IBM VSE/Enterprise Systems Architecture

Guide for Solving Problems

Version 2 Release 4

SC33-6710-00

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SC33-6710-00

Note!
Before using this information and the product it supports, be sure to read the general information under "Notices" on page ix.

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This edition applies to Version 2 Release 4 of IBM Virtual Storage Extended/Enterprise Systems Architecture (VSE/ESA), Program Number 5690-VSE, and to all subsequent releases and modifications until otherwise indicated in new editions.

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Programming Interface Information

This manual is intended to help the customer analyze and solve problems that may occur when IBM VSE/ESA is installed.

This book also documents intended Programming Interfaces that allow the customer to write programs to obtain the services of VSE/ESA. This information is identified where it occurs, either by an introductory statement to a chapter or section, or by the following marking:

Programming Interface Information

End of Programming Interface Information

About This Book

This manual is intended to help you analyze and solve problems that may occur when you have installed IBM VSE/Enterprise Systems Architecture (VSE/ESA).

The main subject of this manual is software errors. Basic information on hardware errors is included.

The manual helps you to:

- Recognize a particular type of error.
- Collect and interpret the available information.
- Identify the actions that are necessary to remove the error.

By following the guidelines presented in this manual, you should be able to diagnose and correct most error situations yourself; that is, without calling IBM for help.

Who Should Use This Book

This manual addresses primarily the **system administrator**. Note, however, that any of the following persons may be the first to encounter a problem:

- The system console operator.
- A display station user, including the system administrator.
- An application programmer.
- An application end user.

Most problems, however, will end up with the administrator. Whenever an application program seems to be at fault, the administrator may hand the problem over to the programmer responsible.

How to Use This Book

If you have an error situation and want to do error diagnosis, go directly to "Hardware Errors" on page 18 or "Software Errors" on page 19.

Refer to "Chapter 1. Introduction" on page 1 for additional details on how to use the manual.

Where to Find More Information

Most problems become apparent through a message. Therefore, the manual *VSE/ESA Messages and Codes* must be available for error diagnosis. Most of these messages are also available online at a VSE/ESA user display station.

There are other manuals of the VSE/ESA library you may have to consult from time to time. Manuals of VSE/ESA base programs, such as VSE/POWER or CICS, are referred to in the text when needed for a particular error situation.

For more information on the programs and statements mentioned in this book refer to these publications:

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- *VSE/ESA Planning*
- *VSE/ESA Guide to System Functions*

In addition, you might also refer to the ...

VSE/ESA Home Page

VSE/ESA has a home page on the World Wide Web, which offers up-to-date information about VSE-related products and services, new VSE/ESA functions, and other items of interest to VSE users.

You can find the VSE/ESA home page at:

`http://www.ibm.com/s390/vse/`

Summary of Changes

Changes to this Manual for VSE/ESA Version 2 Release 4

This manual has been updated to reflect enhancements and changes that are implemented with VSE/ESA Version 2 Release 4:

- The book now supports the use of the CICS Transaction Server for VSE/ESA instead of CICS/VSE. The examples of command sequences and dumps have been amended accordingly.
- The terminology has been updated to relect the latest levels of hardware and software.
- "Appendix D. Handling Dumps" on page 171 contains information that should belong to pages 15 and 16 of the *VSE/ESA Diagnosis Tools* Version 2 Release 1 manual. However, since the *VSE/ESA Diagnosis Tools* manual is not being re-published for Version 2 Release 4, the information has been included here instead.
- "Appendix E. Info/Analysis" on page 173 contains information that should belong to pages 161 to 167 of the *VSE/ESA Diagnosis Tools* Version 2 Release 1 manual, but is included here instead for the same reason as described above.

For a complete overview...
of the functions which are new with VSE/ESA 2.4 refer to the IBM manual *VSE/ESA Planning*, SC33-6703.

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Chapter 1. Introduction

If you have an error situation and want to do error diagnosis, go directly to "Hardware Errors" on page 18, or "Software Errors" on page 19.

This chapter first describes users for whom this manual was written. This is followed by a reading chart that shows how to get familiar with the manual. The remainder of the chapter deals with the errors that may occur and what the system provides to assist you in error diagnosis.

Scope of the Manual

This manual discusses mainly VSE/ESA and its major base programs under the aspect of error diagnosis and problem determination.

The major base programs discussed are:

- VSE/POWER
- CICS
- VTAM
- VSE/ICCF

Note: This manual does *not* cover the VSE/ESA base program TCP/IP. Refer to the IBM manual *TCP/IP for VSE/ESA IBM Program Setup and Supplementary Information* SC33-6601, for a description of the error diagnosis and problem determination aspects of TCP/IP.

How to Read this Manual

The following reading chart helps you to understand the structure of the manual. It tells you what to read and for which purpose. To become familiar with the manual, follow this chart. The person responsible for error diagnosis should be familiar with the **complete** manual.

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YOU ARE LOOKING FOR INTRODUCTORY INFORMATION:

READ:

```
Preface
Chapter 1. Introduction
Chapter 2. Error Messages
Chapter 3. Starting Error Diagnosis
```

YOU HAVE AN ERROR SITUATION:

START WITH:

```
Chapter 3. Starting Error Diagnosis
```

This leads you to one of the following chapters:

```
Chapter 4. Diagnosis Procedures
Chapter 5. Online Analysis of CICS Transaction
           Server Abends
Chapter 6. Using Dumps for Error Diagnosis
Chapter 7. Handling Resource Constraint Conditions
```

The other chapters and appendixes are referred to when needed:

```
Chapter 8.  Using Utilities and Commands
Chapter 9.  Using Traces
Chapter 10. Diagnosis Procedures for More Experienced
            Users
Appendix A. Problem Log and Change Log
Appendix B. Problem Symptom String and APAR
            Submission
Appendix C. List of IPL, JCL, and Label Procedures
Appendix D. Handling Dumps (from Diagnosis Tools book)
Appendix E. Info/Analysis (from Diagnosis Tools book)
```

Figure 1. How to Read this Manual

Recognizing Errors

Following is an overview of how an error situation can be recognized.

A Message is Displayed

Messages reflect the status of your system and most errors are indicated by an error message. Refer to "Chapter 2. Error Messages" on page 11 for details about messages.

A Program is Canceled

The system may cancel a program before processing is finished. The reason may be either a logic error in the program or an attempt to process incorrect data. When a program is canceled, the system issues an error message.

Incorrect Output is Produced

After an application program has finished its execution, the output may be different from what you expected or intended. The cause could be the incorrect specification of an input file, a logic error in a program, or a defective device.

An Unusual System or Device Status Occurs

A number of errors cause symptoms which are more difficult to interpret. For example:

- Unusual pattern of system control lights.
- No system activity.
- No data can be entered from a terminal.

These symptoms can be caused, for example, by a looping program or a wait condition. Depending on the complexity of a given system, it requires system experience to analyze such symptoms and locate the source of the error.

Error Causes

Hardware Errors

A hardware error can be as simple as a device that has unintentionally been set into a NOT READY status. It could also be a defective I/O device, or a power failure.

This manual is mainly concerned with software errors. It gives some basic information on hardware to enable you to distinguish between hardware and software errors. For hardware errors refer to the hardware documentation of the device in error.

Refer also to the description of the WAIT and LOOP condition in the section "Software Errors" which follows.

Software Errors

Examples of software errors are:

- A program has an error in its logic.
- A program contains incorrect data definitions.
- A program wants to process a file that is not defined to the system.
- An entry is missing in a system table.

Because of a software error a program may come to an abnormal end ('**abend**' for short) and may be canceled. A software error may also cause **incorrect output**, a **loop** or a **wait** condition.

LOOP

A loop in a program is any repetitive execution of a sequence of instructions. Frequently, repetitive execution of a part of a program is intentional. Sometimes, however, a program incorrectly executes a sequence of instructions over and over again. The cause is, in most cases, a logic error; usually in an application program or sometimes in an IBM-supplied program. In exceptional cases a hardware malfunction may also be the cause of a loop.

WAIT

There are several kinds of waits and not all of them are error conditions. When the system (processor) stops processing, the WAIT control light comes on. For example, the processor waits for an answer from an I/O device, or there is nothing to process because no program is active. Note, however, that the system control light does not indicate the wait status of a partition.

Sometimes, an error in an application program, in a control program, or a device causes the processor to stop. Such a condition is a **hard wait** if the processor is unable to recover. Only a new startup (IPL) will reactivate the system. In another error situation the system will resume operation after the cause for the wait (for example, a device was not ready) has been removed. This type of wait is a **soft wait**.

Note: Errors often arise when the system setup is changed; devices are added or deleted, or new programs or applications are installed. Therefore, changes to the system should be carefully planned and documented. Refer to "Change Log" on page 160 for further details on documenting system changes.

Error Handling at Your Installation

Reporting Errors

Successful problem resolution depends above all on documenting all system changes and all problems that occur. A problem should be described in as much detail as possible. For documenting problems and system changes see also "Appendix A. Problem Log and Change Log" on page 159.

