terminate the Emulation program (if active)
- Enable Host Graphics Support
- Exit

This section explains how to start and stop sessions, terminate the Emulation program, and exit. For information on the other options, see Chapter 3, "Configuring the Emulation Program," Chapter 11, "Advanced Configuration," Appendix C, "Updating the Emulation Program," and Chapter 10, "Using Graphics."

If you load the Emulation program without specifying the name of the master profile, the WSE main menu appears immediately. If you load the Emulation program with a master profile name, execute these steps to display the menu:

1. Use the Hot Key function to switch to the DOS session.
2. Type `CHDIR \WSE` and press Enter to change to the emulation directory (if necessary).
3. At the DOS prompt, type `WSE` and press Enter.

Note to service personnel: You can press Ctrl-F3 from the WSE main menu to display the Field Support Facility menu.

Starting Sessions

The Start a Session screen allows you to start sessions that were not started when the Emulation program was loaded, sessions that are not listed in the master profile, or sessions that have been stopped.

1. Select the option, *Start a session*, from the WSE main menu. If the Emulation program is active, a screen appears that prompts you to identify the session. This screen also lists the name and number of active sessions. You can only start a session that is not active.

If the Emulation program is not active, a prompt for the master profile name appears. When you enter the master profile name, the Emulation program will load and start all sessions in the master profile.

2. Type the session number, address (optional), and profile name in the entry fields, then press Enter.

Note: Specifying an address will override any address in the session profile.

Stopping a Session

The Stop a Session screen allows you to stop individual sessions.

Note: Always sign off from the host before you stop a session. This avoids the possibility of errors being logged at the host.

1. Select the option, *Stop a session*, from the WSE main menu. A screen appears that prompts you to identify the session.
2. Type the number of the session you want to stop and press Enter.

Terminating the Emulation Program

The *Terminate the Emulation program* option allows you to stop all sessions and clear the Emulation program from the IBM Personal System/2 memory (the Emulation program will remove itself from memory if it can safely). After you terminate, use the *Exit* option to display the DOS prompt.

Exiting the WSE Function Control Program

The *Exit* option clears the menu from the screen and displays the DOS prompt. If you want to display the menu again, type WSE at the DOS prompt and press Enter.

Printing the Screen During Emulation Mode

You can print the information displayed on the screen at the host printer or at a personal computer printer.

Printing on a Host System Printer

Press the emulated Print key to send a print request to the host. The screen is printed or spooled by the host.

Printing on a Personal Computer Printer

Press the emulated PrtSc key to print the screen on a personal computer printer.

If you are running a printer session, and want to print the screen on the same personal computer printer, use the Hot Key function to switch to the session and suspend it. (The *Suspend* option is explained in the printer emulation chapters.) If you are running a DOS print job, wait until the job finishes before you print the screen.

Codes above hex 20 are translated according to the EBCDIC-to-ASCII translation table. See Appendix A in the *Technical Reference* for these tables. EBCDIC codes below hex 20 are not translated, but are sent to the printer *as is*. See the instructions for your printer to determine the action taken as a result of these codes.

Notes:

1. You cannot print graphics data while in a graphics session. However, you can use the emulated PrtSc key to print alphanumeric information.
2. You can change the print screen character set if you are printing a DOS graphics screen. See "Print Screen Character Set" on page 11-6 for more information.

Switching Sessions

The Hot Key function allows you to change emulation sessions or switch to the DOS session. The emulated work station will remain online and the Emulation program continues to run; however, the IBM Personal System/2 displays the requested session. To leave the DOS session, use the Hot Key function. Any application program running in the DOS session is suspended until you use the Hot Key function to return to the session. See "Hot Key" on page 6-5 for instructions on entering the Hot Key function.

Notes:

1. Some personal computer programs do not allow interruptions. In this case, you should let the program run to completion before switching to an emulation session.
2. By customizing the Hot Key function you can switch directly to a particular session (see "Assigning a Single Function to a Key" on page 12-6 for instructions). Customized Hot Key functions are not available for use in the DOS session.
3. Host-issued commands that cause the IBM Personal System/2 to beep while the Emulation program is online with the host also cause a beep in the DOS session. This allows the host to notify you of a message or other event when you are not in an emulation session.

Exiting Emulation Sessions

You have these options for exiting an emulation session:

- Stop the session with the *Stop a Session* option from the WSE main menu. See "Stopping a Session" on page 4-9.
- Terminate all sessions with the *Terminate* option on the WSE main menu. See "Terminating the Emulation Program" on page 4-9.
- Use the Hot Key function to switch to another session. See "Switching Sessions" above.



Chapter 5. Using the Display Screens

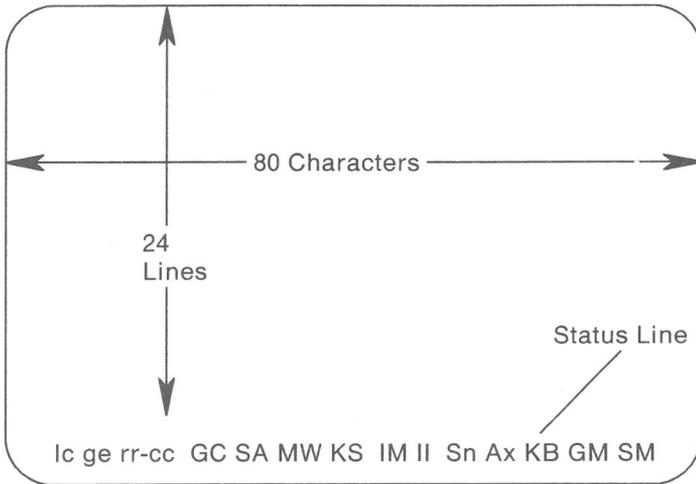
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Introduction

This chapter describes the display in emulation mode, including the screen layout, the status indicators, and highlighting.

The Screen Layout

The 25-line display in emulation mode displays 24 lines of data. Line 25 is the status line and displays the status of the host and the IBM Personal System/2.



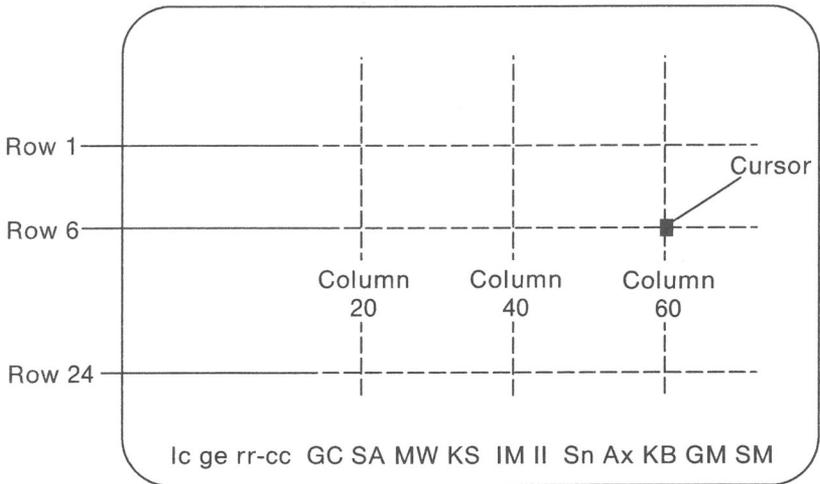
RB3L021

Figure 5-1. The Emulated Display Screen

Note: You can save the information from any session screen on a diskette. See "Sample Emulation Program Utilities" on page 2-5 for more information about this and other utility programs.

Locating the Cursor

The status line of the IBM Personal System/2 in emulation mode describes the location of the cursor. Figure 5-2 illustrates how the cursor is located.



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Figure 5-2. Cursor Location

See "Cursor Location (rr-cc)" on page 5-5 for more information.

Selecting the Cursor Style

The cursor blinks at all times on the IBM Personal System/2. The cursor's attributes can be changed from a blinking rectangle to a blinking underscore, or from a blinking underscore to a blinking rectangle.

You can use the CURSOR function to toggle between an underscore and a block cursor. See "Assigning a Single Function to a Key" on page 12-6 for instructions. You can also change the cursor style by modifying the display attributes. See "Screen Colors and Attributes" on page 11-4 for instructions.

Reversing the Display Screen

You can change the attributes (reverse the image) of a monochrome display from light characters on a dark background to dark characters on a light background. You can use the MODE function to reverse the image. See “Assigning a Single Function to a Key” on page 12-6 for information. You can also reverse the image by modifying the display attributes. See “Screen Colors and Attributes” on page 11-4 for information.

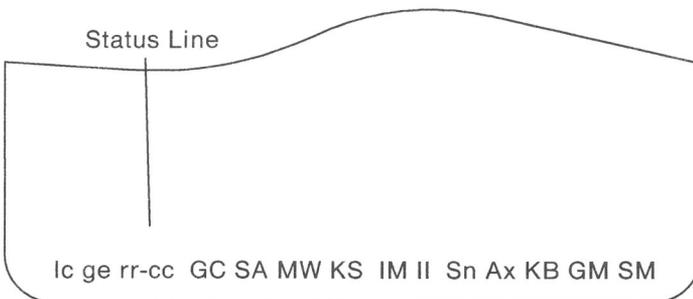
Note: You cannot reverse the display image in a graphics session or on a color monitor.

Autodim Feature

The Autodim feature automatically dims the screen after a specified length of time if no keystrokes have been entered and no host-generated screen updates have occurred. Advanced configuration allows you to enable Autodim and specify the length of time. See “Global Options” on page 11-2 for information.

Status Indicators

Status indicators are located on the status line (line 25) of the IBM Personal System/2 display in emulation mode.



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The status indicators appear either ON or OFF. A square block around an indicator (reverse image) denotes that it is ON.

Line Check Error (lc)

lc The line check error indicates the number of unrecognizable bytes of data that have been received by the IBM Personal System/2. The count appears in columns 1 and 2 on the status line as a decimal number.

Note: This field is usually blank (no indicator appears). If a value appears in this field, see Appendix B, "Problem Determination."

Graphics Error Code (ge)

ge The graphics error code displays a 2-digit error code in columns 5 and 6 if the program is operating incorrectly. Refer to Appendix A, "Handling Error Codes and Messages," for recovery information.

Notes:

1. This field is usually blank (no indicator appears).
2. A graphics error code may be cleared by pressing the emulated Error Reset key or by host system processing.

Cursor Location (rr-cc)

The cursor location appears on the status line as two 2-digit numbers separated by a dash (the first two digits represent the row that the cursor is on, and the second two digits represent the column).

For example: if the cursor is in row **6** and column **60**, this indicator reads **06-60**.

Graphics Display On (G)

- G** The graphics display is on (screen in graphics state).
G The graphics display is off (screen in alphanumeric state).

Note: The G indicator is used only for Host Graphics Support (HGS).

Width/Height On (C)

- C** Width/height indicator is ON.
- C Width/height indicator is OFF.

The C indicator appears when the width/height ratio is compressed. It appears with the same attribute (normal or reverse image) as the Graphics Display indicator.

Note: The C indicator is used only for HGS.

System Available (SA)

- SA** The 5294 controller and/or the host are operating and available to the IBM Personal System/2.
- SA The controller or host is not available to the IBM Personal System/2.

Message Waiting (MW)

- MW** The host has one or more messages for you. (You may hear a beep when the Message Waiting indicator first turns ON.)
- MW The host does not have a message waiting for you.

Keyboard Shift (KS)

- KS** The keyboard is in *shift* state.
- KS The keyboard is in *base* (nonshifted) state.

Note: This indicator does not indicate when the keyboard is in CapsLock or NumLock state. These states are indicated by lights on the Enhanced keyboard.

Insert Mode (IM)

- IM** Characters can be inserted into an existing field without destroying existing data.
- IM** Characters cannot be inserted into an existing field without destroying data.

Input Inhibited (II)

- II** The keyboard is locked.
- II** Keyboard input is being accepted by the host or the controller.

If the session has been configured for keystroke buffering and the II indicator is ON, keystrokes are saved and not sent to the host. When II is ON, the only keystrokes sent to the host are Shift and the emulated Error Reset, Attention, System Request, and Help functions.

When the Graphics Mode or Select Option Mode indicator is also ON, the keyboard is inhibited but the keystrokes are not saved.

If keystrokes are saved, you can clear them by pressing the Immediate Reset Key sequence. (See "Special Key Sequences" on page 6-5.)

The II indicator is turned ON by the host or by the controller while it is processing requests. The II indicator is also turned ON by error conditions.

You can use the emulated Error Reset key to turn the II indicator OFF if it was turned ON by an error condition.

Session Number (Sn)

- Sn** The session number appears as an S followed by the number of the currently displayed session; for example, **S1**.

Station Address (Ax)

Ax The station address appears to the right of the session number.

Keystroke Buffering (KB)

KB Keystrokes have been saved and are waiting for Input Inhibited to clear so that they can be sent to the host. If keystrokes are saved, you can clear them by pressing the Immediate Reset key sequence. (See “Special Key Sequences” on page 6-5.)

KB No keystrokes are being saved.

Note: The Keystroke Buffering indicator appears only in sessions you configured for buffering. (See “Buffer Keystrokes” on page 11-6 for information.)

Graphics Mode (GM)

GM The work station is in graphics mode.

GM The work station is not in graphics mode.

When this indicator is ON, the IBM Personal System/2 is processing or waiting to process graphics data.

Note: This indicator is used only for HGS.

Select Option Mode (SM)

SM The keyboard is in Select Option mode.

SM The keyboard is not in Select Option mode.

This mode is also referred to as Local Select mode. See “Local Select Mode” on page 6-6 for additional information.

Note: This indicator is used only for HGS.

Display Highlighting

This section explains highlighting on IBM Personal System/2 color and monochrome monitors. See the *Technical Reference* for a detailed description of the types of highlighting available for the IBM Personal System/2 displays (compared with the 3196 displays) used in the Emulation program. You can change the display highlighting. See "Screen Colors and Attributes" on page 11-4 for information.

The Emulation program does not support column separators in the same way as a 3196 display. You can select the character to be used for the column separator selected when you configure advanced options. See "Column Separator Character" on page 11-4 for information. Whether the character should appear when the field only contains a null character or when it contains a blank or a null character may also be selected. If no character is identified, a rectangle character (■) appears where column separators would appear when there is a null character in that position.

Color Monitor

The Emulation program with a color monitor can display characters that are normal intensity, high intensity, blinking, and reverse image. The underscore is program dependent. If the program uses hex 00 in the data area of an underscored field, an underscore is simulated. If the host uses hex 40 (blank) in the data area, the underscore cannot be simulated (the character appears without an underscore).

Note: Column separators, blink, and underscore are not supported in graphics mode.

Monochrome Monitor

The Emulation program with a monochrome monitor can display characters that are normal intensity, high intensity, blinking, reverse image, or underscored. It does not provide characters that are in reverse image with underscore (it displays normal image with underscore) or reverse image with high intensity (it displays reverse image with normal intensity).

Note: Column separators are not supported in graphics mode.



Chapter 6. Using the Keyboard

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Introduction

The Enhanced keyboard functions as both an IBM Personal System/2 keyboard and a 5250-style keyboard. The key assignments are located as close to the normal key position as practical for both keyboard styles. For example, the Enhanced keyboard file does not contain the host function, MODE (reverses image).

During configuration, you can choose to have your keyboard emulate this keyboard or you can define your own keyboard with the keyboard customization program. For example, you can define a key to function as MODE or the logical Shift Lock. See Chapter 12, "Keyboard Customization" for information.

On the Enhanced keyboard, the Shift key produces the upper case value of all keys, while the CapsLock key produces upper case only for letters. The Shift key also produces additional function keys; for example, Shift-F1 equals F13 and Shift-F2 equals F14.

The default keyboard file describes the Enhanced keyboard. If this file is not available, or if an error is found in the keyboard customization file, an error message is displayed when the Emulation program is started, and control is returned to DOS.

Service Keyboard Layout Option

The service keyboard layout option provides a default Enhanced keyboard layout when the Emulation program is running and the emulated work station is the system console. See "Starting Sessions" on page 4-3 for more information.

Keyboard States

The keyboard state controls the characters or functions produced when pressing a given key. The keyboard is used in four states:

- Base (nonshifted) state
- Shift state
 - Shift key held affects all keys.
 - CapsLock state affects only alphabetic keys.
 - NumLock state affects only numeric pad keys.
 - Shift Lock state affects alphabetic and special character keys.
- Alt (alternate shift) state

For example, the following table lists the function of the F7 key in the different keyboard states:

Keyboard State	F7 Key Function
Base	Cmd 7
Alt	Hex
Shift (Shift key held)	Cmd 19

Base State

The *base* state is the normal state of a keyboard. As with a typewriter, when the Shift key is not pressed, the CapsLock and Shift Lock functions are not active. In this state, pressing the **a** key displays an **a**.

Shift States

The keyboard is in *shift* state when the Shift key is held down or when an emulated Shift Lock function is active. As with a typewriter, when the Shift key is pressed or the Shift Lock function is active, pressing the **a** key displays an **A**.

CapsLock State

In CapsLock state only alphabetic characters enter uppercase characters. This state remains in effect in all emulation sessions and the DOS session. The indicator light on the keyboard is on when the CapsLock state is in effect.

NumLock State

In NumLock state, the functions or characters assigned to the *shift* state on the numeric keypad are performed. This state remains in effect in all emulation sessions and the DOS session. The indicator light on the keyboard is on when NumLock state is in effect.

If you assign functions to the number pad in the *Alt* state, the NumLock state does not affect them (there is no shifted state).

Shift Lock State

In Shift Lock state, the entire keyboard enters uppercase alphabetic characters and the shifted characters on special character keys. The Keyboard Shift (KS) indicator is ON if the keyboard is in *shift* or Shift Lock state.

Alt State

The *alt* state is the state of the keyboard when the Alt key is held down. Like a Shift key, the Alt key provides another level of shift for the keyboard.

Special Key Sequences

You can use the following special key sequences with the Enhanced keyboard:

- Hot Key
- Immediate Reset
- Local Select

Hot Key

The Hot Key function allows you to change sessions. Each time you perform the Hot Key function, the session switches to the requested session or to the next session in the rotation. The rotation consists of all active sessions in order.