To keep the impact of errors to a minimum, it is necessary to establish communication channels for error reporting. An end user at a terminal usually does not have the knowledge or expertise to solve a problem. He or she should know exactly whom to contact in case of an error or a problem.

User Tasks and Responsibilities

Someone at your installation must be responsible for handling problem situations. Usually, this person will be the system administrator. The system administrator should act as the:

- Focal point for any problems and errors.
- Interface to IBM if help is required.

For example, you (the system administrator) must determine whether an error was caused by hardware or software. If it is a software error, determine the component: a **user program** or **IBM code**. If it is an error in a user program, you may hand over the problem to the owner of the program.

Make it a rule at your installation to save all available information related to a problem. This helps you to solve a problem more quickly. Have this information also available if there is a need to contact IBM. There are a few error situations that require that you contact IBM right away. This manual tells you when to do so.

Diagnostic Information Provided by the System

Besides messages, further information is provided by the system for error diagnosis.

Online Information

If a program (transaction) running under the CICS Transaction Server ends abnormally, error information is saved in a file. You can analyze this data at your terminal via the Interactive Interface of VSE/ESA. This enables you to determine the cause of the error without shutting down the CICS Transaction Server subsystem. For a detailed description refer to "Chapter 5. Online Analysis of CICS Transaction Abends" on page 55.

VSE/ESA saves a number of messages in a message log file. You can access these messages online and use them for error diagnosis. For further details refer to "Reviewing the Message Log File" on page 13.

Whenever a transaction ends abnormally, the CICS Transaction Server creates a transaction dump. Refer to "Handling CICS Transaction Dumps" on page 94 for how to use a transaction dump for error analysis.

Storage Dumps

On certain occasions, such as a program abend, the system writes the contents of storage (a dump) to the dump library.

You can analyze a dump stored in the dump library via the Interactive Interface of VSE/ESA. For a detailed description refer to "Chapter 6. Using Dumps for Error Diagnosis" on page 67.

Tools for Collecting Diagnostic Information

Utilities

To collect diagnostic information, various utilities are available. For example:

- Display table of contents (VTOC) of a disk volume.
- Take a stand-alone dump.
- Display VSE/VSAM catalog information.
- Print or display dump information.
- Print a VSE/VSAM file.
- Print the system console hardcopy file.
- Print the hardware recorder file.

As a VSE/ESA user you can access many of these utilities via the Interactive Interface of VSE/ESA. Refer to "Chapter 8. Using Utilities and Commands" on page 107 for details.

Traces

Traces are available to support you in error diagnosis. This manual provides information on the following traces:

- Interactive Trace Program
- SDAID Event Traces
- Trace Facility of VSE/POWER RJE/BSC and PNET
- Execution Diagnostic Facility (EDF) of the CICS Transaction Server
- Trace Facility of the CICS Transaction Server
- VTAM Traces.

For further details on these traces refer to "Chapter 9. Using Traces" on page 123.

System Startup Modes Available

VSE/ESA provides three **special** system startup modes for handling specific system status or problem situations. These startup modes are:

- COLD
- BASIC
- MINI

The operator may, in the IPL load parameter, request that startup processing is interrupted to allow for selecting a COLD, BASIC, or MINI startup.

The remaining two startup modes WARM and RECOV (recovery) are reserved for VSE/ESA. VSE/ESA performs automatically a WARM startup if the system is in normal, re-usable condition. VSE/ESA performs automatically a RECOV startup if the last shutdown of one or more partitions could not be completed successfully or no shutdown was performed at all.

The special startup modes are described in detail in the following section.

Startup Mode: COLD

If a COLD startup is requested, VSE/ESA reformats the VSE/POWER queues and restores the label area information. A COLD startup is necessary, for example, after extending the VSE/POWER data file.

If you implement certain system functions, VSE/ESA automatically performs a COLD startup. For example, if you include VSE/POWER PNET support.

During a COLD startup, the jobs in the VSE/POWER queues are erased. There are two ways to save and reload these jobs:

- With the utility program DTRIINIT.

  DTRIINIT loads cataloged jobs into the VSE/POWER reader queue. During a COLD startup, VSE/ESA activates program DTRIINIT. DTRIINIT uses a load list to reload jobs automatically from a VSE library into the VSE/POWER reader queue. To reload your own jobs, use skeleton SKCOLD to add your job names to the load list (before you perform a COLD startup). The manual *VSE/ESA Administration* describes skeleton SKCOLD in detail.

  Any job you want DTRIINIT to load into the VSE/POWER reader queue must be cataloged in a VSE library.
- With the POFFLOAD command.

The operator can use the POFFLOAD command to save the jobs of all VSE/POWER queues on tape. With the same command they can be reloaded after startup has been completed.

The manual *VSE/ESA Operation* has details on how to use the POFFLOAD command.

Startup Mode: BASIC

The BASIC startup gives you a "basic" system with the original system tables and definitions active. **All your system modifications are ignored**. The following partitions are active after a BASIC startup has been completed:

BG (available)
F1 (VSE/POWER)
F2 (CICS Transaction Server and VSE/ICCF)
F3 (VTAM, if used)
F4 (available)
F5 (available)

In addition to the system library (IJSYSRS.SYSLIB) and the dump library (SYSDUMP.xx) the following library definitions are active:

- For the F2 partition:

  PRD2.CONFIG, PRD1.BASE, PRD2.PROD, PRD2.BASE
- For all other partitions:

  PRD2.COMM, PRD2.CONFIG, PRD1. BASE

During a BASIC startup you are requested to specify up to three terminal addresses. These terminals are activated and allow you to correct an error interactively.

In general, a BASIC startup should be selected if the normal startup does not function because of an erroneous system condition.

Such a condition may be caused when adding new terminals to your system, for example. To add new terminals, you use the *Configure Hardware* dialog and the following might happen:

- You enter incorrect CICS definitions.
- While using the dialog you get conditions like VSE/VSAM space or VTAM buffer space exhausted.

The resulting system status would prevent you from starting up the system normally. With startup mode BASIC you get a running system and can correct the error.

Startup Mode: MINI

A MINI startup starts two partitions only, BG and F1 with VSE/POWER running.

In general, a MINI startup should be selected if severe problems inhibit the use of other startup modes. For example, if in the system library (IJSYSRS.SYSLIB) library members are missing or incorrect. A MINI startup allows you to use the librarian program LIBR in the BG partition and perform recovery actions. You may use program LIBR to:

- Copy backup versions of library members from PRD2.SAVE (or any other VSE library) to IJSYSRS.SYSLIB.
- Restore library members from a backup tape of IJSYSRS.SYSLIB.

Introduction

VSE library maintenance is another task for which you would request a MINI startup. For example, if you want to backup and restore a faulty library or reorganize a library via backup/restore. Deleting or moving a library or sublibrary are other tasks for which a MINI startup should be used. Note that library maintenance is only possible if the particular library object is not presently being used by another partition and is not included in an active LIBDEF chain. These are conditions that usually exist for a "MINI" system.

For library maintenance, you can enter librarian commands at the system console. The preferred method, however, is to have predefined job streams available in the VSE/POWER reader queue. You then simply release these jobs when library maintenance is required.

You may create such job streams for other tasks such as restoring files or libraries.

Unattended Node Environment

With the Unattended Node Support (*predefined environment C*) you can set up VSE/ESA nodes which have special features for automated operation and system control. Such nodes are attached to an OS/390 host and include functions for automatic restart and shutdown. Because of these functions, no system operator or person with VSE/ESA skill is required at a node site and the effort for problem determination is considerably reduced.

In case of system errors, VSE/ESA tries automatically to recover and performs a re-IPL if necessary. If the first re-IPL fails, it is repeated by using the alternate system library IJSYSRS.SYSLIB on SYSWK1. If it fails again, VSE/ESA repeats the re-IPL process a predefined number of times.

In case of a re-IPL but depending on the source of the error, VSE/ESA creates an internal dump (IDUMP) and stores it in the dump library for later analysis. If you want to find out the reason for a re-IPL, you should start with the dialog *Print IPL Diagnostics*. With it, you can retrieve and print error information from low processor storage about the cause of a (successful) re-IPL. It also includes the IDUMP name if such a dump was created. You can use this dialog directly at the node or from the host system. Should all re-IPL attempts fail, which is very unlikely, you should create and use a stand-alone dump for error diagnosis. In a stand-alone dump, the locator entries UNATTCB and UNATTCBN point to information about the system's re-IPL history. For further details, refer to "Analyzing a Formatted Dump" on page 85.

All the problem determination functions described in this manual are also available in an unattended node environment. For special considerations refer also to the manual *VSE/ESA Unattended Node Support* under "Chapter 8. Problem Determination".