The default Hot Key function is Alt-Esc. You can customize the keyboard to define a different Hot Key. You can also define a Hot Key to switch directly to an emulation session or the DOS session. (See "Assigning a Single Function to a Key" on page 12-6 for information.)

Notes:

1. Occasionally when you use a Hot Key function, the request may not be accepted. Reenter the function until it is accepted.
2. After a Hot Key, all keys used in the Hot Key function must be released before another Hot Key can be attempted.
3. Some DOS applications programs do not allow interruptions. In this case, you should let the program run to completion before switching to an emulation session.

Immediate Reset Key

The Immediate Reset Key function clears the keystroke buffer and stops the playback of any defined key sequences. It also clears any Shift Lock state or Insert mode. To enter the Immediate Reset key function, press Alt-Scroll Lock.

Local Select Mode

Local Select mode allows you to control the graphics display from the keyboard. The keyboard is in Local Select (also called Select Option) mode when SM is shown in reverse image on the status line (**SM**). Except for the key sequences identified in Figure 6-1, the keyboard is inhibited during Local Select mode. During Local Select mode, pressing inhibited keys causes the alarm to sound.

The default key sequence to enter Local Select mode is Alt-F10. By customizing the keyboard you can define the function to any customizable key. (See “Assigning a Single Function to a Key” on page 12-6 for information.)

Key Sequence	Description
Emulated Error Reset	Cancel Local Select mode.
1 key	Graphics display on or off. Toggles the current state of the graphics display. This selection is always accepted. The Graphics indicator is ON (G) when the graphics display is on.
2 key	Turn status line on or off. Toggles the current state of the graphics status line. This selection is accepted at any time, but is effective only when the Graphics indicator is ON (G).
3 key	Aspect ratio key. Pressing this key adjusts the data (changes the aspect ratio) for the differences in screen sizes. Pressing it again returns the data to its normal aspect ratio.
9 key	Erases the graphics display. This selection is only accepted when the display is not in graphics state (GM indicator is in normal image).

Figure 6-1 (Part 1 of 2). Local Select Keys

Key Sequence	Description
0 key	<p>CAUTION This key sequence may cause unpredictable results.</p> <p>Terminates graphics processing. This selection is only accepted when the Graphics indicator is ON (GM).</p>
<p>Note: Only the top row number keys (as opposed to the number pad) function in Local Select mode.</p>	

Figure 6-1 (Part 2 of 2). Local Select Keys

Using the Shift Functions

Shift Lock Key

Pressing the key defined as the Shift Lock function places the keyboard in Shift Lock state.

CapsLock and NumLock Keys

Pressing the CapsLock and NumLock keys in any session, including the DOS session, sets the state in all sessions. The states of the CapsLock and NumLock keys are indicated on the Enhanced keyboard.

Note: The CapsLock function must be defined to the CapsLock key and the NumLock function must be defined to the NumLock key for CapsLock and NumLock to function as described.

In CapsLock state, the alphabetic keys are the only shifted keys. In NumLock state, the characters or functions assigned to the shifted state of the numeric pad are entered. NumLock does not turn the KS indicator ON.

Entering the Shift Functions

When a key is pressed in *shift* state, the character or function defined to the *shift* state of the key is entered. When a key is pressed in the *alt* state, the character or function defined to the *alt* state of the key is entered.

For example, assume you defined the *shift* state of \ (backslash) as | (vertical bar) in the keyboard customization file. When you press and hold down the Shift key, then press the backslash key, the vertical bar character is entered.

Keys defined to perform functions in *shift* state perform those functions only when the Shift key is held down or the key is on the numeric pad and the keyboard is in NumLock state.

When the keyboard is in CapsLock state, an **a** is entered as an **A**, while a **2** is entered as a **2**.

Keys defined to perform functions (as opposed to characters) in *shift* state must have the Shift key held down even when the keyboard is in CapsLock state.

Keystroke Buffering

CAUTION

Keystroke buffering while the GM or SM indicator is ON may cause unpredictable results.

If keystroke buffering is configured for a session and the Input Inhibited (II) indicator is ON, up to 32 keystrokes are stored and then sent to the host when the II indicator is OFF. If more than 32 keys are pressed, an alarm is sounded for each key and the keystroke is discarded. As the buffer space is freed, when keystrokes are sent to the host, additional keystrokes may be buffered.

See "Keystroke Buffering (KB)" on page 5-8 for a description of the Keystroke Buffer indicator.

If keystrokes have been stored and you want to cancel them, do one of the following:

- Press the emulated Error Reset key.
- Or, press the Immediate Reset Key function. This method also stops any playback sequence in progress.

The stored keystrokes are removed from the keystroke buffer, an emulated Error Reset is sent to the host, and Shift Lock state and Insert mode are cleared.

Note: While running 3270 emulation on the host, the II indicator may be cleared when the system is not ready to accept keystrokes. Clearing the II indicator may cause buffered keystrokes to be discarded. Be careful when buffering keystrokes for use during 3270 emulation.

Entering Key Strings

CAUTION

The playback of a string in a session may cause unpredictable results while the GM or SM indicator is ON (**GM** or **SM**).

The keyboard customization program allows you to assign a string of characters and functions, such as "Have a nice day," to any state of a single key except all states of the Shift key and the *alt* state of the Alt, Scroll Lock, and Ctrl keys. See "Assigning a Playback Sequence to a Key" on page 12-7 for information about defining playback sequences.

You can stop a string that is being played back by pressing the Immediate Reset Key function. This also clears the keystroke buffer.

Chapter 7. Emulating an IBM 5219 Printer

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Introduction

The following personal computer printers are capable of emulating the IBM 5219 Printer:

- IBM 3812 Pageprinter using supplied PFT
- IBM 5216 Wheelprinter
- IBM 5201 Quietwriter
- User-defined printer
- IBM 5202 Quietwriter III using supplied PFT

Notes:

1. Any of the above printers can be attached to the IBM Personal System/2 and used to emulate the IBM 5219 Printer on any session configured for 5219 emulation. However, functions not available on the 5219 are not supported, even though the attached printer may support the function.

For example, a 3812 emulating the 5219 is different from a 3812 directly attached to the host. This means that 3812 functions such as bold printing and the Set Text Orientation command are not supported.

2. The keyboard layout in effect for display sessions is also in effect for printer emulation.
3. Printer emulation continues when you switch to the DOS session (unless you suspend the printer session before switching).

The IBM Personal System/2 display emulates the IBM 5219 Printer's operator panel while in emulation mode. Refer to the *Technical Reference* for commands to control the 5219.

Setting Up the Printer

The Emulation program sets up the attached personal computer printer according to options chosen during configuration. The type of paper feed the printer can use, paper width, form feed, and font change without user intervention can be specified. (See "Advanced Printer Options" on page 11-7 for information.)

Each defined printer session requires a separate personal computer printer. The user is responsible for ensuring that the physical paper handling equipment matches what was specified during configuration.

Automatic Cut Sheet Feed Handling Devices

An IBM 5219 Printer initializes the paper feed technique of the Set Print SetUp (SPSU) control to whatever paper feed hardware is electrically connected to the 5219 Printer. 5219 emulation initializes the paper feed technique to the first paper feed type specified in the host print job.

Refer to the printer operator's manual when physically setting up the cut sheet feed handling device.

If an IBM 5216 Wheelprinter is attached, the Paper Feed Toggle switch must be set for the desired sheet feed method.

Serial Printer Limitations

If you are using a serial printer, note the following limitations:

- Serial printers use asynchronous communications adapters. No other types of communications adapters (such as SDLC or BSC) may be used concurrently in the IBM Personal System/2. You can use additional asynchronous communications adapters.
- Printer emulation cannot distinguish between Printer Off Line and Paper End conditions in a serial printer. Printer emulation will indicate Printer Off Line if either condition occurs.

Printer Operator Panel

The options and indicators appear on the printer operator panel:

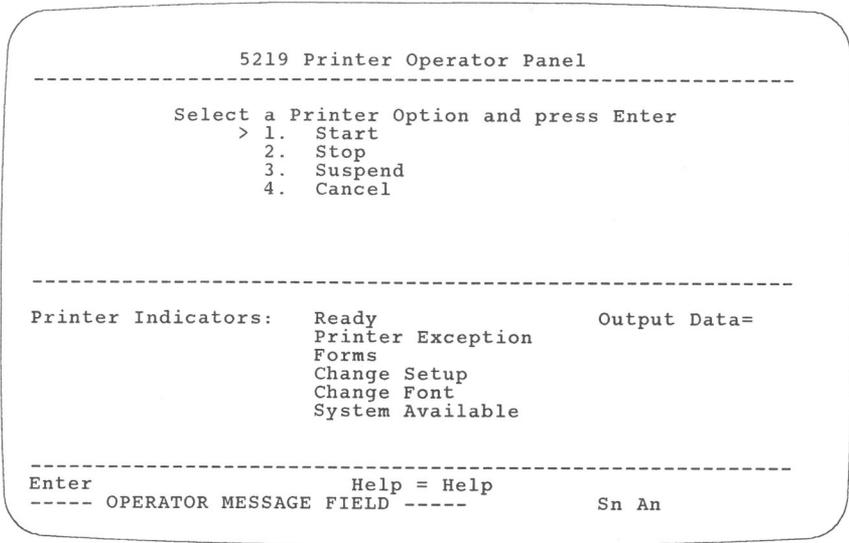


Figure 7-1. IBM 5219 Printer Operator Panel

Printer Options

The printer operator panel displays the the following options:

- Start
- Stop
- Suspend
- Cancel

To select an option, use the cursor movement keys to move the > symbol to the option, then press Enter.

Start Option

The *Start* option prepares for printer emulation. If the Ready indicator is OFF when you select this option, the result depends on the condition of printer emulation as shown in Figure 7-2.

Selecting the *Start* option while the Ready indicator is ON performs no function, since its intended function is to prepare for emulation.

Condition	Result
Printer emulation was just loaded and no error conditions exist.	Turns the Ready indicator ON.
Printer emulation has been halted by the <i>Stop</i> option.	Turns the Ready indicator ON and allows printing to continue.
Printer emulation has been halted by the <i>Suspend</i> option.	Turns the Ready indicator ON, returns personal computer printer control to printer emulation, restores the printer to the state it was in at the time the <i>Suspend</i> option was selected, and allows printing to continue. The current print line becomes the logical top of the page.

Figure 7-2. Start Option

Stop Option

Selecting the *Stop* option while the Ready indicator is ON turns the Ready indicator OFF. The printer continues printing until its buffer is empty. Printer emulation does not process any further data or commands from the host until the *Start* option is selected.

Use this option to halt printing temporarily to allow adjustments to the printer, such as changing paper.

Suspend Option

Selecting the *Suspend* option while the Ready indicator is ON turns the Ready indicator OFF and causes all information in the printer's print buffer to be printed. Printer emulation does not process any further host data or commands.

In addition, the current status of the emulated 5219 Printer is saved, the forms advance to the first print line of a new page, the personal computer printer is initialized to its power-on state, and all operator panel options except *Start* are disabled. This option allows you to free the printer from the host and make it available to the IBM Personal System/2 in the DOS session.

If you want to use the printer for any personal computer printing, select this option, then switch to the DOS session. You can move the forms to any desired position and print. When you are finished, position the forms to the first print line of a new page.

This option is accepted regardless of the state of the Ready indicator.

Note: You need to use this option only if the personal computer application program uses the same printer device name (such as LPT1 or LPT2) as the Emulation program. If the application program uses a different printer, the Emulation program can print at the same time as the application program and you do not need to suspend the session.

Cancel Option

Selecting the *Cancel* option notifies the host of the cancel request. This option is accepted regardless of the state of the Ready indicator.

Output Data Field

The Output Data field provides control and diagnostic information. See "Output Data Field Values (5219 and 5224 Emulation)" on page A-7 for further information.

Status Indicators

The operator panel displays the following status indicators:

- Ready
- Printer Exception
- Forms
- Change Setup
- Change Font
- System Available

Reverse image denotes that the indicator is ON.

Ready Indicator

The Ready indicator is turned ON when you select the *Start* option or a Set Mode command is received from the host when the printer is online. Whenever the indicator is ON, printer emulation is ready to process a host print job.

The Ready indicator is turned OFF by a Change Font or Change Setup request, a Reset command from the host, an end of forms condition, a printer exception, or a data transfer error. You can turn it OFF by selecting the *Stop* or *Suspend* option.

Printer Exception Indicator

The Printer Exception indicator turns ON when a data stream exception is detected. The 2-digit code that appears in the Output Data field defines the exception. See "Output Data Field Values (5219 and 5224 Emulation)" on page A-7 for a description of the codes.

Forms Indicator

The Forms indicator is turned ON when either an automatic cut sheet feed drawer is empty or the printer is out of continuous forms.

See the printer operator's guide for paper handling procedures. Printer emulation must be made ready by selecting the *Start* option to continue printing.

Change Setup Indicator

The Change Setup indicator is turned ON when a request is received to change the paper feed method. The 2-digit code that appears in the Output Data field describes the paper feed mechanism requested. See “Output Data Field Values (5219 and 5224 Emulation)” on page A-7 for the description of the codes. See the printer operator’s guide to change the paper feed hardware.

Change Font Indicator

The Change Font indicator is turned ON when a request is received to change the font. The 2-digit code that appears in the Output Data field describes the requested font. See “Output Data Field Values (5219 and 5224 Emulation)” on page A-7 for the description of the codes.

Note: This indicator is not used with a printer that can change fonts without user intervention (specified when you configure advanced printer options).

System Available Indicator

The System Available indicator is turned ON whenever a printer command other than a Reset command is received from the host. This indicator is turned OFF when communication with the host stops.

Printer Session Number (Sn)

The printer session number appears on line 25 as **Sn**, where **n** is the number of the session.

Station Address Number (An)

The printer station address appears on line 25 as **An**, where **n** is the station address.

User-Defined Printer

The Emulation program allows you to use a nonsupported printer. To do this, you create a printer function table that the Emulation program uses to convert host controls into the escape sequences, controls, and graphics understood by the attached personal computer printer.

See Chapter 4, “Using the Printer Function Table Setup Program” in the *Technical Reference* for information.



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Introduction

The following personal computer printers can emulate the IBM 5224 Printer or IBM 5225 Printer on any session configured for 5224 emulation.

- IBM 3812 Pageprinter using supplied PFT
- IBM 4201 Proprinter
- IBM 4202 Proprinter XL using supplied PFT
- IBM 5152 Graphics Printer (Model 002)
- IBM 5201 Quietwriter
- IBM 5216 Wheelprinter
- User-defined printer

All information concerning the 5224 Printer is also valid for 5225 Printers.

Notes:

1. Any of the above printers can be attached to the IBM Personal System/2 and used to emulate the IBM 5224 Printer on any session configured for 5224 emulation. However, functions not available on the 5224 are not supported, even though the attached printer may support the function.

For example, a 3812 emulating the 5224 is different from a 3812 directly attached to the host. This means that 3812 functions such as bold printing and the Set Text Orientation command are not supported.

2. The keyboard layout in effect for display sessions is also in effect for printer emulation.
3. Printer emulation continues when you switch to the DOS session (unless you suspend the printer session before switching).
4. 5224 Transparent mode and Buffer Print are not supported with the Emulation program.
5. Load Alternate Character (LAC) is not supported with the Emulation program. This means that the System/36 5224 Advanced Printer Function licensed program is not supported.

The IBM Personal System/2 display emulates the IBM 5224 Printer's operator panel in printer emulation mode. See the *Technical Reference* for commands to control the 5224 Printer.

Serial Printer Limitations

If you are using a serial printer, note the following limitations:

- Serial printers use asynchronous communications adapters. No other types of communications adapters (such as SDLC or BSC) may be used concurrently in the IBM Personal System/2. You can use additional asynchronous communications adapters.
 - Printer emulation cannot distinguish between Printer Off Line and Paper End conditions in a serial printer. Printer emulation will indicate Printer Off Line if either condition occurs.
-

Setting Up the Printer

The Emulation program sets up the attached personal computer printer according to options chosen during configuration. LPI, CPI, paper width, form feed, and font changes without user intervention can be specified. (See "Advanced Printer Options" on page 11-7 for information.)

Each defined printer session requires a separate personal computer printer.

Printer Operator Panel

The options and indicators appear as follows:

```
-----  
5224 Printer Operator Panel  
-----  
Select a Printer Option and press Enter  
> 1. Start  
   2. Stop/Reset  
   3. Suspend  
   4. Cancel  
   5. Line Feed  
   6. Form Feed  
   7. Select Printer Parameters  
-----  
Printer Indicators:  Ready          Output Data=  
                    Attention  
                    Forms  
                    Graphics Check  
                    Change Font  
                    System Available  
-----  
Enter              Help = Help  
----- OPERATOR MESSAGE FIELD -----      Sn An
```

Figure 8-1. IBM 5224 Printer Operator Panel

Printer Options

The printer operator panel displays the following options:

- Start
- Stop/Reset
- Suspend
- Cancel
- Line Feed
- Form Feed
- Select Printer Parameters

To select an option, use the cursor movement keys to move the > symbol to the option, then press Enter.

Start Option

The *Start* option prepares for printer emulation. If the Ready indicator is OFF when this option is selected, the result depends on the condition of printer emulation as shown in Figure 8-2.

Selecting the *Start* option while the Ready indicator is ON performs no function, since its intended function is to prepare for printer emulation.

Condition	Result
Printer emulation was just loaded and no error conditions exist.	Turns the Ready indicator ON.
Printer emulation has just been halted by the <i>Stop/Reset</i> option, or the <i>Stop/Reset</i> option was just used to reset an error condition.	Turns the Ready indicator ON and continues printing.
Printer emulation has just been halted by the <i>Suspend</i> option.	Turns the Ready indicator ON, returns personal computer printer control to printer emulation, restores the printer to the state it was in at the time the <i>Suspend</i> option was selected, and continues printing. The current print line becomes the logical top of page.

Figure 8-2. Start Option

Stop/Reset Option

Selecting the *Stop/Reset* option while the Ready indicator is ON turns the Ready indicator OFF. The printer continues printing until its buffer is empty. Printer emulation does not process any further commands from the host until the *Start* option is selected.

If this option is selected when the Ready indicator is OFF, it functions as a Reset key.

Use this option to halt printing temporarily to allow adjustments to the printer, such as changing paper.

Suspend Option

Selecting the *Suspend* while the Ready indicator is ON turns the Ready indicator OFF and causes all information in the printer's print buffer to be printed. Printer emulation does not process any further data or commands from the host.

In addition, the current status of the emulated 5224 Printer is saved, the forms advance to the first print line of a new page, the printer enters its initialized state (Ready and Online), and all operator panel options except *Start* are disabled. This option allows you to free the printer from the host and make it available to the IBM Personal System/2 in the DOS session.

If you want to use the printer for any personal computer printing, select this option, then switch to the DOS session. You can move the forms to any desired position and print. When you are finished, position the forms to the first print line of a new page.

This option is accepted regardless of the state of the Ready indicator.

Note: This option is necessary only if the personal computer application program uses the same printer device name (such as LPT1 or LPT2) as the Emulation program. If the application program uses a different printer, the Emulation program can print at the same time as the application program and you do not need to suspend the session.

Cancel Option

Selecting the *Cancel* option notifies the host of the cancel request.

Line Feed Option

Selecting the *Line Feed* option when the Ready indicator is OFF advances the forms to the next print line.

This option is ignored when the Ready indicator is ON.

Form Feed Option

Selecting the *Form Feed* option when the Ready indicator is OFF advances the forms to the first print line of the next form.

This option is ignored when the Ready indicator is ON.

Note: The operation of this option depends on previous commands to the printer. That is, the form length assigned by the host program must be the same as the actual length of the form.

Printer Parameters

The printer parameters appear when you select option 7 from the printer operator panel.

```
                    5224 Printer Parameters
-----
Use the cursor keys and spacebar to select.

Lines per inch . . . . . > 6 LPI
                        8 LPI

Characters per inch . . . . . >10 CPI (normal)
                               15 CPI (compressed)

-----

Enter                Help = Help
----- OPERATOR MESSAGE FIELD -----                Sn An
```

Figure 8-3. IBM 5224 Printer Parameters

Lines Per Inch (LPI)

Selecting 6 LPI causes the printer to print six lines of text per inch of page length. Selecting 8 LPI causes the printer to print eight lines of text per inch of page length.

You can specify the default LPI during configuration.

Note: The current LPI is indicated by the > character next to the selected option.

Characters Per Inch (CPI)

Selecting 10 CPI causes the printer to print 10 characters per inch. If the attached printer has an eight inch paper width and if more than 80 characters are formatted for a line, the extra characters are printed on the following line.

Selecting 15 CPI causes the printer to print compressed print. When the attached printer has an eight inch paper width, this option allows 132 characters to be printed on a line.

You can specify the default CPI during configuration.

Notes:

1. The host printer prints 15 CPI for compressed print. Personal computer printers print 16 or 17 CPI, depending on the type. See the printer operator's guide for exact information.
2. The current CPI is indicated by the > character next to the selected option.

Output Data Field

The Output Data field provides control and diagnostic information. See "Output Data Field Values (5219 and 5224 Emulation)" on page A-7 for further information.

Status Indicators

The operator panel displays the following status indicators:

- Ready
- Attention
- Forms
- Graphics Check
- Change Font
- System Available

Reverse image denotes that the indicator is ON.

Ready Indicator

The Ready indicator is turned ON when you select the *Start* option. Whenever the indicator is ON, printer emulation is ready to process a host print job.

The Ready indicator is turned OFF by a font change request, an end of forms condition, a Reset command from the host, a printer error (printer in a not ready state), a graphics check error, or an attention message from the host. You can turn it OFF by selecting the *Stop/Reset* or *Suspend* option.

Attention Indicator

The Attention indicator turns ON when the attention of the operator is required by the emulated printer. The indicator can be turned ON by a personal computer printer condition that turns the Ready indicator OFF and turns the Forms or Graphics Check indicator ON.

Selecting the *Stop/Reset* option turns this indicator OFF.

Forms Indicator

The Forms (out of paper) and Attention indicators notify you that the printer has run out of paper. Select the *Stop/Reset* option to turn the Forms and Attention indicators OFF. After a new supply of paper has been loaded and the printer is made ready, select the *Start* option to resume printing.

Graphics Check Indicator

The Graphics Check indicator is ON when an unprintable character is detected in the host print job and the Set Graphics Error Action command stop option had been set previously. (The line containing the unprintable character is printed with a substitute character in place of the unprintable character.)

The Ready indicator is turned OFF and the Attention indicator is turned ON when the Graphics Check indicator is turned ON.

Selecting the *Stop/Reset* option turns the Graphics Check indicator OFF.

Change Font Indicator

The Change Font indicator is turned ON when a request is received to change the font. The 2-digit code that appears in the Output Data field describes the requested font. See "Output Data Field Values (5219 and 5224 Emulation)" on page A-7 for the description of the codes.

Note: This indicator is not used with a printer that can change fonts without user intervention (configured with advanced printer options).

System Available Indicator

The System Available indicator is turned ON whenever a printer command other than a Reset command is received from the host. This indicator is turned OFF when communication with the host stops.

Printer Session Number (Sn)

The printer session number appears on line 25 as **Sn**, where **n** is the number of the session.

Station Address Number (An)

The printer station address appears on line 25 as **An**, where **n** is the station address.

User-Defined Printer

The Emulation program allows you to use a nonsupported printer. To do this, you create a printer function table that the emulation program uses to convert host controls into the escape sequences, controls, and graphics understood by the attached personal computer printer.

See Chapter 4, "Using the Printer Function Table Setup Program" in the *Technical Reference* for information.



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System Available Indicator	9-10
Printer Session Number (Sn)	9-10
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User-Defined Printer	9-11

Introduction

The following personal computer printers can emulate the IBM 5256 Printer on any session configured for 5256 emulation.

- IBM 3812 Pageprinter using supplied PFT
- IBM 4201 Proprinter
- IBM 4202 Proprinter XL using supplied PFT
- IBM 5152 Graphics Printer (Model 002)
- IBM 5201 Quietwriter
- IBM 5216 Wheelprinter
- User-defined printer

Notes:

1. Any of the above printers can be attached to the IBM Personal System/2 and used to emulate the IBM 5256 Printer on any session configured for 5256 emulation. However, functions not available on the 5256 are not supported, even though the attached printer may support them.

For example, a 3812 emulating the 5256 is different from a 3812 directly attached to the host. This means that 3812 functions such as bold printing and the Set Text Orientation command are not supported.

2. The keyboard layout in effect for display sessions is also in effect for printer emulation.
3. Printer emulation continues when you switch to the DOS session (unless you suspend the printer session before switching).
4. 5256 Transparent mode and Buffer Print are not supported by the Emulation program.

The IBM Personal System/2 display screen emulates the IBM 5256 Printer's operator panel in printer emulation mode.

Serial Printer Limitations

If you are using a serial printer, note the following limitations:

- Serial printers use asynchronous communications adapters. No other types of communications adapters (such as SDLC or BSC) may be used concurrently in the IBM Personal System/2. You can use additional asynchronous communications adapters.
- Printer emulation cannot distinguish between Printer Off Line and Paper End conditions in a serial printer. Printer emulation will indicate Printer Off Line if either condition occurs.

Setting Up the Printer

The Emulation program will set up the attached personal computer printer based on options chosen during configuration. LPI, CPI, paper width, and form feed can be specified. (See "Advanced Printer Options" on page 11-7 for information.)

Each defined printer session requires a separate printer.

Printer Operator Panel

The options and indicators appear as follows:

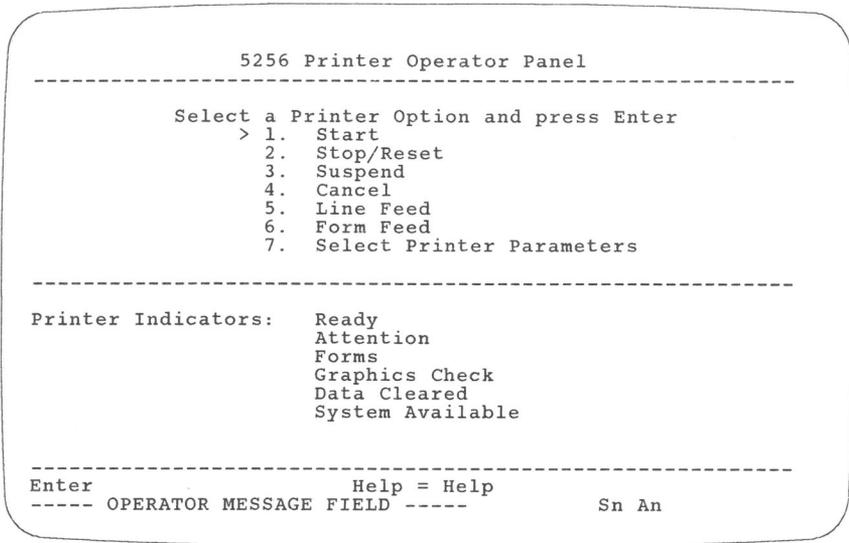


Figure 9-1. IBM 5256 Printer Operator Panel

Printer Options

The printer operator panel displays the following options:

- Start
- Stop/Reset
- Suspend
- Cancel
- Line Feed
- Form Feed
- Select Printer Parameters

To select an option, use the cursor movement keys to move the > symbol to the option, then press Enter.

Start Option

The *Start* option prepares for printer emulation. If the Ready indicator is OFF when the *Start* option is selected, the result depends on the condition of printer emulation as shown in Figure 9-2.

Selecting the *Start* option while the Ready indicator is ON performs no function since its intended function is to prepare for printer emulation.

Condition	Result
Printer emulation was just loaded and no error conditions exist.	Turns the Ready indicator ON.
Printer emulation has just been halted by the <i>Stop/Reset</i> option, or the <i>Stop/Reset</i> option was just used to reset an error condition.	Turns the Ready indicator ON and continues printing.
Printer emulation has just been halted by the <i>Suspend</i> option.	Turns the Ready indicator ON, returns personal computer printer control to printer emulation, restores the printer to the state it was in at the time the <i>Suspend</i> option was selected, and continues printing. The current print line becomes the logical top of page.

Figure 9-2. Start Option

Stop/Reset Option

Selecting the *Stop/Reset* option while the Ready indicator is ON turns the Ready indicator OFF. The printer continues printing until its buffer is empty. Printer emulation does not process any further commands from the host until you select the *Start* option.

If this option is selected when the Ready indicator is OFF, it functions as a Reset key.

Use this option to halt printing temporarily to make adjustments to the printer, such as changing paper.

Suspend Option

Selecting the *Suspend* option while the Ready indicator is ON turns the Ready indicator OFF and causes all information in the printer's print buffer to be printed. Printer emulation does not process any further data or commands from the host.

In addition, the current status of the emulated 5256 Printer is saved, the forms advance to the first print line of a new page, the printer enters its initialized state (Ready and Online), and all operator panel options except Start are disabled. This option allows you to free the printer from the host and make it available to the IBM Personal System/2 in the DOS session.

If you want to use the printer for any personal computer printing, select this option, then switch to the DOS session. You can move the forms to any desired position and print. When you are finished, position the forms to the first print line of a new page.

This option is accepted regardless of the state of the Ready indicator.

Note: This option is necessary only if the personal computer application program uses the same printer device name (such as LPT1 or LPT2) as the Emulation program. If the application program uses a different printer, the Emulation program can print at the same time as the application program and you do not need to suspend the session.

Cancel Option

Selecting the *Cancel* option notifies the host of the cancel request.

Line Feed Option

Selecting the *Line Feed* option when the Ready indicator is OFF advances the forms to the next print line.

This option is ignored when the Ready indicator is ON.

Form Feed Option

Selecting the *Form Feed* option when the Ready indicator is OFF advances the forms to the first print line of the next form.

This option is ignored when the Ready indicator is ON.

Note: The operation of this option depends on previous commands to the printer. That is, the form length assigned by the host program must be the same as the actual length of the form.

Printer Parameters

The printer parameters appear when you select option 7 from the printer operator panel:

```

                    5256 Printer Parameters
-----
Use the cursor keys and spacebar to select.
Lines per inch . . . . . > 6 LPI
                        8 LPI
Characters per inch . . . . . >10 CPI (normal)
                        15 CPI (compressed)
-----

-----
Enter                Help = Help
----- OPERATOR MESSAGE FIELD -----                Sn An

```

Figure 9-3. IBM 5256 Printer Parameters

Lines Per Inch (LPI)

Selecting 6 LPI causes the printer to print six lines of text per inch of page length. Selecting 8 LPI causes the printer to print eight lines of text per inch of page length.

You can specify the default LPI during configuration.

Note: The current LPI is indicated by the > character next to the selected option.

Characters Per Inch (CPI)

Selecting 10 CPI causes the printer to print 10 characters per inch. If the attached printer has an eight inch paper width, and if more than 80 characters are formatted for a line, the extra characters are printed on the following line.

Selecting 15 CPI causes the printer to print compressed print. When the attached printer has an eight inch paper width this option allows 132 characters to be printed on a line.

You can specify the default CPI during configuration.

Notes:

1. The 5256 prints 15 CPI for compressed print. Personal computer printers print 16 or 17 CPI, depending on the type. See the printer operator's guide for exact information.
2. The current CPI is indicated by the > character next to the selected option.

Status Indicators

The operator panel displays the following status indicators:

- Ready
- Attention
- Forms
- Graphics Check
- Data Cleared
- System Available

Reverse image denotes that the indicator is ON.

Ready Indicator

The Ready indicator is turned ON when you select the *Start* option. Whenever the indicator is ON, printer emulation is ready to process a host print job.

The Ready indicator is turned OFF by an End of Forms condition, a Reset command from the host, a printer error (printer in a not ready state), a graphics check error, or an attention message from the host. You can turn it OFF by selecting the *Stop/Reset* or *Suspend* option.

Attention Indicator

The Attention indicator turns ON when the printer requires operator attention. The indicator can be turned ON by a personal computer printer condition that turns the Ready indicator OFF and turns the Forms or Graphics Check indicator ON.

Selecting the *Stop/Reset* option turns this indicator OFF.

Forms Indicator

The Forms (out of paper) and Attention indicators notify you that the printer has run out of paper. Select the *Stop/Reset* option to turn the Forms and Attention indicators OFF. After a new supply of paper has been loaded and the printer is made ready, select the *Start* option to resume printing.

Graphics Check Indicator

The Graphics Check indicator is ON when an unprintable character is detected in the host print job and the Set Graphics Error Action command stop option had been set previously. (The line containing the unprintable character is printed with a substitute character in place of the unprintable character.)

The Ready indicator is turned OFF and the Attention indicator is turned ON when the Graphics Check indicator is turned ON.

Selecting the *Stop/Reset* option turns the Graphics Check indicator OFF.

Data Cleared Indicator

The Data Cleared indicator is turned ON when a Clear command is received from the host to tell the operator that a problem has occurred and all print buffers have been cleared of data. See the appropriate host instructions for recovery procedures. After the problem has been corrected, select the *Stop/Reset* option to turn the Data Cleared indicator OFF; align the forms to print the first line, make the printer ready, and select the *Start* option to prepare for printer emulation.

System Available Indicator

The System Available indicator is turned ON whenever a printer command other than a Reset command is received from the host. This indicator is turned OFF when communication with the host stops.

Printer Session Number (Sn)

The printer session number appears on line 25 as **Sn**, where **n** is the number of the session.

Station Address Number (An)

The printer station address appears on line 25 as **An**, where **n** is the station address.

User-Defined Printer

The Emulation program allows you to use a nonsupported printer. To do this, you create a printer function table that the Emulation program uses to convert host controls into the escape sequences, controls, and graphics understood by the attached personal computer printer.

See Chapter 4, "Using the Printer Function Table Setup Program" in the *Technical Reference* for information.



Chapter 10. Using Graphics

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Introduction

This chapter gives instructions for running the graphics program for host graphics, and also lists considerations for using plotters with graphics.

Notes:

1. You cannot use a printer to support the graphics feature.
2. You cannot use the same asynchronous communications adapter in a DOS session while the graphics functions are plotting a chart in a graphics session.
3. You cannot use the asynchronous communications adapter concurrently with a SDLC or BSC adapter.
4. Emulation responds to graphics orders as though a printer were not attached.
5. Interrupt vector hex 59 is reserved for Virtual Device Interface (VDI) routines.

Displaying Graphics

This section explains how to enable, operate, and terminate graphics display.

Enabling Graphics Display

You must enable graphics before you can display host graphics. Use this procedure:

1. Use the Hot Key function to switch to the DOS session.
2. Type WSE and press Enter. The WSE main menu appears.
3. Select the option, *Enable host graphics support*.

You can then switch to the graphics session.

If you try to display host graphics before you select this option, processing is suspended. To continue, select the option *Enable host graphics support* or use the Terminate graphics function (0 key) in Local Select mode (see “Local Select Mode” on page 6-6 for more information).

Operating during Graphics

The WSE Function Control program continues to run in the DOS session until you terminate it. This does not interfere with other emulation functions. You can use the Hot Key function to switch to other sessions while the program is running in DOS. After you switch to the DOS session, you have two options:

- Use the Hot Key function to switch to another session.
- Press Esc to disable graphics and display the WSE main menu.

If you want to perform other tasks in DOS, you must first exit the WSE Function Control program. See “Exiting the WSE Function Control Program” on page 4-9 for information.

Terminating a Graphics Session

You have five options for terminating graphics:

1. Switch to the DOS session and press Esc. This disables graphics and displays the WSE main menu.
2. Cancel the host job from the system console.
3. Use the Terminate graphics function (0 key) in Local Select mode (see "Local Select Mode" on page 6-6).
4. Stop the session from the WSE main menu (see "Stopping a Session" on page 4-9).
5. Perform a software reset by pressing the Alternate, Control, and Delete key sequence. This also terminates the Emulation program, resets the IBM Personal System/2, and reloads DOS.

Notes:

1. The graphics session does not need to be the active session to use option 2.
2. During termination, the host may send additional graphics data. Use option 3 to remove them.

Plotting Graphics

The Emulation program supports one plotter per graphics session. This plotter can be the IBM 7371 Plotter (two pens), the IBM 7372 Plotter (six pens), or the IBM 6180 Plotter (eight pens) attached to the asynchronous communications adapter (RS232 interface).

The IBM Personal System/2 will not allow the asynchronous communications adapter and the SDLC or BSC adapter to be used at the same time.