Dialogs Available for Problem Determination

Through the selection panel *Problem Handling*, VSE/ESA provides the following dialogs for problem determination:

- **Online Problem Determination**

  Refer to "Chapter 5. Online Analysis of CICS Transaction Abends" on page 55 for details about this function.
- **Inspect Message Log**

Refer to "Reviewing the Message Log File" on page 13 for details about this function.

- **Storage Dump Management**

  Refer to "Chapter 6. Using Dumps for Error Diagnosis" on page 67 for details about this function.
- **Inspect Dump Management Output**

  Refer to "Chapter 6. Using Dumps for Error Diagnosis" on page 67 for details about this function.
- **Retrace History File**

  Refer to "Printing the System History File" on page 115 for details about this function.
- **Dump Program Utilities**:
  - **Create Stand-Alone Dump Program on Tape/Disk**

    Refer to "Taking a Stand-Alone Dump" on page 115 for details about this function.
  - **Scan Dump Files on Tape/Disk**

    Refer to "Scanning the Dump Files on Tape or Disk" on page 116 for details about this function.
  - **Print IPL Diagnostics**

    Refer to "Unattended Node Environment" on page 8 for details about this function.
  - **Format ICCF Dump Data**

    Refer to "Formatting and Analyzing VSE/ICCF Dump Data" on page 93 for details about this function.
  - **Print SDAID Tape**

    Refer to "Printing and Analyzing SDAID Information" on page 123 for details about this function.

Model User Profile for Problem Determination

As shipped, VSE/ESA includes a model user profile for accessing a default panel hierarchy for problem determination. The user ID and password is **$SRV**. The password should be changed after initial installation to avoid unauthorized access to system functions.

The panel hierarchy offered is mainly intended for IBM personnel doing remote problem determination for a user site via a data link connecting the user installation with an IBM Support Center, for example. But the $SRV panel hierarchy can also be used for local problem determination.

The initial *VSE/ESA Function Selection* panel offers the following selections:

Problem Handling
Console
Manage Batch Queues
Display Active Users/Send Message
Retrieve Message

A $SRV user is a type 2 user (can access VSE/ICCF but has no VSE/ICCF administrative authority) and is not authorized to escape to the CICS Transaction Server. In addition, a $SRV user can:

- Use the dialogs of the *Problem Handling* panel but cannot delete OLPD incidents when using the *Online Problem Determination* dialog.
- Access the VSE/ESA console but has restricted command authority.
- Look at the VSE/POWER queues and create jobs which produce output for the VSE/POWER list queue. Such jobs must have as destination operand (in the * $$ LST statement) the ID of the user or ANY. ANY indicates that this output is available to any user accessing it.
- Exchange messages with other users and delete messages from the message log.

If required, you may tailor the model user profile according to the needs of your installation.

Chapter 2. Error Messages

Most error situations are indicated by a message. Therefore, messages must be read carefully. **Careful reading** of message explanations can save hours of time spent on error diagnosis.

Messages may be issued by VSE/ESA, by the Interactive Interface of VSE/ESA, by VSE/ESA base programs, and by any application or user program running.

An Error Message is Issued

Take for example the following error message:

```
L019I  INVALID SUBCOMMAND SPECIFICATION
```

This message was issued by the VSE Librarian program. The *VSE/ESA Messages and Codes* manual tells you that the subcommand specified for an UPDATE command has a syntax error. If necessary, consult the manual *VSE/ESA System Control Statements* for the correct syntax of the UPDATE subcommand.

Other messages may point to a malfunctioning device. For example:

```
0P73I  I/O ERROR
```

The *VSE/ESA Messages and Codes* manual tells you why the job was canceled. The manual also suggests how to collect additional information about the device error. Whenever you are confronted with an error message take the time necessary for a careful interpretation of the message.

On Which Devices Do Messages Appear?

Messages appear at three places:

1. The system console (SYSLOG).

   Messages at the system console reflect the ongoing activities of the system. All system console messages are recorded by the system in the **hardcopy** file. These are the messages documented in the *VSE/ESA Messages and Codes* manual.

   All messages that are directed to the VSE/ESA system console appear identically on any *master console*. The master console is established via the user ID that is logged on to the terminal. Through the *Console* dialog of the VSE/ESA Interactive Interface, a user with the proper authority establishes a master console. For simplicity, this manual uses the term *system console* to mean either the locally-attached system console or any other master console.

   As a display station user, you can use the *Console* dialog and display message explanations online. Refer to “Displaying Messages Online” on page 12 for details.

2. The system printer (SYSLST).

   For each batch job, the system prints start and stop times and, in between, all messages that are issued for the job. For example, if you use DOS/VS COBOL as programming language, the COBOL diagnostic messages issued during the compile run are printed on SYSLST.

3. A user display station.

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Messages issued to a display station by VSE/ICCF are not recorded. Therefore, if a VSE/ICCF error message (prefix K) appears on your screen you should always write it down, including the partition number and the name of the job or program. This simplifies error diagnosis later.

When working with the Interactive Interface of VSE/ESA, you may get error messages that consist of plain text. These messages indicate severe errors like "temporary storage exhausted". For these messages, press the PF1 key to display help text describing the error. For other messages that are preceded by a code, refer to the Interactive Interface codes in the *VSE/ESA Messages and Codes* manual.

In addition, messages are saved in the:

- VSE/ESA message log file.

  These are messages that cannot be displayed immediately. If applicable, a display station user is notified that messages have been stored in the message log file. Refer to "Reviewing the Message Log File" on page 13 for further details.
- VSE/ESA dump library.
- CICS Online Problem Determination (OLPD) file.
- CICS transaction dump files.

For an **unattended node** system, VSE/ESA provides support for automatic message handling. This allows to suppress informational messages and provide automatic replies for messages which cause the system to wait for an operator response. System console messages of a node that cannot be automated (such as error messages) can be routed, for example, to the host for analysis.

Accessing Messages from a User Display Station

Displaying Messages Online

In VSE/ESA, the messages documented in *VSE/ESA Messages and Codes* can be displayed online at a user display station. You can do this by using the *Console* dialog. Select from the *Operations* panel:

```
1 (Console)
```

As a result, you get a full-screen display of a master console, just as it would appear on the real system console screen. To get a message explanation displayed, either type the message number into the input line (==>) and press the EXPLAIN PFkey (PF9, usually). Or, move the cursor under the message number and press the EXPLAIN PFkey.

You can also display VSE/VSAM error and return codes. The following keywords must be used:

```
VSAMOPEN  (for OPEN macro)
VSAMCLOS  (for CLOSE and TCLOSE macro)
VSAMREQU  (for request macros like GET and PUT)
VSAMXXCB  (for GENCB, MODCB, SHOWCB, and TESTCB macro)
VSAMRESN  (for catalog management requests)
```

The following sample shows a portion of a message display with a VSE/VSAM error code. The error message may look as follows:

```
4228I   FILE HNSO41 OPEN ERROR X'76' (118) CAT= ...
```

You get the following display after pressing the EXPLAIN PFkey:

```
4228I   FILE filename macro ERROR X'nn' (nnn) CAT= ...

        EXPLANATION: The ACB error flag was set to X'nn'
        (given in decimal notation in parentheses) during
        the indicated VSAM operation (execution of OPEN,
        CLOSE, or TCLOSE). See error codes; they are listed
        under "VSAMOPEN/VSAMCLOS/VSAMREQU/VSAMXXCB via EXPLAIN-key".
          .
          .
        If an error was detected within the catalog management
        routines ...
        See "VSAMRESN via EXPLAIN-key".
          .
          .
```

The explanation tells you how to proceed to display the description of the error code. In the example, enter VSAMOPEN and press the EXPLAIN PFkey again. You get the description of the OPEN error code 76 (118).

Once you are in explain mode, you can obtain information about other messages. You need not go back to the system console display. Move the cursor to a referenced message or type the message number into the input line. Then press the ENTER key or the EXPLAIN PFkey.

Reviewing System Console Messages

All messages displayed on the system console are saved in the hardcopy file. You can review them when selecting the Console dialog as shown in the previous paragraphs.

By pressing the REDISPLAY PFkey (PF7, usually), you go into redisplay mode. Use the BACKWARD and FORWARD PFkeys (PF7 and PF8, usually) to scroll through the hardcopy file and look for previously displayed messages. By entering a partition ID (for a static or dynamic partition) or AR in the input line (==>), you can selectively display messages. PF3 brings you back to the current console display.

In case of an error situation, a single message may not be very meaningful. To get a better understanding of the error situation, look also at previous messages. Select those messages that relate to the job or the partition in question. You can get a printout of the hardcopy file to check all the messages that appeared at the system console since the last startup. For details refer to “Printing the Hardcopy File” on page 107.

Reviewing the Message Log File

In VSE/ESA, the messages of the online part of your system are saved in the message log file. These are mainly CICS Transaction Server messages (prefix DFH) and interactive interface messages issued in case of severe errors (prefix IES).