The host-generated graphics data stream uses IEEE-488 protocol. The Emulation program removes the IEEE-488 protocol commands and the remaining data is sent to the plotter via the RS232 interface.

Chapter 11. Advanced Configuration

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Introduction

This chapter explains the following advanced configuration options:

- Global options in the master profile
- Display session options
- Printer session options
- Graphics

See Chapter 3, “Configuring the Emulation Program” for information about using the configuration program.

Global Options

Global options affect all sessions you run from one IBM Personal System/2. These include the following:

- Automatic screen dimming

This option instructs the Emulation program to dim the display after the number of minutes you specify of no activity. Consider using this option if you leave the screen unattended, but do not want to stop sessions. This will prolong the life of the hardware.

- Screen Save Area

This option allows you to specify where to save the DOS screen area in the Emulation program. If you do not plan to use Host Graphics Support or application programs that use multiple pages of the display adapter, you can save the screen on the Emulation adapter. This will reduce the size of the Emulation program by 16K.

- Allow API Access to Saved DOS Screen

This option allows you to save IBM Personal System/2 memory if you do not plan to use the API to access the saved DOS screen. You can save the screen in memory or on the adapter during a Hot Key function.

Modifying the global options is a selection on the Main Configuration menu.

Advanced Display Options

The following options are available for each session you have configured as a display:

- Modify additional display options:
 - Bypass presign-on screen
 - Buffer keystrokes
 - Immediate Hot Key to DOS
 - Print screen character set
- Modify the EBCDIC-to-ASCII translation table
- Modify the text editor screen attributes
- Modify screen colors and attributes
- Modify the column separator character
- Modify virtual diskette drive names
- Modify the station address list

Advanced Display Options, Menu 1

The options for customizing the display appear when you select *Modify Advanced Options* from the Session Configuration menu. (The options under *Modify additional display options* are explained in “More Display Options” on page 11-6.)

EBCDIC-to-ASCII Table

The EBCDIC-to-ASCII table provides the translation of EBCDIC values 00 through FF to ASCII. The default table supports all standard host applications. (Appendix A in the *Technical Reference* contains these tables.)

This option allows you to modify the translation of host EBCDIC characters to IBM Personal System/2 ASCII characters. Changing the table affects only the appearance of characters displayed on the IBM Personal System/2, not what is sent to the host.

An example of the use of this option is to assign the ASCII line-drawing characters to unassigned EBCDIC codes to display lines and box corners in a display session.

Note: This table is based on the codepage chosen when the Emulation program is installed. The default is 437. If you are using any other codepage when the Emulation program is started, the presign-on screen will display a warning message. You can continue; however, you may notice some characters do not appear as you expect them. For example, the cent sign (¢), ASCII code point 9B in the 437 codepage, is code point BD in the 850 codepage.

Modify Text Editor Attributes

The host text editor, Displaywrite/36, displays control symbols on the screen. This option allows you to modify how these control codes (subscript, required tab, CR, tab, RCR, superscript, page end, and required space) appear on the screen.

Screen Colors and Attributes

This option allows you to change the display attributes (blink, column separator, high intensity, normal, reverse, underscore, and color). The configuration program first prompts you to specify if the display is color or monochrome. It then displays the hex values of the attributes. You can define the appearance of the attribute.

Chapter 2 in the *Technical Reference* lists the attributes and their corresponding hex codes.

The host attribute codes hex 20 and 21 determine the appearance of the display session status line indicators and the printer operator panel. Hex 20 determines their appearance when they are OFF, and hex 21 when they are ON. You cannot assign hex 20 and 21 the same attribute value.

Column Separator Character

This option allows you to change the character used by the IBM Personal System/2 to emulate 3196 column separation. You can also change the character that appears in a host entry field when you type a blank with the Spacebar.

Normally, the Emulation program displays the column separator only when there is a null (hex 00) value at that position. You can choose to display the column separator character instead of a blank.

Virtual Diskette Drive Names

This option allows you to display and modify the list of drive names that reference a virtual diskette. This option is available only for use with the File Support Utility. See the *File Support Utility User's Guide* for more information.

Station Address List

In basic configuration, you specified a unique address for each session. You can also enter a list of addresses (that is, an address search list) for a session. This allows, for example, four users to share three addresses. The host allows up to seven addresses on a local work station line. You can include up to six addresses in a list. The Emulation program listens to the line and searches for the first address that is not being used by any other work station. The host first tries the station address you specified in "Creating Session Profiles" on page 3-13, then the addresses in the list.

The addresses should be rotated to reduce the chance of an address conflict. For example, if there are four users (A, B, C, and D) sharing three addresses (1, 2, and 3) the lists should be set up as follows:

User	A	B	C	D
Address list	1, 2, 3	2, 3, 1	3, 1, 2	1, 2, 3
Address one will likely get	1	2	3	1 (if user A is not online)

Notes:

1. Do not mix display and printer addresses in the same address list.
2. If two work stations attempt to use the same address at the same time, unpredictable results can occur.

More Display Options

Additional options appear when you select *Modify additional display options* from the Advanced Display Options menu.

Bypass Presign-On Screen

The presign-on screen displays the sessions as they become active when you load the Emulation program. This option allows you to bypass the presign-on screen when you load the Emulation program. Otherwise, you need to press Enter to erase the screen before you can continue.

Buffer Keystrokes

This option allows you to “type ahead,” that is, continue typing when the keyboard is locked. If keystroke buffering is configured for a session and the keyboard is locked (the Input Inhibited indicator is ON), up to 32 keystrokes are stored and then sent to the host when the Input Inhibited indicator is OFF. If more than 32 keys are pressed, an alarm is sounded for each key and the keystroke is discarded. As the buffer space is freed, additional keystrokes sent to the host are buffered.

Immediate Hot Key to DOS

This option instructs the Emulation program to switch to the DOS session immediately after you load the program, instead of the first active session.

You can use this option in conjunction with the *Bypass Presign-on screen* option to load the Emulation program from a batch file, then return automatically to the batch file processing.

Print Screen Character Set

This option allows you to specify the number of characters used when you print the screen. For example, the IBM Graphics Printer and Proprinter can print 255 characters, while the IBM Matrix Printer prints 127. If you use a printer that can print 255 characters, you need to specify the 255 character set.

Advanced Printer Options

The following advanced printer options are available:

- Modify printer hardware characteristics:
 - Disable the printer audible alarm
 - Change the printer paper width definition
 - Define default CPI and LPI for 5256 and 5224 Printers
 - Specify whether user intervention is required to change fonts
 - Specify the type of form feed
- Specify the printer attachment (parallel or serial)
- Define initialization data to be sent to the printer
- Modify the printer EBCDIC-to-ASCII translation table
- Change the 5219 paper feed hardware definition

The options for customizing the printer appear when you select *Modify Advanced Options* from the Session Configuration menu.

Printer Hardware

You can configure the following printer hardware characteristics.

Audible Alarm

If the audible alarm is enabled the Emulation program sends a BEL command to the personal computer printer when the host sends a BEL command or when a graphic check occurs. The audible alarm will be enabled by default.

Printer Paper Width

You can specify a paper width of either 8 or 13.2 inches. When a personal computer printer with a paper width of 8 inches is used to emulate a 5256, 5224, or 5219 Printer, the Emulation program will not allow printing beyond 8 inches. If the auto new line function is active, a new line operation equivalent to the New Line single byte control will be performed before printing the next graphic character. If the auto new line function is deactivated, an exception condition occurs.

CPI and LPI Selection

When emulating a 5256 or 5224 Printer, you can specify the default characters per inch (CPI) and lines per inch (LPI). The Emulation program uses these defaults until a print job requests a specific CPI or LPI. If these values are not supplied, the Emulation program uses 10 CPI and 6 LPI.

User Prompt for Font Change

When using 5219 or 5224 Printer functions, you may need to change the physical font element to change the CPI. For example, the IBM 5216 requires a printwheel change. This option allows you to indicate if the attached printer has this requirement. If you specify that a prompt is required, the Emulation program will request a font change each time the CPI is changed by the host. Otherwise, the Emulation program will send the CPI change to the printer and no user intervention will be requested.

You can also use this option if you have defined a non-supported printer to use 5219 printer functions. If you define a control sequence in the printer function table to change the font and request no prompt with this option, the Emulation program sends the command internally to change the font instead of prompting with the Change Font indicator.

Form Feed Selection

This option allows you to specify whether the printer uses continuous forms or cut sheets. The Emulation program uses this option to determine how to perform page ejection.

Parallel Attachment Options

If the personal computer printer is parallel attached, you can specify LPT1, LPT2, LPT3, or LPT4 as the port used to communicate to the printer. The default port is LPT1.

Serial Attachment Options

To configure a serial (asynchronous) attached printer, you will need to know the following information:

- Async port name (COM1 through COM4)
- Communication speed (baud rate)
- Number of data bits per frame (7 or 8)
- Number of stop bits per frame (1 or 2)
- Use of parity bit (none, even or odd)

This information depends on how your particular serial attached printer is configured. See the operator's guide for the printer for specific information.

Note that the Emulation program cannot distinguish between Not Ready and End of Forms conditions for serial attached printers. If either of these conditions occurs, the Emulation program will report that the attached printer is offline.

Printer Initialization String

Up to 64 bytes of initialization data may be specified for the printer. Each time you start the printer session, the Emulation program will send the initialization data to the printer.

EBCDIC-to-ASCII Table

You can modify the table used to translate host EBCDIC characters to personal computer ASCII characters. The Emulation program maintains two EBCDIC-to-ASCII translation tables, one for word processing applications and one for data processing applications. Any EBCDIC-to-ASCII translation modifications you make affect both tables.

Note: This table is based on the codepage chosen when the Emulation program is installed. The default is 437. If you are using any other codepage when the Emulation program is started, the presign-on screen will display a warning message. You can continue; however, you may notice some characters do not appear as you expect them. For example, the cent sign (¢), ASCII code point 9B in the 437 codepage, is code point BD in the 850 codepage.

5219 Printer Paper Feed Hardware

You can specify the type of paper feed hardware you want to attach to the printer. If a print job requests a type of paper feed that has not been defined for your printer, the Emulation program will request manual insertion of the required form. These types of paper feed hardware can be specified:

- One or two drawers
- Envelope feed

Configuring for Host Graphics

If you plan to use Host Graphics Support (HGS), you may want to run the graphics configuration program after you configure a display session for host graphics.

Graphics Characteristics

You can change the following graphics characteristics:

- Width/height ratio
- VDI buffer size
- Line style mapping
- Writing mode
- Color mapping

VDI must be loaded and initialized before you modify the above graphics characteristics (except color mapping). See “Installing Graphics” on page 2-8 for more information.

Width/Height Ratio

You can change the width to height ratio for pie charts to make them look more circular or oblong. The default is one to one (circular).

VDI Buffer Size

The VDI buffer saves the commands that build pictures on the display. This option allows you to increase the buffer size if you plan to shift in and out of graphics sessions (with the Hot Key function or Local Select 1). Increasing the buffer size ensures that the graphics display will be saved. The default (and minimum) size is 20,000 bytes.

Line Styles

The host supports seven line styles:

- 1 Solid
- 2 Long dash
- 3 Dotted
- 4 Dash/dot
- 5 Medium dash
- 6 Dash/two dots
- 7 Short dash

You can change any of these defaults to another line style to be displayed by the host.

Writing Mode

Writing mode determines how the background or previous figure is displayed (for example, what appears between the dots in a dotted line). You can change the defaults of functions 4, 7, and 8. See the *Graphics Development Toolkit* for more information.

Color Mapping

If the IBM Personal System/2 supports fewer than eight colors, you can change how those colors are mapped to the eight host colors.

Graphics Configuration Procedure

The defaults for graphics sessions emulate host graphics as closely as possible. Run a session with HGS to see if you want to change any defaults.

Notes:

1. You cannot configure for graphics if you are running a host graphics session. Stop the graphics session, then proceed.
2. You must install and initialize VDI before you configure graphics. See "Installing Graphics" on page 2-8 for instructions.

Use this procedure to configure graphics characteristics:

1. Switch to the DOS session. Change directories to \WSE, if necessary.
2. At the DOS prompt, type WSE and press Enter. The WSE main menu appears.
3. Select the option, *Graphics Configuration*. The program prompts you to enter a session profile name.
4. Type the name of a session profile configured for graphics and press Enter. A menu appears that lists the HGS configuration options.
5. Make the desired changes.
6. When you have finished, select the option to save the configuration. The program prompts you to enter the session profile name.
7. You can save the changes to the session profile you started with, or you can save them to a different profile. This allows you to keep several session profiles with the same station address and other information, but with different graphics configurations.
8. After you save the configuration, select the *Quit* option to exit.

Chapter 12. Keyboard Customization

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Introduction

Keyboard customization allows you to change the function of keys on the keyboard. This chapter explains how to create a keyboard customization file or modify an existing file.

The first section of this chapter gives information you should know before you begin. The second section has instructions for using the program. The third section lists the keyboard functions you can assign to a key.

The Keyboard Customization Program

Keyboard customization is an option of the configuration program that allows you to create new keyboard layouts to use with the Emulation program. Run this program to accomplish the following:

- Move keyboard functions to more convenient locations.
- Add certain functions to your keyboard layout that are not in the default keyboard layout. For example, you can set up the key sequences Alt-1 through Alt-4 to function as direct Hot Keys to sessions 1 through 4.
- Add playback sequences to your keyboard layout.

For each key, you can assign a function, a character, or a series of functions and characters (called a playback sequence) for the *base*, *shift*, and *alt* keyboard states. The keyboard customization program stores each new keyboard layout in a keyboard customization file. You can also use the keyboard customization program to modify the files you have created.

You can create several keyboard customization files to match your specific needs. For example, you could have one keyboard customization file that uses default assignments, and another that includes some of the advanced functions available.

You can create and modify keyboard customization files at any time. When the Emulation program is loaded, the keyboard customization file is read, and the functions and characters that it contains are assigned to the corresponding keys on the keyboard.

The keyboard customization program can be run by your host system administrator, who may save the keyboard customization files on a disk or diskette so that several users have access to the same keyboard layout.

Requirements for Customizing Keyboards

You need to know the name of the master profile that you use to run the Emulation program. You must put the keyboard customization file name into the master profile for the Emulation program to use it when sessions are started.

If you are editing an existing keyboard customization file, you need to know the name of the keyboard customization file before you run the configuration program. If you are creating a keyboard customization file, you are provided with a set of default assignments that you can modify and save.

How the Keyboard Customization Program Functions

You must use the keyboard customization program to view or modify a keyboard customization file. The file contains information in a binary internal data format that is not directly printable.

Each keyboard customization file contains three required sections and one optional section. The three sections found in all keyboard customization files are the definitions for the *base*, *shift*, and *alt* states of each key on the particular keyboard being described. The optional section, if used, contains strings of functions and characters (playback sequences) that are assigned to a state of a key. Pressing the key in a host session causes the entire playback sequence to be executed.

Customizing the Keyboard

This section gives instructions for using the program to customize keyboards.

Accessing the Customization Program

The keyboard customization program is an option of the configuration program. Select the option, *Create your own keyboard*, when prompted to select a keyboard style. This invokes the keyboard customization program. Then you decide if you will create a new keyboard customization file, or modify an existing file.

Creating a New Keyboard Customization File

Select the option to create a keyboard customization file. A keyboard diagram, based on the Enhanced keyboard default values, appears. You can use this file as is, or modify it and save it under a different filename.

Note: Do not save the file under the name of the default file, WSEMAST.KBD.

Defining Keys with the Keyboard Assignment Screen

The Keyboard Assignment screen displays a diagram of the keyboard. A symbol of each key is shown in the location that it would be found on an actual keyboard. There are three basic steps in defining keys:

1. Select a key that you want to define. A window appears that shows you the current assignment for that key in the *base*, *shift*, and *alt* states.
2. Type the new key definition, or select a function from the function list.
3. After you define all the keys you want to change, save your new keyboard layout in a keyboard customization file.

The following sections provide detailed instructions for each step.

Selecting a Key to Define

There are two methods for selecting the key you want to define:

- Use the IBM Personal System/2 keyboard:

Press the key you want to define while holding down a Shift key.

The keyboard you are using does not need to match the keyboard assignment screen. In this case, some keys may have different locations. For example, if you are using a PC-style keyboard to define an Enhanced keyboard, pressing Shift-F1 (F1 located on the top row of the PC-style keyboard) allows you to define the function of the F1 key on the Enhanced layout (located on the left side on the keyboard assignment screen).

- Use the key assignment screen layout:

Move the cursor to the location of the key you want to define and press the Spacebar.

The selected key is highlighted on the screen layout. A screen displays the current assignments in each state for the key you selected. The shift states are as follows:

Base state

The definition for the key when you press only that key.

Shift state

The definition for the key when you press and hold down a Shift key, then the key. The *shift* state definition also applies to Shift Lock, CapsLock, and NumLock.

Alt state

The definition for the key when you press and hold down an Alt key, then the key.

You can assign a single character, a single function, or a series of characters and functions to each state. When a key is selected, the cursor appears in the input field for the *base* state of the key. To change the assignment for the *shift* or *alt* state, press Tab to move the cursor to the input field you want.

Notes:

1. The right and left Shift keys are always defined as Shift keys. You may not redefine them for any other purpose.
2. You can define the Alt, Ctrl, and Scroll Lock keys only in the *base* and *shift* states. You cannot define these keys in the *alt* state.
3. The function assigned to an Alt key is performed only when you press the Alt key and then release it, and if you have not pressed any other key while the Alt key was held.

Assigning a Single Function to a Key

After you select a key, you type the new character or function in an entry field. For example, you can define a Hot Key rotation or a direct Hot Key to a particular session.

If you need to see a list of valid functions, press F3 or see “Key Function Names” on page 12-10. The functions are listed in groups. For example, all the cursor movement functions are displayed as one group. To scroll through the function window, press the PgDn and PgUp keys. To display the definition of a function, move the cursor to the function and press F1.

To assign a single character or function to a selected key, execute these steps:

1. Move the cursor to the input field for the key state you want to define (*base*, *shift*, or *alt*).
2. Type the character enclosed in single or double quotation marks.

Or, type the name of the function you want to assign to the key inside square brackets. For example, to assign the key sequence Alt-2 to execute the Hot Key function that switches directly to session 2, select the 2 key to define, then type in the ALT STATE field:

[HOTKEY2]

Or, press F3 to display the function list. Move the cursor to the function you want to use and press Enter. This function is entered in the input field. (If you decide not to select a function, press Esc. The cursor returns to the input field.)

3. After you type the character or function name or select a function from the list, press Enter to record the new key assignment.
4. Repeat these steps for all keys you want to have single functions.

Assigning a Playback Sequence to a Key

A playback sequence is a combination of characters and functions that you assign to the state of a single key. After you assign a playback sequence of keystrokes to a key, whenever you press that key, all keystrokes in the sequence are entered for you.

You can assign a playback sequence that allows you to switch to a particular session (Hot Key) and then continues with the function or data you enter. If the playback sequence contains a request for Hot Key and more data follows the Hot Key request, the playback sequence continues in the new session. If the requested session is the DOS session, the playback sequence ends. Playback sequences do not function in the DOS session.

To assign a playback sequence to a key, execute these steps:

1. Select a key from the Keyboard Assignment screen as described above.
2. Type the names of the functions and the character strings.
 - Put square brackets around each function name.
 - Put quotation marks around each string. You may use either single (') or double (") quotation marks. If you use a quotation mark within a character string, use a different style quotation mark to begin and end the string.

Example: For a playback sequence that displays the time when you press Alt-t, select the *t* key to define, then type in the ALT STATE field:

```
"time" [ENTER]
```

If you need to assign a playback sequence that is longer than the input field, press F4. A new screen appears that allows you to enter more characters.

3. After you type the playback sequence, press Enter to record the playback sequence.

Notes:

1. When creating playback sequences, an error message appears if you exceed the total space allowed for all playback sequences.
2. You should not assign strings, such as security code strings, that you do not want displayed. These strings can be played back in a displayable field.
3. You cannot use CapsLock or NumLock in a playback sequence.
4. While running 3270 emulation on the host, the Input Inhibited indicator may be cleared when the system is not ready to accept keystrokes. Clearing Input Inhibited may cause playback sequence keys to be discarded. You should be careful when defining playback sequences for use during 3270 emulation.

Saving the Keyboard Layout

When you finish assigning key definitions, you save them in a keyboard customization file. To save the keyboard layout, execute these steps:

1. Press Enter. The Save the Keyboard Customization File screen appears.
2. Select the option to save the keyboard customization file. (If you press Esc or select the option *Return to Select a Keyboard Layout*, the changes are not saved.) The screen displays a default keyboard customization file name. (If you are editing an existing customization file, that name appears.)
3. Press Enter to save the changes in this default file. Or, type a name for the keyboard customization file and press Enter. The Save the Keyboard Customization File screen appears.
4. Press Esc to display the Assignment screen and continue keyboard customization. Or, you can quit and return to the Select a Keyboard Layout screen of the configuration program.

Selecting the Customized Keyboard

After you create a keyboard customization file and want to use it, you must put the file name in the master profile. Use this procedure:

1. From the Save the Keyboard Customization File screen, select the option, *Return to Select a Keyboard Layout*. The Select a Keyboard Layout screen appears.
2. Select the option, *Use an existing keyboard customization file*.
3. The program displays the name of the file you saved. Press Enter to copy the keyboard customization file name to the master profile. (You can also enter the name of another profile.)

Editing a Keyboard Customization File

You can edit an existing keyboard customization file. Execute these steps:

1. Select the option, *Create your own keyboard*, from the Select a Keyboard Layout screen.
2. Select the option to edit an existing keyboard customization file.
3. The screen prompts for the name of the keyboard file you want to edit. Type the name of the profile and press Enter.
4. The keyboard layout screen from the keyboard customization file you requested appears. Change the key assignments the same way you defined the key assignments when you created a new keyboard customization file.
5. Save the modified keyboard customization file as described in "Saving the Keyboard Layout" on page 12-8.

Key Function Names

This section lists the functions you can assign to single keys and playback sequences.

Host Command Functions

CMD
CMD1 through CMD24

Data Control Functions

INSERT
INSERT TOGGLE
DELETE
ROLL UP
ROLL DOWN
ERASE INPUT

System Functions

TESTREQ
CLEAR
HEX
MODE
ATTN
SYSREQ
HOME
HELP
RESET
ENTER
DUP
LOCAL SELECT

Print Functions

PRINT HOST
PRINT PC

Cursor Functions

UP
DOWN
LEFT
RIGHT
FAST LEFT
FAST RIGHT
SPACE
BACKSPACE
TAB
BACKTAB
NEWLINE
FIELD EXIT
FIELD +
FIELD-
CURSOR

Shift Control Functions

SHIFTLOCK
CAPSLOCK
NUMLOCK

Numeric Pad Functions

PAD.
PAD0 through PAD9

Hot Key Functions

HOTKEY (rotation)
HOTKEYD (to DOS session)
HOTKEY1 (to session 1)
HOTKEY2 (to session 2)
HOTKEY3 (to session 3)
HOTKEY4 (to session 4)

Special Character Values

CENT (¢)

BAR (|)

NOT (¬)

Keyboard Templates

Blank templates are provided to assist you with the operation of your customized keyboard. The keyboard template may be placed at the top of the keyboard as a reminder of the key placement.

Appendix A. Handling Error Codes and Messages

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General Information

This appendix contains error codes and messages for the Emulation program. The following types of errors are described:

Printer Errors: Errors that appear on the printer operator panel. Sources include:

- 5219 Printer errors
- 5224 Printer errors
- 5256 Printer errors
- Communications errors
- Operator errors

Four-digit Error Codes: Errors generated by the host. These appear in the lower left hand corner of the display or printer session. Sources include:

- Controller errors
- Communications errors
- Operator errors

WSE Error Codes: Errors generated by the Emulation program. These messages begin with WSE. Sources include:

- Communications errors
- Emulation program errors
- Initialization errors
- Initialization messages
- Operator errors
- Keyboard customization file errors
- Plotter messages
- Informational messages

Two-digit Graphics Error Codes: Errors generated by a graphics data stream. They appear on the status line in a graphics session. Sources include:

- Plotter errors
- Data stream errors
- Communications errors
- Operator errors

CAUTION

References are to specific keys in the Enhanced keyboard file. If you have redefined any of the keys, use the appropriate key.

If a keying error occurs while you are typing information in an emulation session, the following occurs:

- A 4-digit error code is displayed on the screen (usually on the last line of the screen).

Find the 4-digit error code in this appendix and attempt the recovery procedure.

If keystroke buffering has not been selected:

- The host ignores any additional data entered from the keyboard.
- The IBM Personal System/2 beeps each time you press a key.

If keystroke buffering has been selected:

- Additional keystrokes are buffered and must be cleared using the Error Reset key or the Immediate Reset key sequence before further recovery actions can be taken.

Notes:

1. Error codes 0040 through 0054 are communication errors and occur when the IBM Personal System/2 is attached as a remote work station through the IBM 5294 Controller. These errors must be corrected at the controller.
2. Two-digit graphics error codes (not local error codes) that define graphics errors are displayed on the status line of the IBM Personal System/2 and also are available to the programmer by using the *read status* graphics order.
3. Printer emulation can only detect the End of Forms (out of paper) and Printer Not Ready conditions on personal computer printers. If you do not know how to respond to a printer message, see the operator's guide for the printer you are using.

Using the Help Function

Some hosts provide assistance for error recovery. If an error code appears after you sign on to the host, press the emulated Help key. A message appears describing the error condition. After you read the message, press the emulated Error Reset key and perform the recovery procedure listed for the error code. You should then be able to continue typing.

Additional Information

Additional error information can be found in the host system messages manual. If you are not able to recover from an error, refer to Appendix B, "Problem Determination."

Printer Errors

Printer errors appear on the printer operator panel.

Note: If you do not know how to respond to an error message, see the operator's guide for the attached printer.

Attached Printer Offline: (5219, 5224, 5256 Emulation)

The Emulation program tried to send host data to the printer, but a Printer Not Ready condition exists.

The printer's internal buffer may have lost some information. The host is only informed that the printer was not available. It is not aware of any possible loss of information. If any information was lost, see the appropriate host recovery procedures.

This message is removed when the *Start* option is successfully completed by the program.

End of Forms (5219 Emulation)

When an End of Forms (out of paper) condition is indicated, the following happens:

- The Ready indicator is turned OFF.
- The End of Forms indicator is turned ON.
- The host is notified of the End of Forms condition.

Recovery

1. Correct the out of paper condition and make the printer ready.
2. Select the *Start* option from the operator panel. The Ready indicator is turned ON.

End of Forms (5224 Emulation)

When an End of Forms (out of paper) condition is indicated, the following happens:

- The Ready indicator is turned OFF.
- The Attention and Forms indicators are turned ON.
- The host is notified of the End of Forms condition.

Recovery

1. Correct the End of Forms condition and make the printer ready.
2. Select the *Stop/Reset* option from the operator panel. The Attention and Forms indicators are turned OFF.
3. Select the *Start* option from the operator panel. The Ready indicator is turned ON.

End of Forms (5256 Emulation)

When an End of Forms (out of paper) condition is indicated, the following happens:

- The Ready indicator is turned OFF.
- The Attention and Forms indicators are turned ON.
- The host is notified of the End of Forms condition.

Recovery

1. Correct the End of Forms condition and make the printer ready.
2. Select the *Stop/Reset* option from the operator panel. The Attention and Forms indicators are turned OFF.

Note: If the printer was turned off to correct the End of Forms, select the *Suspend* option before you select the *Stop* option.

3. Select the *Start* option from the operator panel. The Ready indicator is turned ON.

Invalid Option

You have selected an option that does not appear on the operator panel.

This message is removed when a valid option is selected.

Output Data Field Values (5219 and 5224 Emulation)

The output data codes for the IBM 5219 Printer and the IBM 5224 Printer are listed in Figure A-1 on page A-8. These codes may indicate a print font, a feature, or a condition that has occurred on your printer. Check the table for instructions.

If a print font has been requested, refer to the information provided for you or request help from the host system operator.

If the host is expecting a printer operation that uses a feature of the attached printer, or an error condition has occurred, follow the instructions given in the printer operator's guide.

After you find the Output Data field value, execute these steps:

1. Perform the action listed.
2. Select the *Start* option.

The column headings for Figure A-1 are as follows:

Value	Output Data field value
Setup	Setup indicator ON (if X)
Form	Form indicator ON (if X)
Except	Printer Exception indicator ON (if X)
Action	Requested operator action

Value	Setup	Form	Except	Action
Blank		X		Load paper.
01	X			Manual paper feed selected. Install appropriate device.
01		X		Manual paper feed override. Feed paper from drawer 1.
02	X			Tractor feed selected. Install appropriate device.
02		X		Manual paper feed override. Feed paper from drawer 2.
03	X			Automatic sheet feed selected. Install appropriate device.
0E		X		Manual paper feed override. Feed from envelope feed.
10-14 16-17 20-26 30-32 40			X	Contact the host or controller operator and report a formatting error. (Include the value in the Output Data field.)
55				Controller stopped the printer. Contact the host or controller operator for directions.
D1		X		Paper feed type is continuous tractor. Change to source drawer 1.
D2		X		Paper feed type is continuous tractor. Change to source drawer 2.
Any number				If the Change Font indicator is ON, change to the font indicated by the host system programmer.

Figure A-1. Output Data Field Values

Printer Emulation Suspended

You have suspended printer emulation. The printer can now be used by a personal computer application program. Select the *Start* option to remove this message.

Four-Digit Error Codes

The 4-digit error codes are generated by the host and appear in the lower left-hand corner of the display.

0000 No Help Text Available

Cause: You pressed the emulated Help key; however, either no error code was displayed or the error was issued by a program that does not support this function.

Action: Press the emulated Error Reset key. Then continue, or refer to the meaning of the previously displayed error code and take the action described.

0001 Keying Too Fast

Cause: The host or controller could not keep up with the rate at which you were pressing keys, and the last keys pressed were not recognized.

Action: Press the emulated Error Reset key and then continue.

0002 Received Invalid Code

Cause: The host or controller received a key code that is not valid and therefore does not recognize which key you pressed.

Action: Press the emulated Error Reset key and try to continue.

0003 Key Not Command Key

Cause: You pressed the emulated Cmd key, but the next key you pressed was not one of the command function keys.

Action: Press the emulated Error Reset key and continue by pressing valid keys.

0004 Protected Field

Cause: You have attempted to type in a field that does not allow keyboard input. This field is defined as an input/output feature field.

Action: Press the emulated Error Reset key.

0005 Protected Field

Cause: You have attempted to type in a field that is not an input field. Data cannot be entered in a protected area of the screen.

Action: Press the emulated Error Reset key and move the cursor to a valid input field.

0006 Invalid Entry

Cause: After pressing the emulated Attn key and before pressing the emulated Enter key or the emulated Error Reset key, you pressed a key that is not valid.

Action: Press the emulated Error Reset key and use a valid key sequence.

0007 Must Enter Field

Cause: There is at least one mandatory entry field on the screen that you must put data into before the screen can be changed or moved. (The cursor moves to the first character position of the first mandatory entry field requiring data.)

Action: Press the emulated Error Reset key and press the required keys.

0008 Alphabetic Only Field

Cause: The field you are now trying to put data into takes only alphabetic data, and you pressed a nonalphabetic character. Valid characters are a through z, A through Z, blank, comma, period, and hyphen.

Action: Press the emulated Error Reset key and continue by pressing valid keys.

0009 Numeric Only Field

Cause: The field you are now trying to put data into takes only numeric data, and you pressed a nonnumeric key. Valid characters are 0 through 9, blank, comma, period, plus, and minus.

Action: Press the emulated Error Reset key and continue by pressing valid keys.

0010 Signed Numeric Only Field

Cause: The field you are now trying to put data into takes only signed numeric data, and you pressed an invalid key. Valid characters are 0 through 9.

Action: Press the emulated Error Reset key and continue by pressing valid keys.

0011 Sign Position Only

Cause: You attempted to put data into the last position of a signed numeric field.

Action: Press the emulated Error Reset key. Make sure that the data is correct and exit the field with the emulated Field- or Field+ key.

0012 Field Full

Cause: There is no room to put data in this field. Either there is no more room in the field, or the cursor is in the last position of the field.

Do not use Insert mode to change data or put data into the last position of this field.

Action: Press the emulated Error Reset key. Then correct the field, if necessary, and continue.

0013 Insert Mode On

Cause: You attempted to leave a field while the IBM Personal System/2 was still in Insert mode.

Action: Press the emulated Error Reset key and exit the field normally.

0014 Must Fill Field

Cause: You pressed a function key that would move the cursor out of this field; however, the requirements of this mandatory fill field have not been met. A mandatory fill field must be completely filled or left blank.

Action: Press the emulated Error Reset key. Fill the entire field, or move the cursor to the start of the field, then use the emulated Field- or Field+ key.

0015 Does Not Compare

Cause: You have put data into a self-check field; the number and the check digit you entered do not compare.

Action: Press the emulated Error Reset key. Check that you used the correct number and check digit. If you used the correct characters, check that the number is valid for a self-check field.

0016 Not Signed Numeric Field

Cause: You pressed the emulated Field- key, but the current field is not a signed numeric field or (for some hosts) a numeric only field.

Action: Press the emulated Error Reset key. Continue by pressing data keys or press the emulated Field+ key.

0017 Field Not Full

Cause: You pressed the emulated Field- or Field+ key; however, the requirements for this mandatory fill field have not been met. A mandatory fill field must be completely filled unless you exit it from the first position of the field.

Action: Press the emulated Error Reset key. Then continue by pressing data keys to fill the field, or move the cursor to the start of the field, and use the emulated Field- or Field+ key.

0018 Nodata Key Required

Cause: You must use a nodata key such as emulated Field+, Field-, Field Exit, or a cursor movement key to leave this field.

Action: Press the emulated Error Reset key. Then use a nodata key to leave this field.

0019 Dup Key Not Allowed

Cause: You pressed the emulated Dup key; however, the Dup key is not permitted in this field.

Action: Press the emulated Error Reset key and continue without using the emulated Dup key in this field.

0020 Right Adjusted or Signed Numeric Field

Cause: You pressed a key that is not allowed in this field. This is either a right-adjusted or a signed-numeric field, and you must exit the field before pressing any of the following keys: Backspace, emulated Enter, emulated New Line, emulated Cmd, emulated Help, emulated Roll Up, emulated Roll Down, and emulated Home when the cursor is in the home position.

Action: Press the emulated Error Reset key. The cursor is in the same position it was in when you pressed the invalid key. Continue by pressing the emulated Field- or Field+ key.

0021 Must Enter Field

Cause: The cursor is positioned in a mandatory enter field. A mandatory enter field must have data in it before you can exit the field by pressing the emulated Field+ or the emulated Field- key.

Action: Press the emulated Error Reset key and press the required data keys.

0022 System Error

Cause: A host error has occurred. The status of the current field is not known. This error can occur during an insert or delete operation.

Action: Press the emulated Error Reset key. Check the screen to determine if the insert or delete function was completed properly. If not, correct the field.

0023 Nonhexadecimal Key

Cause: You are in hexadecimal mode, but you did not type hex digits (1 through 9 and A through F). This error also occurs when a hex code is used in a numeric only, signed numeric, alphabetic only, or input/output field.

Action: Press the emulated Error Reset key. Continue by pressing the valid key.

0026 Numeric Only Field

Cause: You pressed the emulated Field- key to exit a numeric only field, but the last position of the field was not 0 through 9.

Action: Press the emulated Error Reset key. Correct the last position of the field or exit the field with the emulated Field+ key.

0028 Key Not Assigned

Cause: You pressed a key that is not used by this program.

Action: Press the emulated Error Reset key and continue by pressing a valid key.

0029 Not Diacritic Key

Cause: The second key pressed during a diacritic key function did not result in a valid combination.

Action: Press the emulated Error Reset key and enter a valid combination.

0040 Data Set Not Ready

Cause: The 'data set ready' line is inactive, and it should be active.

Action: Notify the controller operator.

0042 Receive Clock Failed

Cause: The receive clock signal failed during a receive operation.

Action: Notify the controller operator.

0043 Data Set Ready

Cause: The 'data set ready' line is active, but it should be inactive.