The message log file is printed at CICS Transaction Server shutdown. You can review that file online for error diagnosis. From the *Problem Handling* panel select:

```
2  (Inspect Message Log)
```

Use the PF-keys as shown on the screen to review the message log.

Outstanding Messages at the System Console

Messages that require an operator response are displayed on the console screen in highlighted form. It may happen that a message is no longer shown on the screen and is still awaiting a reply. This may cause the system to behave unusually. For example:

- A partition does not start processing.
- A job does not complete.
- No input/output activity.

If such symptoms occur, check first for outstanding message replies before starting a time consuming problem analysis. You can check for outstanding message replies by entering:

```
REPLID
```

If no replies are outstanding, the system issues the following message:

```
1I88I NO REPLIES OUTSTANDING
```

If there is a message reply outstanding, the system tells you so by displaying the associated partition number and the ID of the message. You can redisplay messages with the *Console* dialog and use PF7 and PF8 to scan through the display (as was explained above).

Leave the redisplay mode by pressing the END PFkey (PF3, usually).

For further details on redisplaying messages, refer to the manual *VSE/ESA Operation*.

Chapter 3. Starting Error Diagnosis

What You Should Consider First

Before you start a time consuming analysis consider the following questions. They may give you a clue or pinpoint the error area right away.

- Was an **error-related message** displayed on SYSLOG or SYSLST? If so, first consult the *VSE/ESA Messages and Codes* manual and follow the instructions given there.
- Were **any changes** applied to the system or to a failing program? For example:
  - A new application or a VSE/ESA optional program has been installed.
  - A program has been changed (recompiled, recataloged).
  - A job stream (JCL statements) has been changed.
  - Startup procedures and jobs have been changed.
  - The hardware configuration has been changed.
  - A library definition (LIBDEF) has been changed, deleted, or added.
  - The format of the data processed has changed.
  - The location of the data processed has changed.
  - A different supervisor has been used.
  - The run mode (real or virtual) has been changed.

Note: Before you change any software, create a backup copy of the successfully running version. This may be the SYSRES, a user file or program, or a job stream. If the changed version fails, you can still use the backup version. The manual *VSE/ESA Operation* describes the backup and restore dialogs of VSE/ESA.

How to Start Error Diagnosis

Whenever a problem occurs, perform error diagnosis in the following sequence:

1. Record the problem.
2. Do **problem determination**:

   Is it hardware or software?
3. Do **problem source identification**:

   Is it user code or IBM code?

Recording the Problem

When an error occurs, record the error in the problem log. Do an initial recording first. Later, add as many details as possible. For suggestions for a problem log see "Appendix A. Problem Log and Change Log" on page 159. The problem log information helps you to evaluate an error more easily. Apart from a specific error description, the following should be recorded for every error situation:

- Messages displayed. Check **SYSLOG** and **SYSLST**.
- Partitions that were running.
- Partition priorities.
- Jobs that were running.
- Devices involved.
- Listings and dumps created.
- Actions taken.

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Starting Error Diagnosis

To find the cause of an error, you always start by observing a symptom and then work your way back to whatever was the cause. This section shows you how to proceed when an error symptom is noticed. You begin with problem determination.

Problem Determination: Is it Hardware or Software?

First you have to find out whether the error is caused by hardware or software. Do that by checking for hardware symptoms. A selection of them is listed under "Hardware Errors" on page 18.

Problem Source Identification: Which Software?

If the problem is apparently not caused by hardware, continue your search in the software area. Use the error symptom tables for that purpose. You find them under "Software Errors" on page 19. If you locate the error in IBM code, follow the steps shown in Figure 2 on page 17. The figure shows the diagnosis steps in relation to IBM's responsibilities.

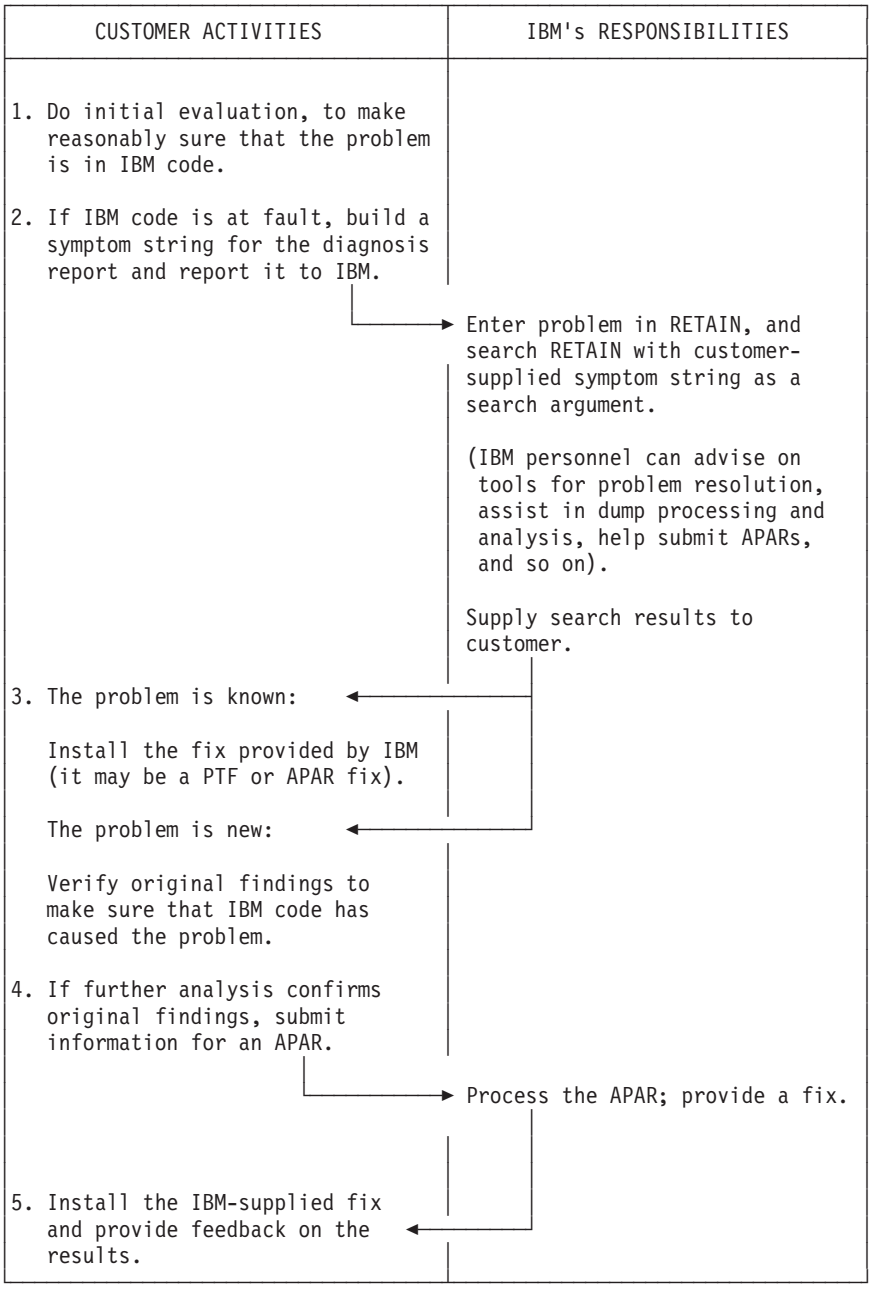

Figure 2. IBM's Service Concept if IBM Code is at Fault

Note: For details on the diagnosis report mentioned in step 2 see "The Problem Symptom String" on page 161. For details on the APAR document mentioned in step 4 see "Submitting an APAR" on page 167.

If it is an error in a user program or if it is a system handling error, follow the procedures established for your installation.

Hardware Errors

Whenever your system shows a symptom that points to a hardware error, proceed as follows:

1. Consult the appropriate hardware manual first.
2. If you cannot remove the error, contact the IBM Service Representative.

Whenever a hardware error occurs, the system records that error in the recorder file. You can use the **EREP** program to produce reports based on the recorder file information. Such a report provides valuable information for IBM's service personnel. For details on the EREP program refer to "Printing the Recorder File" on page 107.

Following is a selection of hardware error symptoms.

Processor (System) Errors

Consult the appropriate manual of the processor you are using.

Device Errors (General)

Do you observe any of the following?

- Mechanical noise normally not present.
- Enable/disable or read/write switches not correctly set.
- Lamps on or off, which are obviously not normal operating conditions.
- No movement of I/O media which should be moving.

Device Errors (Specific)

Do you observe any of the following?

- **Disk Devices**
  - A disk device always drops its READY status.
  - For the same disk device, certain messages of type 4xxx/0Cxx appear repeatedly (the explanation in the *VSE/ESA Messages and Codes* manual points to a hardware error).
  - Whenever a particular disk device is accessed, the system starts to write information to the recorder file.
- **Tape Devices**
  - The retry's on a particular tape drive seem to be rather frequent.
  - For a particular tape drive, certain messages of type 4xxx/0Cxx appear repeatedly. The explanation in the *VSE/ESA Messages and Codes* manual points to a hardware error.
- **Printers**
  - The spacing or skipping of lines is irregular.
  - The page layout is invalid.
  - Some characters are wrong or out of line.

  Note that such symptoms may also be caused by software errors. For example by a wrong FCB or UCB.

Software Errors

The error symptoms listed in the following table point to software errors. The table helps you find diagnosis information for a particular software error more quickly. In some cases, the error symptom may be caused by a **hardware malfunction**.

Table 1. Error Symptom Reference Table

ERROR SYMPTOM	For DIAGNOSIS refer to:
Startup Problem	Page 21
Program Abend	Page 31
Transaction Abend	Page 31
Incorrect Output Problem	Page 33
Performance Problem	Page 35
Loop Condition	Page 37
Wait Condition	Page 42
Suspended Online Activities	Page 45
Resource Constraint Condition	Page 97

If your system, or part of it, is in a state that points to a WAIT or LOOP condition, check first for outstanding messages at the system console. This is described in section "Outstanding Messages at the System Console" on page 14. To check for outstanding messages, communication with the system via the system console must still be possible. For details about a WAIT condition refer to "Wait Condition" on page 42, for details about a LOOP condition refer to "Loop Condition" on page 37.

Chapter 4. Diagnosis Procedures

Startup Problem

This section describes error situations that may occur during system startup.

Startup begins with turning power on. It lasts through IML (initial microprogram load), IPL (initial program load), and the activation of partitions. During the final stage of startup, message

```
F2 ... DFHSI1517  DBDCCICS Control is being given to CICS
```

is displayed at the system console. This indicates that CICS Transaction Server startup has been successful. The *VSE/ESA Online* panel for signing-on appears on user display stations.

Areas not covered by this chapter:

1. For power-on and IML problems, refer to the documentation for the processor you are using.
2. For TCP/IP problems, refer to the IBM manual *TCP/IP for VSE/ESA IBM Program Setup and Supplementary Information*, SC33-6601.
3. For CICS/VSE problems, refer to the IBM manual *CICS/VSE Problem Determination Guide*, SC33-0716 (if you have a CICS Coexistence Environment, and run the CICS Transaction Server together with a CICS/VSE system).

What You Should Consider First

Before you follow the diagnosis steps below, consider the following:

1. If startup mode is RECOV or COLD, VSE/ESA performs time consuming recovery and initialization functions. This may appear as if the system were in a LOOP or WAIT condition. To verify the system status, use the redisplay function at the system console and check for message:

   ```
   IESI0221I  PARTITIONS xx  xx WILL BE INITIALIZED IN
              yyyyyy START MODE
   ```

   If the message shows that a RECOV or COLD startup is being performed, the system is most likely not in an error state but startup will take longer than usually.
2. Has your system setup changed since the last startup? For example, you may have added an IBM-supplied application to your system. **If so, the problem is most likely connected with that change**. Start with error diagnosis in that area.
3. Did you change any of the following since the last system startup:
   - ASI IPL procedure.
   - ASI JCL procedure.
   - Partition startup job.
   - A CICS table.
   - The CICS System Definition (CSD) file.
   - A VTAM book.

If anything was changed, verify the values specified. **Incorrect specifications usually cause startup problems**.

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Error Diagnosis Steps for VSE/ESA Components and Functions

Note: The following information is based on a system which has the characteristics of predefined environments A and B and was brought up with an initial startup mode of WARM.

Initial Diagnosis Steps

This section describes actions you should perform first to identify the component or function that failed during startup. You are guided to recovery information and from one component or function to the next. You start with the CICS component and proceed, step by step, down to the IPL level.

The tasks to be performed are all related to the **system console**.

CICS

Is the CICS Transaction Server up ?

Check for the following:

- The following message is displayed if the CICS Transaction Server startup was successful:

  ```
  F2 ... DFHSI1517  DBDCCICS Control is being given to CICS
  ```

- Enter the

  ```
  MSG F2  (partition where the CICS Transaction Server is running)
  ```

  command to find out whether the CICS Transaction Server is able to communicate.
- The panel *VSE/ESA Online* is displayed on user display stations if the CICS Transaction Server startup was successful.

If your actions indicate that the CICS Transaction Server is up and you still have a problem, continue error diagnosis. Use the information given in "Suspended Online Activities" on page 45.

If your actions indicate that the CICS Transaction Server is not up, find out whether VTAM startup was successful.

VTAM

Is VTAM up ?

Check for the following:

- Is the *Remote Application* panel displayed?
- Check for the VTAM completion message for initialization **IST020I**.
- Enter the following VTAM commands to see whether VTAM responds.

  At a display station:

  ```
  TEST          (to get the "IBM ECHO OK" message)
  ```

  At the system console:

  ```
  D NET,TERMS   (to get a terminal status report)
  ```

If you get a response, VTAM is up and you have a CICS Transaction Server startup problem. Refer to "CICS Transaction Server Startup Problem" on page 24 for recovery information.

If your actions indicate that VTAM is not up, find out whether VSE/POWER startup was successful.

POWER
Is VSE/POWER up ?

Check for the following:

- Check for the VSE/POWER completion message for initialization **1Q12I**.
- Enter one of the following commands to see whether VSE/POWER responds:

```
D A
D RDR
```

If your actions indicate that VSE/POWER is up, you have a VTAM startup problem. Refer to "VTAM Startup Problem" on page 25 for recovery information.

If your actions indicate that VSE/POWER is not up, find out whether the BG partition was started successfully.

BG
Is BG partition active ?

Check for the following:

- Check whether the BG partition ID is displayed.
- Check whether the following VSE/ESA startup messages are displayed:

```
IESI0221I  PARTITION F1 WILL BE INITIALIZED IN xxxx START MODE

IESI0222I  REMAINING PARTITIONS WILL BE INITIALIZED IN xxxx
           START MODE
```

If your actions indicate that the BG partition is active, you have a VSE/POWER startup problem. Refer to "VSE/POWER Startup Problem" on page 26 for recovery information.

If your actions indicate that the BG partition is not active, find out whether IPL completed successfully.

IPL
Did IPL complete successfully ?

Check for the following:

- Check for the IPL completion message **0I20I**.
- Enter the

```
MAP
```

  command to see whether VSE/ESA responds.

- Check whether the BG partition ID is displayed.

If your actions indicate that IPL completed successfully, you have a VSE/ESA startup problem. Refer to "VSE/ESA Startup Problem" on page 28 for recovery information.

If your actions indicate that IPL did not complete successfully, refer to "IPL Problem" on page 30 for IPL recovery information.

CICS Transaction Server Startup Problem

First check whether the CICS Transaction Server issued a message that indicates an abend situation. If so, perform the actions indicated by the message description in the manual *VSE/ESA Messages and Codes*.

If a dump was created for the abend, try a BASIC startup and correct the error according to the dump analysis result. For details about BASIC startup, refer to "Startup Mode: BASIC" on page 7. For details about dump analysis, refer to "Chapter 6. Using Dumps for Error Diagnosis" on page 67.

If no abend situation occurred, proceed as follows:

1. Enter the

   ```
   MAP
   ```

   command to check if the CICS Transaction Server startup job was started. Normally, the name of the startup job is CICSICCF.

   If the startup job has not been started, proceed as follows:

   If you use the VSE/ESA system startup facility, refer to "VSE/ESA Startup Problem" on page 28 for recovery information. Otherwise, ensure that you did release the CICS Transaction Server startup job (usually CICSICCF) in the VSE/POWER reader queue.
2. Check for CICS (prefix DFH) error messages. Proceed as follows:
   a. Check if any message replies are outstanding by issuing the command

      ```
      REPLID
      ```

      If no reply is outstanding, the system issues the following message:

      ```
      1I88I NO REPLIES OUTSTANDING
      ```

      In case of an outstanding message reply, the system displays the associated partition number and the ID of the message. Go into the redisplay mode by pressing the REDISPLAY PFkey (PF7, usually) and locate the message with outstanding reply. Leave the display mode by pressing the END PFkey (PF3, usually).
   b. Enter

      ```
      xx
      ```

      in the input line (==>) and press PF7 to redisplay and check all the messages of the CICS Transaction Server partition (xx is the partition identifier).

      Press PF3 to leave the display mode.
   c. If message

      ```
      DFHSI1572 APPLID  Unable to OPEN VTAM ACB ...
      ```

was displayed, it indicates most likely that the definitions for the CICS Transaction Server and VTAM do not agree. It may be caused by an incorrectly or incompletely specified application name (APPLID), for example. If this message occurs, proceed as follows:

1) Try to force an open of the ACB by entering from the system console:

```
MSG F2
CEMT SET VTAM OPEN
```

2) If this fails to open the ACB, compare the CICS and VTAM definitions:
   - Get a printout of the VTAM definitions by printing the B-books from library PRD2.CONFIG.
   - Display the CICS Transaction Server terminal IDs by entering from the system console:

```
MSG F2
CEMT INQUIRE TERM
```

   Then check the definitions for correctness. For networking definitions, see the introduction to "Suspended Online Activities" on page 45.

d. If the CICS Transaction Server partition was started and there is no message that indicates a problem, check your VTAM and CICS Transaction Server environment. Enter the following command:

```
D NET,APPLS
```

   Use the information displayed to verify the following:

   1) Is there an application entry for the CICS Transaction Server?