Action: Notify the host or controller operator.

0044 Not Receiving Data

Cause: The 30-second communication time-out has expired with no valid data being received.

Action: Notify the controller operator.

0050 Clear and Request to Send Not Together

Cause: Either the 'clear to send' line was inactive while the 'request to send' line was active, or the 'clear to send' line was active while the 'request to send' line was inactive.

Action: Notify the controller operator.

0051 Transmit Clock Failed

Cause: The transmit clock signal failed during a transmit operation.

Action: Notify the controller operator.

0052 Controller Error

Cause: The controller has detected an internal error.

Action: Notify the controller operator.

0054 Controller Received Invalid Command

Cause: The controller received an invalid command from the host.

Action: Notify the controller operator.

0099 Host Not Available

Cause: A key that required host action was pressed, and the host was not available.

Action: Determine when the error occurred (before, during, or after sign-on) then refer to "DOS Program ID on Screen" on page B-7 for the meaning and recovery procedures.

WSE Error Codes

The following errors are generated by the Emulation program.

WSE-1003 filespec File In Improper Format

Cause: When trying to configure a session, one of the files (*filespec*) required by the Emulation program or the configuration program is not in the correct format.

User Action: Notify your support personnel for assistance.

Programmer Action: When the filespec was read, it was not in the expected format (the file has been corrupted in some manner). Supply the user with a new copy of the file from the backup diskette.

WSE-1102 filespec File Not Found

Cause: The running program requires the given file specification (*filespec*), but the file could not be found. The file may exist on a different directory.

User Action: Return to the DOS prompt. If the file is in another directory, copy it into the directory you are running from. If you cannot find a copy of the file, contact your support personnel for assistance.

Programmer Action: Supply the user with a new copy of the file from the backup diskette.

WSE-1300 xxxx Loading WSE Emulation Programs

Cause: Informational message.

User Action: None necessary.

Programmer Action: This return code (xxxx) is for your information only; no recovery is needed.

WSE-1303 Adapter Card Not Found

Cause: The Work Station Emulation adapter is not installed in the system.

User Action: Notify your support personnel for assistance.

Programmer Action: Check that the adapter is installed correctly; refer to the *Work Station Emulation Adapter Quick Reference*.

WSE-1304 Station Address Already In Use

Cause: The station address specified in the session profile is already in use.

User Action: Notify your support personnel for assistance.

Programmer Action: Check that the defined station address in the profile is correct. Also verify that the host configuration is correct.

WSE-1305 Emulator Already Loaded

Cause: You attempted to load the Emulation program, but it has already been loaded.

User Action: Use the Hot Key function to enter an emulation session.

Programmer Action: An attempt is being made to load the Emulation program after it has already been loaded. The defined startup procedures for the user may be in error.

WSE-1306 WSE Hardware Diagnostic Failure

Cause: The loading procedure has detected an error with the adapter.

User Action: Write down the error number (WSE-1306) and 2-digit error code. Report the error to your support personnel.

Programmer Action: The adapter has an error. Perform the hardware diagnostics to isolate the problem. Report the problem to your service personnel.

WSE-1307 Waiting For System Available

Cause: The Emulation program is waiting for the host to identify the session as coming online. This is for your information only.

User Action: None necessary.

Programmer Action: None necessary.

WSE-1308 Line Check At Station Address

Cause: The Emulation program received data it did not recognize from the host (for example, the data contained a parity error) while starting the program. This message indicates a possible hardware error in the host, the cable, or the IBM Personal System/2.

User Action:

1. Terminate the Emulation program. The IBM Personal System/2 is returned to DOS and no sessions are active.
2. Reload. The Emulation program retries the address or address list. If the problem recurs, report the error to your support personnel.

Programmer Action: Perform the hardware diagnostics to verify the adapter is in working order. Contact your host system support personnel and have them check the host system.

WSE-1309 DOS File Specification Initialization Data Is Invalid

Cause: The configuration file exists, but does not contain data in the proper format for configuration data.

User Action: Write down the error number (WSE-1309) and DOS file specification and notify your support personnel.

Programmer Action: The configuration file is generated by the configuration program and can only be edited through this program. If the Emulation program does not recognize the configuration data, it displays this message and returns control to DOS. You should delete the configuration file (see DOS manuals for instructions) and run the configuration program again to generate a new file.

WSE-1310 Error On Command Line

Cause: The data on the command line is not recognized.

User Action: Write down the error number (WSE-1310) and message and notify your support personnel.

Programmer Action: Reference the load procedures for the Emulation program and specify the desired valid parameters.

WSE-1311 DOS Version Is Not Supported

Cause: A DOS level other than DOS 3.3 is running in the IBM Personal System/2.

User Action: Write down the error number (WSE-1311) and message and notify your support personnel.

Programmer Action: See "Requirements for the Emulation Program" on page 1-3 and load the correct level of DOS on the IBM Personal System/2.

WSE-1312 No Space For WSE Adapter RAM

Cause: Bringup code was unable to install the adapter RAM.

User Action: Write down the error number (WSE-1312) and message and notify your support personnel.

Programmer Action: A 16K region above configured RAM must be made available to run the Emulation program.

WSE-1313 Message ID Has No Message

Cause: The Emulation program is attempting to issue a message that is not documented.

User Action: Write down the error number (WSE-1313) and message and notify your support personnel.

Programmer Action: Write down the error number and message and notify your service personnel.

WSE-1314 WSE Boot File Not Found

Cause: The Emulation program attempted to load the boot record, but it was not found.

User Action: Write down the error number (WSE-1314) and message and notify your support personnel.

Programmer Action: Reference the Installation procedures and verify that the file WSEBOOT.LEX is in the emulation directory. If it is not, reinstall. If it is, notify your service personnel.

WSE-1315 WSE Adapter RAM Is Failing

Cause: The WSE on-card RAM is failing.

User Action: Write down the error number (WSE-1315) and message and notify your support personnel.

Programmer Action: Reference the diagnostic procedures and then notify your service personnel of the hardware failure.

WSE-1316 Interrupt Vector Does Not Point To WSE

Cause: The bringup code determined that the interrupt vector used to locate the Emulation program does not point to it.

User Action: Write down the error number (WSE-1316) and message and notify your support personnel.

Programmer Action: The Emulation program must be the last program to chain into interrupt vector hex 0D. This allows application programs to use the documented interface to key emulation functions.

WSE-1317 On Card RAM Has Been Overlaid

Cause: The adapter on-card RAM contains data of an unknown origin.

User Action: Write down the error number (WSE-1317) and message and notify your support personnel.

Programmer Action: Invalid data has been written onto the adapter RAM, causing unpredictable results to the Emulation program. Turn the IBM Personal System/2 off, then back on to restore the integrity of the system RAM.

WSE-1318 Configured RAM Address Is In Error

Cause: The master profile used to start the Emulation program contains a desired location for on-card RAM. That address cannot be used by the Emulation program.

User Action: Write down the error number (WSE-1318) and message and notify your support personnel.

Programmer Action: Configure a new address for the Emulation program. See your IBM Personal System/2 technical reference manual to assist you in determining a valid address to use.

WSE-1319 Incompatible Emulator Version Loaded

Cause: A downlevel version of the Emulation program is loaded on the system.

User Action: Write down the error number (WSE-1319) and message and notify your support personnel.

Programmer Action: Terminate and restart the Emulation program.

WSE-1320 Internal Emulator Error

Cause: An error has been diagnosed that inhibits the functionality of the Emulation program.

User Action: Write down the error number (WSE-1320) and message and notify your support personnel.

Programmer Action: Terminate and restart the Emulation program. If the problem recurs, notify your service personnel.

WSE-1321 Session Already Defined

Cause: A request has been made to start a session that is already defined.

User Action: Write down the error number (WSE-1321) and message and notify your support personnel.

Programmer Action: Terminate and restart the Emulation program. If the problem recurs, notify your service personnel.

WSE-1322 System Not Available

Cause: A request has been made to start a session, but the host system is not responding.

User Action: Write down the error number (WSE-1322) and message and notify your support personnel.

Programmer Action: The host system is not polling the station address configured for the session. Verify that the host is configured properly.

WSE-1323 Card Not Usable

Cause: During initialization, the adapter was not usable.

User Action: Write down the error number (WSE-1323) and message and notify your support personnel.

Programmer Action: The adapter is either not functioning correctly or not installed properly. Reference the *Work Station Emulation Adapter Quick Reference* to remedy the problem.

WSE-1430 Printer Port Already In Use

Cause: The port specified by the session profile is already in use by an active session.

User Action: Write down the message number (WSE-1430) and the 2-digit error code. Report the error to your support personnel.

Programmer Action: Check the session profile for the correct port and the station for the correct configuration. If necessary, run the configuration program to change the port or reconfigure the station.

Error code	Port	Error code	Port
00	LPT1	10	COM1
01	LPT2	11	COM2
02	LPT3	12	COM3
03	LPT4	13	COM4

WSE-1446 Printer Function Table Is Too Large

Cause: The printer function table (PFT) was too large for assigned memory.

User Action: Write down the message number (WSE-1446) and report the error to your support personnel.

Programmer Action: Check the session profile for the correct PFT file specification. Check the contents of the PFT. If necessary, reconfigure the session profile with the correct PFT, or rebuild the PFT with the PFT setup program.

WSE-1447 Printer Screen MRI File is Invalid

Cause: The printer screen MRI file either is too large or contains invalid data.

User Action: Write down the message identifier (WSE-1447) and report the error to your support personnel.

Programmer Action: Verify that the WSEPRINT.MRI file has not been modified and that its name has not been duplicated.

WSE-1451 Keyboard File Error

Cause: During initialization, an error was detected while processing a keyboard file or the IBM-supplied defaults.

User Action: Do not use this file because it is bad.

Programmer Action: If the file is a keyboard file specified by the user, run keyboard customization to see if it can be brought up and saved without giving errors. If it does not work, the file is bad. If a back-up for the file is not available, a new one must be created.

WSE-1452 File Is Empty

Cause: The file listed in the file specification is empty.

User Action: Give a keyboard file name which is not empty.

Programmer Action: If the desired file is empty, create a new one with the keyboard customization program.

WSE-1453 Invalid File

Cause: The filename given in the file specification is not valid.

User Action: The filename given is not valid for use as a keyboard file.

Programmer Action: If the name is WSEMAST.KBD, this is not a keyboard file, but is required for initialization. A copy named WSEMAST.KBP should be put in the emulation directory. If the name is not WSEMAST.KBD, then the keyboard file specified was not created with the keyboard customization program.

WSE-1454 File Not Keyboard Compatible

Cause: The keyboard file that is specified in the master profile was created for another personal computer system or keyboard.

User Action: Do not use the file; it contains bad data. Configure for a keyboard file for the current system and keyboard that you are using.

Programmer Action: See message WSE-1459.

WSE-1455 xx Keyboard unshifted state error

Cause: During initialization, an error was detected while processing a keyboard file in the unshifted (base) state of the keyboard file at PC scan code location xx.

User Action: Do not use this file because it is bad.

Programmer Action: Run keyboard customization to see if it can be brought up and correct the mistake in the defined location given by the PC scan code value and save it. If this does not work, the file is bad. If a back-up for the file is not available, a new one must be created.

WSE-1456 xx

Keyboard shift state error

Cause: During initialization, an error was detected while processing a keyboard file in the *shift* state of the keyboard file at PC scan code location xx.

User Action: Do not use this file because it is bad.

Programmer Action: Run keyboard customization to see if it can be brought up and correct the mistake in the defined location given by the PC scan code value and save it. If this does not work, the file is bad. If a back-up for the file is not available, a new one must be created.

WSE-1457 Playback Exceeded For File

Cause: The keyboard file being processed contains key sequences that exceed the area allowed for playback sequences.

User Action: Reduce the key sequences with the keyboard customization program until this error does not occur.

Programmer Action: Same as for the user.

WSE-1458 Default Keyboard Layout Error

Cause: The IBM-supplied defaults have errors in them.

User Action: Ask the programmer.

Programmer Action: The WSEMAST.KBD file has errors in it. Take this file from the original (or latest version) backup diskette and copy it to the emulation directory and then rerun the program.

WSE-1459 xx

Keyboard alternate state error

Cause: During initialization, an error was detected while processing the *alt* state of a key in the keyboard file at PC scan code location xx.

User Action: Do not use this file because it is bad.

Programmer Action: Run keyboard customization to see if it can be brought up and correct the mistake in the defined location given by the PC scan code value and save it. If this does not work, the file is bad. If a back-up for the file is not available, a new one must be created.

WSE-1460 xx

Keyboard playback state error

Cause: During initialization, an error was detected while processing a keyboard file in the playback state of the keyboard customization file at PC scan code location xx.

User Action: Do not use this file because it is bad.

Programmer Action: Run keyboard customization to see if it can be brought up and correct the mistake in the defined location given by the PC scan code value and save it. If this does not work, then the file is bad and if a back-up for the file is not available, then a new one must be created.

WSE-1500 VDI Device Drivers Not Loaded

Cause: The VDI device drivers are not loaded.

User Action: Write down the message number (WSE-1500). Report the error to your support personnel.

Programmer Action: Verify that the CONFIG.SYS file is present and that it specifies the correct VDI device driver. Then reload DOS.

WSE-1501 Attempt To Open Graphics Workstation Failed

Cause: During initialization, an error was returned from the VDI device driver.

User Action: Write down the message number (WSE-1501). Report the error to your support personnel.

Programmer Action: Verify that the CONFIG.SYS file is present and that it specifies the correct VDI device driver. Then reload DOS.

WSE-1502 Unsupported Graphics Device

Cause: You attempted to use an unsupported graphics device.

User Action: Write down the message number (WSE-1502). Report the error to your support personnel.

Programmer Action: Run the configuration program and specify a supported graphics device or change the session to nongraphics.

WSE-1503 Comm adapter conflict with printer session

Cause: You attempted to use a graphics plotter and a serial printer on the same asynchronous communications adapter.

User Action: Write down the message identifier (WSE-1503). Report the error to your support personnel.

Programmer Action: Run the configuration program and specify a different adapter.

WSE-1504 Default Graphic Parameters Will Be Used

Cause: The graphics characteristics specified in the graphics session profile do not match the characteristics of the graphics adapter you are using. Defaults will be used.

User Action: If you are not satisfied with the graphics session's characteristics, ask your support personnel to change them with the graphics configuration program.

Programmer Action: Run the graphics configuration program to change the characteristics.

WSE-1505 Specified Comm Adapter Not Found

Cause: The asynchronous communication adapter specified in the configuration program cannot be found.

User Action: Write down the message identifier (WSE-1505). Report the error to your support personnel.

Programmer Action: Run the configuration program and specify an adapter that is installed in the IBM Personal System/2.

WSE-1506 WSEVDI.LEX Module Not Found

Cause: The graphics program could not find WSEVDI.LEX.

User Action: Write down the message identifier (WSE-1506). Report the error to your support personnel.

Programmer Action: Make sure that WSEVDI.LEX is in the emulation directory (\WSE).

Two-Digit Graphics Error Codes

The 2-digit graphics error codes appear on the status line of the IBM Personal System/2 and also are available to the programmer using the *read status* graphics order. The 2-digit codes are listed in Figure A-2.

Each error falls into one of the following categories:

- Host errors: recoverable (G5) and nonrecoverable (E1 through E5, G1 through G4, P1, P5)
- Local errors: recoverable (L1 through L3) and nonrecoverable (L9)

The procedures to perform when the Emulation program detects a graphics error depend on the category of error. These procedures follow the error codes summarized in Figure A-2.

Code	Error and Possible Cause
E1	IEEE bus error: <ul style="list-style-type: none">● Invalid configuration data.● Plotter is not powered on.● Plotter is not attached.● No address match between a host assigned listen address and configuration listen address.
E2	Talker error: No interface message was received which confirmed the talker address.
E3	Invalid IEEE set order data: Set address = 31.

Figure A-2 (Part 1 of 3). 2-Digit Graphic Error Codes

Code	Error and Possible Cause
E4	Time-out error: <ul style="list-style-type: none"> ● No <i>interface clear</i> order was received after powering on. ● No <i>interface clear</i> order was received following an E1 order. ● Plotter did not respond after a data transmission within specified time period.
E5	Listen mode attempted: An Interface message was received which assigned the Emulation program talker to listen.
G1	Invalid graphic byte: <ul style="list-style-type: none"> ● Invalid data byte format. ● <i>More data to come</i> order received with no preceding data. ● Data byte detected when expecting an order.
G2	Undefined order: Order code received which is not supported.
G3	Invalid graphic set order data: <ul style="list-style-type: none"> ● <i>Set color table</i> index = 0. ● <i>Set marker style</i> > 8.
G4	<i>Fill polygon</i> error: The number of nonhorizontal fill edges > 128.
G5	Marker outside display boundaries: Center coordinate does not allow entire marker to be drawn.
L1	VDI buffer overflow in graphics state.
L2	VDI buffer overflow not in graphics state.
L3	A polygon is too complex (for example, a large number of intersecting lines) and it cannot be drawn using the current fill pattern. The polygon will be drawn using the hollow fill pattern.
L9	VDI exception.

Figure A-2 (Part 2 of 3). 2-Digit Graphic Error Codes

Code	Error and Possible Cause
P1	Printer not ready: <i>Printer data follows order or system copy order received from host.</i>
P5	Invalid printer control order data: Load printer A/N color mix table index = 7, 15, 23, or 31.
Note:	The status line error code field is cleared when you press the emulated Reset key or when a graphics block has been processed with no errors.

Figure A-2 (Part 3 of 3). 2-Digit Graphic Error Codes.

Host Errors

The G5 graphics error is recoverable.

The following events take place when this error is detected:

1. The error code appears on the status line.
2. A short beep is sounded.
3. Processing continues with the next byte in the graphics block.
4. The appropriate graphics error aid key codes are sent to the host following completion of graphics block processing.

The following errors are not recoverable:

E1	G1	P1
E2	G2	P5
E3	G3	
E4	G4	
E5		

The following events take place when a nonrecoverable type error is detected.

1. The error code appears on the status line.
2. A short beep is sounded.
3. Graphics block processing is stopped.
4. Graphics mode is terminated.
5. Appropriate graphics error aid key codes are sent to the host.