      If not, you probably have a problem with VTAM startup books or a VTAM startup failure.

   2) Does the VTAM application name match the CICS Transaction Server APPLID definition?

      If not, you probably changed either the CICS Transaction Server table DFHSIT, the Terminal Control entries in the CICS System Definition (CSD) file, or the VTAM startup book ATCCONxx.

   3) Did VTAM activate the APPLID for the CICS Transaction Server?

      If not, a VTAM startup problem is indicated. Refer to "VTAM Startup Problem" for recovery information.

If there is a need to perform corrections, you may use startup mode BASIC. For details on this startup mode, refer to "Startup Mode: BASIC" on page 7.

You may also refer to the manual *VSE/ESA Administration* for details about skeleton SKCICS. The skeleton helps you create and load the CICS Transaction Server startup job CICSICCF.

If the CICS Transaction Server startup was successful and the problem still exists, continue error diagnosis with "Suspended Online Activities" on page 45.

VTAM Startup Problem

1. Enter the

```
MAP
```

   command to check if the VTAM startup job was started. Normally, the name of the startup job is VTAMSTRT. If the startup job has not been started, proceed as follows:

If you use the VSE/ESA system startup facility, refer to "VSE/ESA Startup Problem" on page 28 for recovery information. Otherwise, ensure that you did release the startup job in the VSE/POWER reader queue.

2. Check for VTAM error messages (prefix IST). Proceed as follows:
   a. Check if any message replies are outstanding by issuing the command
      ```
      REPLID
      ```
      If no reply is outstanding, the system issues the following message:
      ```
      1I88I NO REPLIES OUTSTANDING
      ```
      In case of an outstanding message reply, the system displays the associated partition number and the ID of the message. Go into the redisplay mode by pressing the REDISPLAY PFkey (PF7, usually) and locate the message with outstanding reply. Leave the display mode by pressing the END PFkey (PF3, usually).
   b. Enter
      ```
      xx
      ```
      in the input line (==>) and press PF7 to redisplay and check all the messages of the VTAM partition (xx is the partition identifier).

      Press PF3 to leave the display mode.

   Note that VTAM error messages may have been suppressed depending on the SUPP parameter in ATCSTR00. You can modify the SUPP parameter in two ways:
   - By using the command:
     ```
     F NET,SUPP=NOSUP
     ```
   - By correcting startup book ATCSTR00.

   Your startup problem may be caused by one of the following:
   - Insufficient VTAM buffer space resulting from newly added terminals or applications.
   - Changed VTAM startup books.
   - Changed partition sizes.

If there is a need to perform corrections, you may use startup mode BASIC. For details on this startup mode, refer to "Startup Mode: BASIC" on page 7.

If VTAM startup was successful, continue error diagnosis with "Initial Diagnosis Steps" on page 22.

VSE/POWER Startup Problem

1. Enter the
   ```
   MAP
   ```
   command to check if the VSE/POWER startup job was started. Normally, the name of the startup job is POWSTART.

   If the startup job has not been started and you use the VSE/ESA system startup facility, refer to "VSE/ESA Startup Problem" on page 28 for recovery information.
2. Check for VSE/POWER (prefix 1) error messages. Proceed as follows:

a. Check if any message replies are outstanding by issuing the command

```
REPLID
```

If no reply is outstanding, the system issues the following message:

```
1I88I NO REPLIES OUTSTANDING
```

In case of an outstanding message reply, the system displays the associated partition number and the ID of the message. Go into the redisplay mode by pressing the REDISPLAY PFkey (PF7, usually) and locate the message with outstanding reply. Leave the display mode by pressing the END PFkey (PF3, usually).

b. Enter

```
xx
```

in the input line (==>) and press PF7 to redisplay and check all the messages of the VSE/POWER partition (xx is the partition identifier). Press PF3 to leave the display mode.

3. If you used skeleton SKPWRGEN to regenerate your VSE/POWER phase, verify the values and parameters modified.
4. If you extended the space for the VSE/POWER files, startup of the VSE/POWER partition fails if you specified incorrect values.

   For example, you specified a starting block and/or a size such that the added VSE/POWER space overlaps an existing file. Depending on the file which was overlapped, the system will report the error situation with a message. For example, if VSE/VSAM space was overlapped, the messages

```
4n98I  OVLAP UNEXPRD SECRD FILE ...
1Q19I  INVALID DATA FILE EXTENT, RC=nnnn
```

   will be issued and startup will be terminated. Other messages require your decision. For example:

```
4n44D  OVERLAP ON UNEXPRD FILE IJDFILE ...
```

   If the message refers to a file that (1) you recognize as a **user file** (as opposed to a system file), and (2) you are certain that this file is no longer needed, enter:

```
DELETE
```

   But in other cases, enter:

```
CANCEL
```

   This terminates the startup. If corrections are necessary, perform a BASIC startup. This gives you a basic VSE/ESA system that allows you to correct existing errors. For details about this startup mode, refer to “Startup Mode: BASIC” on page 7.

   Otherwise, perform a stand-alone restore of the DOSRES volume. This restores the original extents of the VSE/POWER queue files. For the VSE/POWER data and account files, you must restore the SYSWK1 volume.
5. Ensure that you did load the correct startup jobs into the VSE/POWER reader queue. Use program DTRIINIT (described in the manual *VSE/ESA System Utilities*) or the POFFLOAD command (described in the manual *VSE/POWER Administration and Operation*) to perform this task.

If VSE/POWER startup was successful, continue error diagnosis with “Initial Diagnosis Steps” on page 22.

VSE/ESA Startup Problem

Consider the following first:

- Did you change procedure CPUVAR1 or $COMVAR?
- Did you change any other startup procedure or startup job?
- Are the correct startup jobs available in the reader queue?

If any changes were made, ensure that they are correct and run error-free. Following is a selection of VSE/ESA startup problems.

Startup Procedure

Startup Procedure Not Available or Incorrect

The following messages may indicate problems with the startup procedure CPUVAR1 or any other startup member:

```
1S59D  CONFLICTING DATA=YES/NO OPTION

IESI0085I  LIBRARIAN MACRO xxxxxxxx TERMINATED WITH RETURN
           CODE yy

IESI0230I  MEMBER xxxxxxxx DOES NOT EXIST IN LIBRARY
           xxxxxxx.yyyyyyyy ...

IESI0231I  SYNTAX ERROR IN STATEMENT xx...xx. STATEMENT
           WILL BE IGNORED
```

For the following discussion, startup procedure CPUVAR1 is used as an example. If CPUVAR1 is not available during startup, it may be caused by one of the following:

- CPUVAR1 was deleted by mistake in system library IJSYSRS.SYSLIB.

  A copy of CPUVAR1 should still be available in library PRD2.SAVE. If so, perform a MINI startup to get a system with the BG and F1 partition active. At the system console, use librarian program LIBR and copy CPUVAR1 from PRD2.SAVE into IJSYSRS.SYSLIB.

  Otherwise, you must restore system library IJSYSRS.SYSLIB. Use a stand-alone backup tape created with the librarian BACKUP command and RESTORE=STANDALONE.
- You used the utility program DTRSETP to tailor CPUVAR1 or to create a new CPUVARn.

  This may result in conflicting names or syntax errors. A copy of CPUVAR1 should still be available in library PRD2.SAVE. If so, perform a MINI startup to get a system with the BG and F1 partition active. At the system console, use librarian program LIBR and copy CPUVAR1 from PRD2.SAVE into IJSYSRS.SYSLIB.

  Otherwise, you must restore system library IJSYSRS.SYSLIB. Use a stand-alone backup tape created with the librarian BACKUP command and RESTORE=STANDALONE.

See “Backup a SYSRES File, Library, Sublibrary, or Member” and “Restore a SYSRES File, Library, Sublibrary, or a Member” in the *VSE/ESA Guide to System Functions*.

System Library
System Library is Full

If a library full condition exists, CPUVAR1 can be read but the updated version cannot be written back to IJSYSRS.SYSLIB. To remove the condition, proceed as follows:

1. Perform a MINI startup to get a system with the BG and F1 partition active.
2. Invoke the librarian program LIBR from the system console. Use librarian commands to delete members or to release space. The command sequence you enter may look as follows:

   ```
   0 EXEC LIBR
   0 LD LIB=IJSYSRS OUTPUT=STATUS
   0 ACCESS S=IJSYSRS.SYSLIB
   0 DEL mn.mt
      .
      .
   0 REL SPACE LIB=IJSYSRS
   ```

   In the above sequence, the LD statement creates a library directory list. This list helps you decide which members can be deleted and shows you how much delayed space there is for release. For details about delayed space, refer to "VSE Libraries" on page 36.
3. Perform IPL again.