Local Errors

The following events take place when recoverable errors (L1, L2, or L3) are detected while processing a graphics write block. The host is not informed of local errors.

1. The error code appears on the status line.
2. A short beep is sounded.
3. Processing continues.

The following events take place when an L9 (nonrecoverable local error) is detected while processing a graphics write block.

1. The error code appears on the status line.
2. A short beep is sounded.
3. Graphics is disabled, but the IBM Personal System/2 continues to process in text mode.

Appendix B. Problem Determination

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Introduction

This appendix can help you solve a problem with your IBM Personal System/2 and the Emulation program. Check to see if any of the symptoms describe your problem, and take the corrective action.

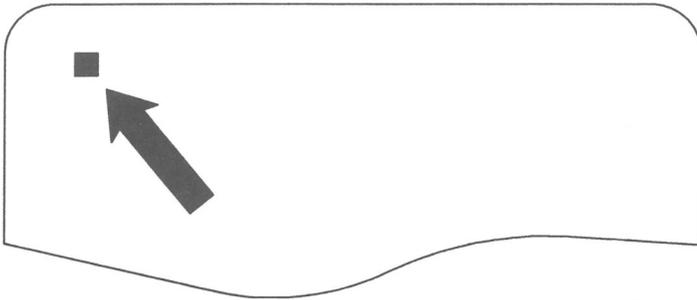
Blank Screen

The screen is blank. (No status indicators can be seen, and the cursor is missing.)

Action:

1. Make sure the monitor is properly plugged into both power and signal connectors and turned on.
2. Adjust the Brightness control.
3. Turn the system unit off.
4. Make sure you have power at the electrical outlet.
5. Make sure the system unit power cord is securely plugged into the rear of the system unit and securely plugged into the electrical outlet.
6. Turn the system unit on and listen for the beep.
7. If the screen is still blank, refer to the *Work Station Emulation Adapter Quick Reference* and run the diagnostics supplied with the program.

Cursor Blinking Upper Left



RB4L025

The cursor is blinking in the upper left corner of the screen.

1. The System/38 may have varied this session offline. This only applies to a System/38 that is running a CPF release prior to release 6.0, program change C. Program change number 06076 in program change C corrects this problem.

System/38 varies offline a display following the fourth time it is powered off without a user signing on. The display must be varied online (VRYDEV) before it can be used again.

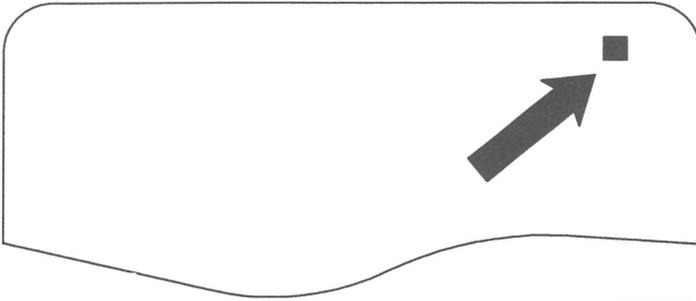
The system continues to vary the display offline each time it is subsequently varied online, powered on, and powered off without a user signing on. On the eighth consecutive power off (including the first four noted above), a warning message is sent to the QSYSOPR message queue. On the ninth occurrence, the display's subsystem deallocates the device. The only way to recover at this point is to terminate (TRMSBS) and restart (STRSBS) the subsystem.

The counters are reset each time a user signs on to the display.

When invoking the Emulation program, the user must sign on to each emulation session at least once every fourth time. This is generally not a problem with the first session. But the remaining sessions may be configured as display sessions and not used. The screen for the offline session will be blank except for the cursor in the upper left corner and the System Available indicator ON.

2. Contact the host system operator and make sure the host is operating correctly.

Cursor Blinking Upper Right



RB4L026

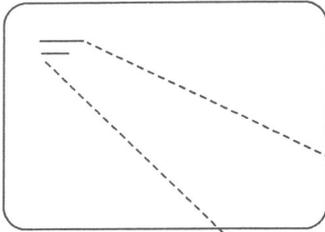
The cursor is blinking in the upper right corner of the screen.

Action:

1. Contact the host system operator and make sure the host is operating correctly.
2. Make sure that the cable between the IBM Personal System/2 and the host is securely fastened and is not visibly damaged.
3. Make sure the work station address in the session profile is correct. Ask the host system operator for confirmation.
4. Make sure that only the last work station on your cable is terminated. Ask the host system operator for assistance.
5. If the cursor is still blinking in the upper right corner of the screen, refer to the *Work Station Emulation Adapter Quick Reference* and run the diagnostic program.
6. If the problem persists, report to the host system operator that your work station is not communicating with the host.

Date Prompt on Screen

You see a screen similar to the following:



Current date is day m-d-y
Enter new date:

RB4L030

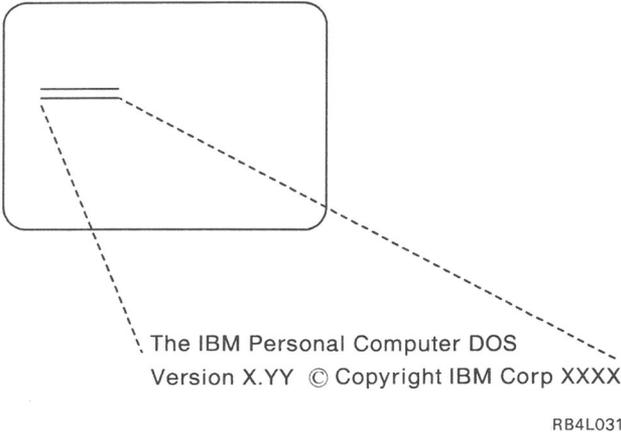
A system reset was performed.

Action:

1. Type the date, if desired, and press Enter. Or you may press Enter for the default date.
2. Type the time, if desired, and press Enter.
3. Reload the Emulation program, if desired.

DOS Program ID on Screen

You see a screen similar to the following:



The DOS program was loaded. The Emulation program did not load.

Action: After the DOS prompt appears, type WSE and press Enter.

Error Occurred after Sign-On

If the work station is locally attached, contact the host system operator to determine if the host is available. If the work station is attached through a controller, this error can be caused by a loss of communication between the controller and the host.

Action: Press the emulated Error Reset key, then try to run a different type of job or procedure. If the error does not occur again, there is a system programming problem or an invalid key was pressed. If the error does occur again and the IBM Personal System/2 is attached to a controller, contact the controller operator to determine if communications with the host has been lost and the host is not available. For additional error information, contact the host system operator.

Error Occurred before Sign-On

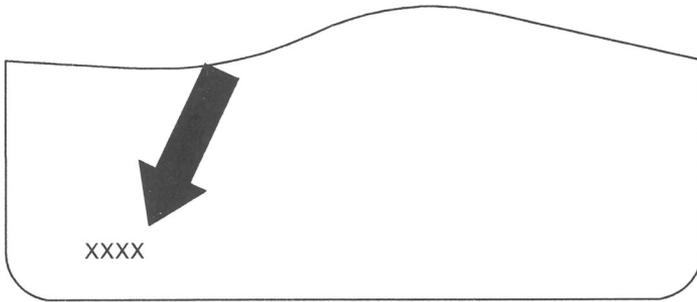
The function key you pressed is not valid at this time.

Action: Press the emulated Error Reset key. Then use the correct procedure to sign on.

Error Occurred during Sign-On

Either the host is not operating, or the controller is not communicating with the host.

Four-Digit Error Code



RB4L032

This error code is displayed in the four leftmost columns of the screen.

Action: Find the error code in Appendix A, "Handling Error Codes and Messages" and take the action recommended.

Keyboard Not Working

When you press any key, no data appears on the screen.

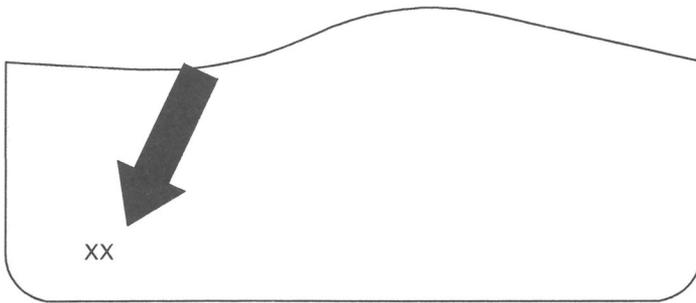
Action: If the alarm sounds, the keyboard may be input inhibited:

- Press the emulated Error Reset key.

If the alarm does not sound:

1. Turn the system unit off. Wait 10 seconds, then turn it on.
2. Test the keyboard by pressing a few keys. If the screen remains blank, refer to the *IBM Personal System/2 Quick Reference* and run the diagnostics supplied with the program. If the KB indicator is ON, clear the keyboard buffer by pressing Alt-Scroll Lock.

Line-Check Error



RB4L033

The line check count is displayed as a decimal number at the left end of the status line.

Action:

1. Make sure the cable between the IBM Personal System/2 and the host is securely fastened and is not visibly damaged.
2. Make sure you have the correct work station address in the session profile. Ask the host system operator for assistance.
3. Make sure that only the last work station on your cable is terminated. Ask your host system operator for assistance.
4. Turn the system unit off, wait 10 seconds, then turn it on.

Printer Failure Not Defined

Meaning: If the printer is not operating, you may have forgotten to turn the printer on before loading the Emulation Program.

If this situation occurs, execute this procedure:

1. Suspend the printer session.
2. Turn the printer on.
3. Ready the printer.
4. Start the printer session.
5. Restart the host print job.

Problem Not Defined

A problem still exists. Your work station is not operating as expected and you have none of the previous symptoms.

Action:

1. Contact the host system operator and make sure the host is operating correctly.
2. Make sure the twinaxial cable between the IBM Personal System/2 and the host is securely fastened and is not visibly damaged.
3. Make sure you are using the correct profiles for this IBM Personal System/2 or make sure the work station address is correct in the profile. Ask your host system operator for assistance.
4. Refer to the *Work Station Emulation Adapter Quick Reference* and run the diagnostics program.



Appendix C. Updating the Emulation Program

Introduction	C-2
The Update Control Data Set	C-2
Updating with the Update Program	C-5
Listing Applied Updates	C-6

Introduction

If you experience problems, IBM may instruct you to update the Emulation program. This appendix explains the commands used to update the program, and how to run the update program.

Note: IBM will supply the update information. The customer will only need to create or edit a file to include this information, then update the Emulation program.

Updating involves two basic steps:

1. Creating or modifying a file with the update information supplied by IBM. This file is called the control data set.
2. Using the Update program to update the Emulation program with the control data set.

The Control Data Set

A control data set is a file of special commands which give directions to the update program. (Note that the Update program will allow you to update only one file at a time.) The file may be given any unique name and may be created with any DOS editor that terminates an input line with CR + LF and does not use tabs. Each input line starts a new command for the Update program and has a maximum length of 256 characters. The Update program executes the commands from the control file in order.

All commands in the control data set have positional parameters associated with them, which are separated by blanks. You can enter the commands in upper or lower case.

Following is a list of valid Update commands and their parameters:

- B** This command resets any error condition found to this point of execution.

When the apply program detects a mis-compare during a verify command, all following commands are ignored until a new **B** command is executed. Therefore, this command may be used for conditional updating. (Note that nesting is not allowed.)

- C** This command allows you to place comment lines within the control file. Any new line in the control file that begins with **C** will be ignored. For example:

```
C This is a comment line.  
C A comment line is ignored by the program.
```

- P** This command updates part of a file. The first parameter for this command is the hex address to start the verify relative to the beginning of the file. This address may have simple hex addition and subtraction within it. Hex values are right-justified.

The second parameter is the data to update with. If this parameter starts with a single quote, the rest of the parameter is considered a character string and is terminated by another single quote. Otherwise, the parameter is assumed to be hex data in full byte format (2 characters per byte required). If this parameter is in hex format, you may use commas on any byte boundary to separate input data. For example:

```
P 0 'This is the beginning of the file'  
P EE-1 90,90,909090
```

- S** This command places a stamp or ID at the end of a COM or EXE file. It is designed to help track the updates and sequence in which they were applied for a particular program. The only parameter is 5 bytes of ID for the update. This update ID is appended to the end of the COM or EXE file with other control information when executed. (Note that the Update program will enforce the rule of only appending a stamp to COM or EXE files.) For example:

```
S WSE01  
S PAT1Z
```

V This command verifies part of the file that is to be updated. Its first parameter is the hex address to start the verify relative to the beginning of the file. This address may have simple hex addition and subtraction within it. Hex values are right-justified. This feature is useful for handling relative addresses within a file.

The second parameter is the data used to verify. If this parameter starts with a single quote, the rest of the data is considered a character string and is terminated by another single quote. Otherwise, the parameter is assumed to be hex data in full byte format (two characters per byte required). If the parameter is in hex format, you may use commas on any byte boundary to separate input data. For example:

```
V 10+2A-C 'DUMMY STRING'  
V 100+1A CF,FA,534678,90,90,DC5C
```

The following is an example of a control data set:

```
C THIS IS THE BEGINNING OF THE  
C UPDATE CONTROL DATA SET EXAMPLE  
B  
V 0 '123'  
C IF THE VERIFY AT ADDRESS 0 FAILS  
C THEN THE FOLLOWING UPDATE AND STAMP  
C WILL NOT OCCUR  
P 0 '234'  
S 10001  
  
B  
V 0 '234'  
C IF THE VERIFY AT ADDRESS 0 PASSES  
C THEN THE FOLLOWING UPDATE AND STAMP  
C WILL OCCUR  
P 0 '123'  
S 10002  
C END OF THE EXAMPLE
```

Updating with the Update Program

Use the following procedure to update the Emulation program.

1. You can run the Update program from the DOS prompt or from the WSE main menu (see "The WSE Function Control Program" on page 4-7).
 - Change to the emulation directory, if necessary. At the DOS prompt, type `WSEPATCH` and press Enter.
 - Or, select the option, *Update the Emulation Program* from the WSE main menu.

The WSE Update Utility menu appears.

2. Select option 1, *Apply an Update to an WSE File* to update the Emulation program. (Option 2 is explained below.)

The WSE Update application screen appears. This screen prompts you to enter the file to be updated and the file with the update information.

3. Type `WSE.COM` and press Tab.
4. Enter the file name of the control data set and press Enter.

As the Update program applies updates to the program, a list of update stamps appears on the screen. The reverse image status line at the bottom of the screen will indicate any error condition or completion of the update process.

Listing Applied Updates

The Update program also allows you to view a list of all updates that have been made to a file.

1. Select option 2 from the WSE Update Utility screen. The program prompts you to enter the WSE file name.
2. Type `WSE.COM` and press Enter. A list of all updates applied to the file appears in this format:

```
FIXssssssyyyymmdd
```

where `sssss` is the stamp specified by an **S** command, and `yyyy mm dd` is the date of the update.

Appendix D. Changing the Codepage

Introduction	D-2
Procedure	D-3

Introduction

A codepage is a set of displayable characters assigned to the 256 ASCII code points. You can change the codepage you use with the Emulation program when you install it.

Following are considerations for changing the codepage:

- Codepage 437 is the personal computer ASCII codepage. 850 is the multi-language codepage. Other national language countries use other codepages, such as 860 for Portuguese or 863 for Canadian French.
- The Emulation program defaults to codepage 437.
- You must use the same codepage as DOS. (See your DOS manuals for instructions on changing the DOS codepage.)
- If you are using PC Support/36, you must use the 437 codepage.
- If you use a printer session with a codepage other than 437, you must download the proper fonts and define the proper printer initialization string for the printer.
- All sessions use the same codepage. To switch the active codepage, execute the following procedure.

See Appendix A in the *Technical Reference* for all codepage character sets.

Procedure

Use the following procedure to change the active codepage.

1. If the Emulation program is running, terminate it (see "Terminating the Emulation Program" on page 4-9).
2. Locate the following files on the first program diskette:

```
WSEMAST.ext  
WSEE2A.ext
```

where *ext* is any file name extension (such as KBD, TBL, 437, and MNL). Be sure to copy all files with these base file names.

3. Change the directory to the emulation directory (\WSE).
4. Copy the WSEMAST.ext file from the diskette to WSEMAST.KBD in the emulation directory. For example, if you want to use the 850 codepage, type:

```
COPY A:WSEMAST.MNL WSEMAST.KBD
```

5. Copy the WSEE2A.ext file from the diskette to WSEE2A.TBL in the emulation directory. For example, if you want to use the 850 codepage, type:

```
COPY A:WSEE2A.MNL WSEE2A.TBL
```

6. Run the configuration program again. Create new master and session profiles (see Chapter 3, "Configuring the Emulation Program").

Note: You must create new profiles. If you do not run the configuration program again, or you edit existing profiles, the Emulation will not use the new codepage.



Glossary

access. A way or means of approach to a part or to data.

acronym. A word formed from the initial letter or letters of each of the successive parts or major parts of a compound term.

adapter. The part of a device or feature required to attach it to a processing unit.

address. The number assigned to a device or to a location in memory.

alarm. See *beep*.

align. To bring into or be in line with another or with others. For example, to line up the numbers on the decimal point.

allocate. To assign a resource, such as a disk file, to perform a specific task.

alphabetic. Of, relating to, or employing an alphabet.

alphabetic keys. The letter keys a through z, blank, comma, period, and hyphen.

alphanumeric. (1) Consisting of both letters and numbers and often other symbols (such as punctuation marks and mathematic symbols). (2) Capable of using alphanumeric characters.

Alt state. The definition for the key when you press that key and an Alt key at the same time.

alternate. A choice between two or more things.

alternate shift mode. A method of operation that causes keys to be entered as characters or functions (For example, the Backspace key is represented as the CLEAR function when the Alt key is held down). See also *nonshifted mode* and *shifted mode*.

application program. A program used to perform a particular data processing task such as payroll.

ASCII. American Standard Code for Information Interchange. The standard code using a coded character set consisting of 7-bit coded characters (8 bits including parity check), used for information interchange among data processing systems, data communications systems, and associated equipment. The ASCII set consists of control characters and graphic characters.

aspect ratio. The ratio of the width of the data to its height as displayed on a monitor or display.

asterisk. The character (*) used as a reference mark in printing or writing.

async. See *asynchronous*.

asynchronous. A method of data communications in which information is sent at irregular intervals. Serial printers use asynchronous communications.

attribute. The properties associated with the use of a device.

authorize. To allow a user to communicate with or make use of an object, resource, or function.

auto-configuration. The automatic arrangement of the parts of a computer.

AUTOEXEC.BAT file. A batch file that contains DOS commands or program names that are executed immediately after DOS is started.

back up. To copy information, usually onto a diskette, for safekeeping.

backspace. To move back a position along a row.

Base state. The definition for the key when you press only that key.

batch file. A file containing one or more commands that DOS executes one at a time. All batch files must have the extension of .BAT.

beep. An audible tone at a display or printer that is used to get the operator's attention.

binary. Pertaining to a numbering system with a base of 2. Valid digits are 0 (zero) and 1 (one).

binary synchronous. A character-oriented, half-duplex data communications protocol.

bit. The basic unit of computer information, such as 0 or 1.

block cursor. See *cursor*.

boot. Loading and executing the boot record. This is accomplished by performing the software reset sequence.

boot record. A record stored on track 0 and sector 0 of a disk(ette) which contains a program designed to load DOS into memory and start its execution.

boundary. The division between each of 64K blocks of physical storage addresses.

buffer. A temporary storage unit that accepts data at one rate and delivers it at another rate.

bypass. To avoid by means of another path.

byte. The amount of storage required to represent one character; a byte is 8 bits.

cable splice. The physical connection between two pieces of twinaxial cable.

Cable Thru feature. A special feature that allows more than one display station (except the 5251 Model 2 or 12) and/or more than one printer to be attached to a single cable path.

capacity. The ability to receive, hold, or store.

card. An adapter card that is installed in the IBM Personal

System/2 to enable it to be connected to another device or to increase the size of the computer's memory.

caret. The wedge shaped mark made on written or printed matter to indicate the place where a character is to be inserted.

character codes. The ASCII or EBCDIC values assigned to the symbols or functions that are used by the IBM Personal System/2 or the IBM 3196 display station.

character set. A set or style of alphabetic, numeric, and special characters that can be displayed or printed by the IBM Personal System/2 or the IBM 3196 display station.

checklist. Any list in which items can be compared, scheduled, verified, or identified.

clicker. A mechanism that sounds when a key is pressed and accepted for processing.

close a file. To remove a file from the program in which it is executing. Contrast with *open a file*.

column. The character position within a print line or on a display. The positions are numbered from 1, by 1 starting at the leftmost character position and extending to the rightmost position.

column separators. The character symbol displayed at the beginning and end of each column in an input field.

combination. A result of bringing two or more things together.

command line. (1) A DOS command and any associated parameters, file names, and so forth. (2) The line on the display screen following the DOS prompt where you type a DOS command.

compatible. The ability of one device to work with another without the need to change either device.

CONFIG.SYS. A personal computer file that contains the device driver assignments.

configuration. (1) The group of machines, devices, and programs that make up a data processing system. (2) To describe to a system or program the configuration.

configure. To connect the devices, work stations, programming, and the host system to each other by using addresses.

contention. The contest of two or more rivals trying to reach the same goal at the same time.

control panel. A panel that contains lights (to observe the status) and switches (to operate) on a device or a system.

controller. A device used to coordinate and control the operation of one or more devices.

coordinate. To put things in order.

copyright. The exclusive right to reproduce, publish, and sell the matter and form of a material.

CPI. Characters per inch

current directory. The root directory or the last directory specified by a DOS CHDIR (Change Directory) command.

current screen size. The number of rows and columns of data which are displayed on the screen.

cursor. A movable marker (such as an underline or a block) on the display used to indicate to the operator where to type the next character.

cursor location. The location on the screen (row 1 through 24 and column 1 through 80), at which the cursor is located.

customize. To change to suit personal needs or preferences.

D connector. A D-shaped connector like the connector on the cable that connects the Integrated Cable Assembly to the IBM Personal System/2.

data. All information entered into or used by the computer.

data stream. The sequence of characters being transmitted over a line.

deallocate. To free memory or disk(ette) space from use by a specific task.

default value. A value stored in the system that is used when no other value is specified.

deflector. The person or object that changes the course of travel.

delete. To remove. For example, to erase a file.

determination. The act of making or arriving at a decision.

device. The generic term for a piece of equipment or a mechanism; for example: the IBM Personal System/2 display or the attached printer.

device address. The unique number assigned to a device that enables it to communicate with other devices in a system.

device driver. A program used to control the operation of an output device.

device type. The number assigned to a unit or box in a system, such as 5256 (the IBM Matrix Printer).

diagnostic. Pertaining to the investigation of the cause of a error.

diagram. A line drawing made to show the location of objects.

digit. Any of the numbers from 0 through 9.

directory. A list of files contained on a disk(ette). Directories are used to organize files into related groups.

disable. To prevent a unit of a data processing system from operating with the rest of the system.

disclosure. The act of exposing to view.

disk. A round flat plate coated with a magnetic substance on which data from a computer is stored.

disk drive. See *drive*.

diskette. A thin, flexible magnetic plate that is permanently sealed in a protective cover.

diskette drive. See *drive*.

display screen. The part of a display station on which information is displayed.

display station. (1) A device that includes a keyboard from which an operator can send information to the system and a display screen on which an operator can see the information sent to or the information received from the system. (2) See also *work station*.

DOS. Disk Operating System. A program that works with the processing unit and the disk(ette) drive to control the flow of data.

DOS session. The method of operation which allows the IBM Personal System/2 to perform independently of the host system when attached as an emulated work station.

drive. The electromechanical device which records and reads the information that is stored on a disk(ette).

driver. See *device driver*.

EBCDIC. (1) An acronym for Extended Binary-Coded Decimal Interchange Code. A set of 256

eight-bit characters. (2) A set of standards for data transmission.

emulate. To imitate a device with a second device.

emulated control panel. The screen used on the IBM Personal System/2 to imitate the control panel of the IBM 5256, 5224, or 5219 Printer.

emulation. The use of a device or program to perform the functions of another device or program.

emulation mode. The mode of operation in which the IBM Personal System/2 is operated like a work station in an IBM 3196 Information Display System.

emulator. A program or device that performs the functions of another program or device.

engineering change. The alteration to a product that allows it to perform either additional functions or to correctly perform its designed functions.

engineering change level. The manufacturing level of a product.

Enhanced keyboard. A keyboard that combines the functionality of a Personal Computer keyboard and a 5250 Display Station keyboard.

error code. A hexadecimal value that identifies a condition that interferes with normal operations.

error message. A displayed indication that an error has been detected.

escape sequence. A combination of keystrokes used to send commands to a printer.

execution. The process of carrying out the instructions of a computer program by a computer.

facility. Something that is built, installed, or established to serve a particular purpose.

field. One or more characters of information (such as a name or an amount).

field exit. To move the cursor from a numeric field on the display screen.

field exit required. A rule that requires either a field exit key, a cursor movement key, or a nondata key be used to move the cursor from a numeric field.

file. A collection of records of information that you create, group, and access by file name.

file name. The name assigned to a file.

file specification. Any DOS file name including the drive and path.

fixed address vector. A pointer in the Emulation program that points from fixed addresses to internal addresses that can change.

fixed disk. A disk of rigid material with a magnetic coating used for mass storage of data.

font. An assortment of type all of one size and style.

format. (1) (noun) The specific arrangement of information.
(2) (verb) To arrange information in a specific way.

formatted screen. A screen with fields established for specific information.

free key mode. An operating mode that allows the entering of data without control by a system program (unformatted).

function keys. (1) IBM Personal System/2 keys F1 through F12. Their functions are assigned by the operating system or application program. (2) A keyboard key that requests an action but does not display a character. The cursor movement keys are examples of function keys.

function control keys. See *function keys*.

generic. Relating to or characteristic of an entire group or class.

graphics. See *graphics-capable*.

graphics-capable. The ability to display or print complicated pictures.

hardware. The equipment that makes up a data processing system. Contrast with *software*.

help text. A display aid that provides the operator with an explanation of a message that has been received or that allows an operator to request information on how to use a key, menu, or parameter.

hex. See *hexadecimal*.

hexadecimal. A numbering system with a base of 16. Valid digits range from 0 (zero) through 9 (nine) and A (ten) through F (fifteen).

home position. (1) The first input position of the first input field on the screen of a display station. (2) The position (far left) to which the print head moves after the printer has been turned on, after the Stop switch has been pressed.

host system. (1) The System/36 or System/38. (2) The primary or controlling system in a data communications configuration.

Hot Key function. A key function that allows you to change sessions.

id. Identification.

IEEE. Institute of Electrical and Electronic Engineers

II. Input inhibited. The input inhibited indicator used in the Emulation program.

IM. See *insert mode*.

inadvertent. By mistake, unintentional.

incur. Become responsible for.

inhibited. Prevented from doing something.

initialize. To prepare for use. For example, to format a diskette and to initialize registers, and/or program variables to the condition previously determined by a program.

initiate. To cause something to start.

input. Data to be processed.

input field. An area on the screen in which an operator enters data. Input fields are blank on the screen and can have a prompt before the input field.

insert mode. The mode of operation that allows characters to be placed between the characters already displayed on the screen when a character key is pressed. Characters are inserted at the location identified by the cursor.

installation. The act of installing, the state of being installed.

Integrated Cable Assembly. A cable that connects the Work Station Emulation Adapter to the twinaxial cable. This cable automatically terminates the line when a second line is not connected.

integrity. The state of not being changed or erased.

intend. (1) Refer to. (2) Have in mind a purpose or goal.

intensity. The level of brightness used to display the characters on the screen.

intention. A determination to act in a certain way.

interact. To act interdependently.

interface. The machinery and programs that permit the exchange of information between computers or devices.

interrupt level. A path used to get the processing unit's immediate attention.

I/O. Input/output.

I/O address. See *device address*.

justify. To adjust text to be even with the left and right margins.

KB. Keystroke buffering. The display indicator used to show the operator when keystrokes are saved.

K. Kilobyte. 1024 bytes of information.

keyboard layout. The arrangement of the keys on the keyboard attached to a display station.

keyboard template. See *template*.

keystroke. The act of pressing a key on a keyboard.

keyword. A symbol that identifies a parameter.

KS. Keyboard shift. The display indicator used to show the operator when the keyboard is in the shifted mode.

line. The cable from the host computer or controller to which one or more work stations are attached.

load. To move data or programs into memory.

local display station. See *local work station*.

local work station. A work station that is attached directly to the host system with twinaxial cable.

lowercase mode. The keyboard is in lowercase mode when the Shift keys are not pressed and the Shift Lock and CapsLock functions are unlocked.

LPI. Lines per inch.

MB. Megabyte. 1,048,576 bytes of information.

make/break key. A key that sends a scan code to the host system when it is pressed and again when it is released.

master profile. A file that contains configuration information about all Emulation sessions.

matrix. Characters arranged in rows and columns.

maximum. The largest number in a group of numbers.

memory. The devices used to store data within a computer.

minimum. The smallest number in a group of numbers.

mode. A method of operation.

modem. A device that allows information to be exchanged between computers using telephone lines.

monitor. The device that is used to display information that is viewed by a computer operator.

monochrome. Single color.

MW. Message waiting. The display indicator used to show the operator when a message received from the host is waiting to be displayed.

nonshifted mode. A method of operation that causes keys to be entered as characters or functions similar to when a typewriter's shift key is not held down (for example, the **a** is represented as **a**). See also *alternate mode* and *shifted mode*.

normal image. The display attribute that causes characters to be displayed as light characters on a dark background.

null character. A blank (no character) that is displayed as a result of zeros occupying a character position in the buffer.

numeric. Refers to any of the numbers 0 through 9.

numeric keys. The characters 0 through 9, blank, comma, period, plus, and minus.

on-card memory. The memory contained on the Work Station Emulation Adapter.

offline. The state of not being controlled by, or directly communicating with a host system.

online. The state of being controlled by, or directly communicating with a host system.

open a file. To associate a file with a program. Contrast with *close a file*.

operating system. A program that supervises the execution of user programs by the computer.

overlay. (1) To write over (and therefore destroy) an existing file. (2) A program segment that is loaded into storage and replaces all or part of a previously loaded program segment.

override. To use in place of another.

panel. A screen display listing options or requesting action.

parallel printer. A printer that is attached to a parallel port (LPT1 through LPT4).

parameter. A value supplied to a program that is used as input or controls the actions of the program.

password. A code you must enter before you can access specific programs.

path. The sequence of directories designated for DOS to search when looking for a program.

physical planning. The action taken to prepare a site for the installation of a computer or some related equipment.

pixel. An element of a picture.

playback sequence. A combination of characters and/or functions assigned to a key.

plotter. An output device that graphically records data in two dimensions (length and width) on paper.

port. (1) The part of the system unit or controller to which cables for work stations are attached. (2) The part of the Integrated Cable Assembly to which the work station line may be connected.

print buffer. A storage area within the printer where characters to be printed are temporarily stored.

print head. The part of the printer that strikes the ribbon to print characters on the paper forms.

printer. A device that provides printed output.

printwheel. The element used to create the impressions printed by the IBM 5216 Wheelprinter.

processing unit. The part of a computer that operates on data.

profile. Data file that describes the features of a user, program, or device. See *master profile*, *session profile*.

program. A sequence of instructions for a computer.

program diskette. A diskette which contains programs to be executed on the IBM Personal System/2. For example, the Work Station Emulation Program Licensed Program Diskette.

prompt. A displayed request for information or operator action.

protocol. A series of rules for transferring data.

RAM. Random access memory.

random access memory. The volatile, electronic memory in computers in which data is stored temporarily for manipulation.

recovery procedure. The action performed by the operator when an error message appears on the display screen.

remote display station. See *remote work station*.

remote work station. A work station that is attached directly or indirectly to the host system via some communication channel.

remotely. Indirectly or from a distance.

reset. See *system reset*.

resolution. The visual quality of the display.

restart. To start again.

reverse image. A method of highlighting where the character color on the screen and the background color are swapped. For example, in place of green on black, the characters would appear as black on green.

right adjust. To position a character(s) within a field to the rightmost position of the field.

root directory. The directory on a disk(ette) that contains the list of files stored on that disk(ette). If there is more than one directory on the disk(ette), the root directory can also contain the names of each of the other directories. This directory

is established when the disk(ette) is formatted.

row. The horizontal arrangement of characters on a screen.

SA. System available. The system available indicator used with the Emulation program.

scan code. A numeric representation of a key's location on a keyboard.

screen. A display, similar to a television screen, used to display characters.

SCS. SNA (system network architecture) control string.

self-loading program. A program that does not use DOS to move from a diskette to IBM Personal System/2 memory.

separator. See *column separator*.

serial printer. A printer that uses the serial printer interface feature.

session. (1) The period of time in which the host system and one of the devices are communicating.
(2) The logical connection between the host system and a work station. The session may be established for a display station or for a printer.

session profile. A file which contains configuration information about individual sessions.

set up. To prepare for use.

Shift state. The definition for the key when you press that key and a Shift key at the same time. The shift

state definition is also used during Shift Lock, CapsLock, or NumLock.

shifted mode. A method of operation that causes keys to be entered as a character or function similar to when a typewriter's shift key is held down (for example, an **A** represented as **A**). See also *alternate mode* and *nonshifted mode*.

sign on. To begin a session at a display station.

sign-on. The action an operator uses at a display station in order to begin working at the display station.

sign-on screen. The screen that prompts a user to enter the appropriate sign-on information.

signal. To notify.

signed numeric. A format control used to specify that the units position of the field is reserved for the sign (usually, blank for positive and minus for negative).

signed numeric field. A numeric field that has a character in it to identify it as having either a positive or negative value.

simulate. To display the appearance of.

software. The programs, procedures, and rules that are stored as data but are used to control the operation of a computer. Contrast with *hardware*.

software reset sequence. A keying sequence (Alternate, Control, and Delete) that allows you to leave

emulation mode and take the emulated work station offline. This causes the boot record to be read into memory and given control.

splice. To join by weaving (as two ropes) or by connecting two objects.

spool. To place in a queue.

station address. See *work station address*.

station address list. A list of work station addresses a session may use.

station protector. A device connected to the twinaxial cable to protect a work station against lightning.

status. Condition. For example, the status of an IBM Personal System/2, a printer, or a job.

status line. The 25th (or bottom) row on the screen of the IBM Personal System/2, which is used to display the condition of the emulation session.

subsystem. A system that operates under control of another system.

symbol keys. The keys on the keyboard that represent displayable characters other than alphabetic and numeric characters.

synchronous. A type of data communications protocol that transmits data according to a precisely timed clock pulse.

syntax. The rules for the construction of a statement.

system. A computer, its devices, and programs.

system operator. A person who uses a display station, which is designated as the system device to activate certain system functions and control and monitor system operation.

system reset. See *software reset sequence*.

system time. The time of day as recognized by a system.

system unit. The part of the IBM Personal System/2 that contains the processing unit.

table. A list of data in which each item can be uniquely identified.

template. A pattern to help the user identify the location of keys on a keyboard.

terminate. Bring to an end.

terminator. A twinaxial cabling device placed at the end of twinaxial cabling to prevent line noise.

terminator switch. A switch used to terminate the line at the last work station when the Cable Thru feature is used.

toggle. To operate a device (switch) that stays in the operated position until operated a second time.

trademark. A device (as a word) that identifies an owner of a machine, program, or book.

twinaxial cable. A cable made of two wires inside a shield.

underscore. To draw a line under.

unique. The only one.

update. To modify.

uppercase. Capital letters.

uppercase mode. The method of operation that causes alphabetic characters to be displayed as capital letters and all other keys in the typewriter area, when pressed, to be displayed as the character shown on the upper portion of these keys.

utility. A program in general support of the processes of a computer; for example, a sort program.

VDI. Virtual device interface.

virtual disk(ette). A portion of a disk attached to the host system that is used to emulate an IBM Personal System/2 disk(ette). A virtual diskette has a capacity of up to 320 K. A virtual disk has a capacity of up to 32 MB.

withdraw. (1) To remove. (2) To no longer make available.

work station. An input/output device consisting of a display station and/or printer that allows you to send and receive information from a host system.

work station address. The address assigned to a work station enabling the host system to communicate with it.

work station line. The twinaxial cable from a host computer or the chain of work stations to which a work station is connected.



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