If you cannot delete members or if there is no space for release, you must restore library IJSYSRS.SYSLIB. Use a stand-alone backup tape created with the librarian BACKUP command and RESTORE=STANDALONE.

The librarian commands are described in detail under "Librarian Commands" in the manual *VSE/ESA Guide to System Functions*.

System Library
System Library is Locked

You use the access control function of VSE/ESA and message

```
0S20I UNAUTHORIZED ACCESS REQUEST FOR:
      yyyyyyyy.zzzzzzzz
0S00I xxx name CANCELED
```

is displayed during IPL. This would indicate that a successful startup cannot be performed because of incorrect access control table definitions that lock the system library. To remove the error, proceed as follows:

1. Perform IPL again and interrupt the IPL process. For details refer to the manual *VSE/ESA Guide to System Functions*.
2. Enter the IPL and JCL procedure names together with the STOP parameter. For example:

   ```
   IPL=$IPLESA,JCL=$$JCL,STOP=SVA
   ```

   The system responds with message 0J05D and further parameters can be entered.
3. Enter

```
SYS SEC=NO
```

to reset access control temporarily. The system responds with message 0D07D.

4. Press ENTER.

   Startup continues without activating access control. Correct the access control table as soon as the system is up.

If the above steps do not remove the problem, you must restore your system library IJSYSRS.SYSLIB. Use a stand-alone backup tape created with the librarian BACKUP command and RESTORE=STANDALONE. See "Backup a SYSRES File, Library, Sublibrary, or Member" and "Restore SYSRES File, Library, Sublibrary, or a Member" in the *VSE/ESA Guide to System Functions*.

IPL Problem

IPL is started by entering load information on the *S/390 Support Element* panel.

If the load does not complete successfully, follow the directions given on the window, or on any messages that might be displayed, to determine the problem and how to correct it. Refer to the *S/390 Support Element Operations Guide,* GC38-3118 for further information.

Then proceed as follows:

1. Has the correct IPL information been entered?

   Specifying an incorrect IPL device address is the most common cause of an IPL problem.

   After typing the correct IPL information into the *PROGRAM LOAD* panel press ENTER to continue IPL.

2. Does the IPL procedure contain incorrect information? (You may have changed the IPL procedure).

   Proceed as follows:

   Perform IPL again and interrupt IPL processing. Refer to the manual *VSE/ESA Guide to System Functions*.

   Enter the IPL command with the names of the IPL and JCL procedures appropriate for your environment. For example, for a system with DOSRES on a 3380 disk volume you should enter:

   ```
   IPL=$IPLE80,JCL=$$JCL780,TYPE=SENSE
   ```

   This causes a startup with the original IPL and JCL procedures as shipped with VSE/ESA. The TYPE=SENSE parameter ensures that all attached devices are sensed and recognized by VSE/ESA. No ADD commands are required.

   "Appendix C. List of IPL, JCL, and Label Procedures" on page 169 shows the names of the IPL and JCL procedures shipped with VSE/ESA. When startup is complete, you can correct your own IPL procedure, if necessary:

   a. From the *Hardware Configuration and IPL* panel select:

      ```
      3  (Tailor IPL Procedure)
      ```

   b. Correct your IPL procedure.

   c. Perform normal shutdown.

   d. Repeat IPL.

3. Did the system issue message:

   ```
   0I94A PHASE phasename NOT FOUND. IPL TERMINATED
   ```

A library member may have been deleted by mistake.

To remove the error situation, you must restore system library IJSYSRS.SYSLIB. Use a stand-alone backup tape created with the librarian BACKUP command and RESTORE=STANDALONE. See "Backup a SYSRES File, Library, Sublibrary, or Member" and "Restore a SYSRES File, Library, Sublibrary, or a Member" in the *VSE/ESA Guide to System Functions*.

4. Did the system issue the following messages:

```
0I04I IPLDEV=X'cuu', VOLSER=number, CPUID=number
0I03D ENTER SUPERVISOR PARAMETERS [OR ASI PARAMETERS]
```

If YES:

Enter the supervisor parameters. For details see the description of message 0I03D in the *VSE/ESA Messages and Codes* manual. Supervisor parameters are described under "The Supervisor Parameters Command" in the *VSE/ESA System Control Statements*.

If NO:

Display **storage bytes 0 - 3** (low-address storage bytes) with the Display/Alter function. Is an **IPL message code or WAIT code** stored in these bytes? To identify a code, refer to the "VSE/Advanced Functions Codes and SVC Errors" in the *VSE/ESA Messages and Codes* manual and follow the instructions given there.

If the error is apparently not related to IPL, consider a power-on or IML problem. For such a problem, consult the documentation of the processor you are using.

Data You Should Collect in Case of a Startup Problem

For further analysis, collect the following data:

- System console log (from the hardcopy file).
- Dump or record the contents of low-address storage bytes X'00' to X'17'. Use the Display/Alter function. To interpret the data stored in these bytes refer to the "VSE/Advanced Functions codes and SVC errors" in the *VSE/ESA Messages and Codes* manual.

  Note: You must do this before you take a stand-alone dump.
- Stand-alone dump. Refer to "Taking a Stand-Alone Dump" on page 115.
- Assembly listings and linkage editor map if you generated your own supervisor.
- Retrace printout of system history file.

Abend Problem

A program or transaction may terminate before processing is finished because of an error situation or because the operator forced termination. The program or transaction comes to an abnormal end (**abend** for short).

Recognizing an Abend

Messages or a notification panel indicate an abend. The **partition identifier** in front of the message text tells you in which partition the abend occurred.

Among the abend messages are the following:

- A message at the system console indicating a program check:
  `0S03I PROGRAM CHECK INTERRUPTION ...`
- A message at the system console indicating that a dump is written:
  `0S30I DUMP STARTED. MEMBER= ... DUMP in SUBLIB= ...`
- A message at a user display station indicating a transaction abend:
  `DFHAP0001 DBDCCICS  An abend (code xxx/yyyy) has occurred ...`

  This abend originates from a transaction running under the CICS Transaction Server of VSE/ESA. The message is preceded by a notification panel that gives details about the transaction abend. For details about how to analyze such an abend online, refer to "Chapter 5. Online Analysis of CICS Transaction Abends" on page 55.

What You Should Consider First

Depending on the JCL definitions, the system creates a **partition** or **system dump** of the partition in which the abend occurred.

For a CICS transaction abend, however, only a dump of the transaction related storage (a CICS **transaction dump**) is taken. In case of an exceptional error situation a CICS partition or system dump is created in addition.

Some abend conditions may be related to a user application program, others to one of the IBM-supplied programs.

If the system creates a dump, always record the following in the problem log:
- Dump ID
- Job name
- Partition
- Day and time.

Application Program Abend

Transaction Abend: In case of a CICS transaction abend, the system displays a notification panel on your screen (see Figure 4 on page 56). It gives you details about the abend. You can then activate the Online Problem Determination Program or redisplay your working screen. Your working screen would then show message
`DFHAP0001 DBDCCICS  An abend (code xxx/yyyy) has occurred ...`

The Online Problem Determination Program collected and saved all relevant error data in a file. You, or the programmer responsible for the transaction, can access this data right away or later for online error diagnosis. To diagnose a transaction abend, go to **"Chapter 5. Online Analysis of CICS Transaction Abends" on page 55.**

Batch Program Abend: In case of a batch program abend, the system or partition dump is stored in the dump library. You can analyze such a dump online or in batch mode. Refer to **"Chapter 6. Using Dumps for Error Diagnosis" on page 67** for details.

The dump analysis gives the programmer initial information for debugging the program. It is advisable first to check whether the setup for running the program was correct.

VSE/ESA Base Program Abend

One of the VSE/ESA base programs (such as the subsystems CICS Transaction Server or VTAM) may come to an abnormal end. If this happens, VSE/ESA creates a partition or system dump and stores it in the dump library.

Analyze the dump as described in "Chapter 6. Using Dumps for Error Diagnosis" on page 67.

Experienced User

As a more experienced user, you may also refer to "Abend Symptom" on page 149. There you find additional diagnosis information for abend situations.

Data You Should Collect in Case of an Abend

For further analysis, collect the following data:

- System console log (from the hardcopy file).
- Dump output.
- Job stream.
- MAP command output.
- Retrace printout of system history file.

Incorrect Output Problem

Incorrect output problems are usually detected by the user of the output. The application user may notice incorrect print output. A program which processes data of a tape file may detect the incorrect formatting of the data on tape.

On some occasions, the system console operator might discover an error situation such as excessive printer paper consumption. This may be due to an incorrect job setup or erroneous skipping or spacing.

Recognizing Incorrect Output

Incorrect output appears in many forms. Here are a few examples:

- Invalid or unexpected messages.
- Unidentifiable data; in particular, unreadable output on a printer or at a display station.
- Duplicated data.
- Missing data.
- Data out of sequence or in the wrong format.
- Repetitive output (see "Loop Condition" on page 37 for details).

What You Should Consider First

The cause for incorrect output is of two types:

- Setup errors, such as incorrect specification of an input file or a mismatch between the printer train and the loaded Universal Character Set Buffer (UCB).
- Program errors.

Error Diagnosis Steps

Setup Errors

First make sure that the operational setup was correct. For example, that the correct files were specified and do exist. For error diagnosis, it may be necessary to rerun the job or program with the original setup.

Files:

If you suspect a problem with the files used, gather file information. Utilities are available for:

- Displaying VTOC information.

  For details refer to "Displaying the Table of Contents (VTOC) of a Disk Volume" on page 112.
- Displaying file information.

  For details refer to "Displaying VSE/VSAM File Information Online" on page 108.
- Printing a VSE/VSAM catalog.

  For details refer to "Printing a VSE/VSAM Catalog" on page 110.
- Printing the contents of a VSE/VSAM file.

  For details refer to "Printing the Contents of a VSE/VSAM File" on page 109.

Printer Output:

Proceed as follows:

- If the printer output is not readable or message 0P11D (Data Check) occurred, check whether the correct Universal Character Set Buffer (UCB) is loaded. The system library must contain a UCB that corresponds to the printer chain being used. To create and catalog a new UCB, select

  ```
  5 (Catalog Printer UCB)
  ```

  from the *Hardware Configuration and IPL* panel. Refer to the *VSE/ESA Administration* manual under "Cataloging Printer UCB" for details.

  Note that simply cataloging does not make the new UCB available. The new UCB must be loaded. It is loaded automatically during IPL. An UCB can also be specified in the VSE/POWER *** $$ LST** control statement, or the operator can enter an LUCB command. To enter an LUCB command, proceed as follows:

  – If a VSE/POWER list task is active on the printer, stop the task by entering:

    ```
    P cuu
    ```

  – Load the correct UCB:

    ```
    LUCB cuu,$$BUCBxx,...
    ```

    See the manual *VSE/ESA Operation* under "Changing Print Trains" for additional information.

  – When message 0P11D appears, enter:

    ```
    IGNORE
    ```

  – Start the printer again. Enter:

    ```
    S LST,cuu
    and the PGO command, if applicable:
    G cuu
    ```

  At the next IPL, the new UCB will be loaded automatically.

- If the skipping or spacing is incorrect, ensure that the correct Forms Control Buffer (FCB) is loaded. To create and catalog an FCB, select

  ```
  4 (Maintain Printer FCB)
  ```

  from the *Hardware Configuration and IPL* panel. Refer to the *VSE/ESA Administration* manual for details about the dialog.

  Note that loading a new FCB depends on the type of FCB. A standard FCB is loaded automatically during IPL. A standard FCB *can be* and a non-standard FCB *must be* specified in the VSE/POWER *** $$ LST** control statement, or the operator must enter an LFCB command:

  ```
  LFCB cuu,$$BFCBxx,...
  ```

  Always ready the printer before using the LFCB command.

Program Errors

If a program error is the most likely cause of the problem, the programmer responsible should do error diagnosis. Before you contact the programmer, gather the following information:

- Take note of the:
  - Dump ID (if a dump was written).
  - Job name.
  - Partition.
  - Day and time.
- Issue the MAP command. Save the output.
- Save all program output.

If the cause of the error is not obvious, the programmer can use tracing tools. For tracing tools refer to "Chapter 9. Using Traces" on page 123.

Experienced User

As a more experienced user, you may also refer to "Incorrect Output Symptom" on page 147 for additional diagnosis information.

Data You Should Collect in Case of Incorrect Output

Collect the following data and have it available for error diagnosis:

- System console log (from the hardcopy file).
- Dump ID (if necessary, rerun the job and cancel it to create a dump).
- Job stream.
- A list of all I/O files and volumes used by the particular program.
- EREP output, if possible.
- Program output.

Performance Problem

Recognizing a Performance Problem

A performance problem exists when the performance deviates notably from the established values. The deviation may affect the entire system, only one, or several partitions. Note that a job as such still runs correctly, but needs more time to complete.

What You Should Consider First

Such a situation may be caused *not by an error* but by one of the following conditions:

- A program has to process more data than usual.
- A program has been changed.
- Too many jobs are running at the same time. As a result, the system is overloaded and may deactivate one or more partitions.

But performance degradation can also be caused by real errors. For example:

- An error in a user program.
- An error in a control program.
- Shortage of storage (storage is not released).
- A high number of errors on an I/O device. This can slow down the system considerably.

If one of these conditions or error situations exists, the system may show symptoms such as:

- High paging activity.
- High channel usage.
- High number of busy control units.

Resources that Might Affect Performance

VSE/ICCF DTSFILE

If the VSE/ICCF library owners perform many delete and add operations, the library space may become scattered after some time. This can *increase* considerably the time needed for accessing a library member. You can use message

```
K088I  HI FILE RECORDS=nn (mm%)
```

as an indicator. This message is issued during startup or normal processing and may indicate less space (due to scattered and unused space) than should actually be available. If *mm* shows a relatively low value, consider a reorganization run. This makes the unused space available again and improves performance. To reorganize the DTSFILE, use the VSE/ICCF utility program DTSUTIL.

VSE Libraries

Performance problems may be caused by a large amount of “delayed space” in a library. Delayed space means space that is no longer used but has not been released yet. It occurs in libraries that are shared either among partitions or among CPUs. You can find out how much of library space is delayed by creating a directory list with the LISTD command. Refer to “LISTD Librarian Command” on page 118 for details. To free delayed space, use the librarian RELEASE command as described under “Release Space for a Library or Sublibrary” in the *VSE/ESA Guide to System Functions*.

Make it a rule that non-shared libraries are not placed on shared volumes.

Error Diagnosis Steps

If a performance problem is indicated, proceed as follows:

1. Cancel one partition after another and check which program causes the performance problem.
2. Find out whether any changes have been applied to the system.

Note that a loop condition may also be the cause of a performance degradation. For details about a loop condition, refer to “Loop Condition”.

Refer also to the *VSE/ESA Planning* manual which has details about tuning the system under “Storage and Tuning Recommendations”.

If you cannot remove the problem, contact IBM for support.

Monitoring the System

To evaluate the performance of your system, you should monitor it over a longer period of time. You can do that online via the Interactive Interface of VSE/ESA. The following dialogs are available:

- Display System Activity.

  Refer to Figure 3 on page 38 for information provided by the dialog.
- Display Channel and Device Activity.

For a description of these dialogs and how to interpret the information shown, refer to the *VSE/ESA Operation* manual.

Loop Condition

In most cases, a loop results from a logic error in a program. In exceptional cases a hardware malfunction may also be the cause of a loop. See description of system loop below.

Recognizing a Loop

Quite often, the symptom gives an indication as to which part of the system is looping.

Repetitive Output

When the system produces the same output over and over, the reason is most likely a looping program. Usually, you can relate such output (a printout, a display, or a tape or disk), to a specific job or program that created it. This tells you where to look for the error.

If the repetitive output consists of messages at the system console, the partition identifier gives you a clue where to start searching for the error.

Other symptoms that point to a loop are more difficult to relate to a particular part of the system.

Online Loop

The following symptoms indicate that either a transaction running under the CICS Transaction Server, or any of the control programs VTAM, the CICS Transaction Server, or VSE/ICCF may be in a loop.

- Extremely slow response time at the display stations, or no response at all.
- Data cannot be entered at a display station.

VSE/POWER Loop

The following symptoms indicate that VSE/POWER may be looping.

- Impossible to communicate with VSE/POWER queues.
- Impossible to flush the batch partitions with the PFLUSH command, or to stop a printout with the PSTOP command.

- VSE/POWER commands are not executed even if they are entered after an RC (Request Communication) command.

Batch Loop

A program in a batch partition may be in a loop if you observe the following:

- A pointless recurrence of input/output activity. For example, the same console messages appear over and over again, or you suspect that the same data is written repeatedly to disk or tape. Also, entering the PDISPLAY A command may show you that a job produces more output segments than expected. VSE/POWER indicates the beginning of a new segment with message 1Q53I.

  Also, watch out for message 1Q52I. VSE/POWER issues this message if a job produces more output than specified. You can specify the number of list or punch records expected with the RBM parameter in the * $$ LIST or * $$ PUN statement.
- A program does not change its status for a long time; for example, no input/output activity takes place.

Using the System Activity Display to Recognize a Loop

Select from the *System Status* panel:

1 (Display System Activity)

You get a display as shown in Figure 3.

```
IESADMDA             DISPLAY SYSTEM ACTIVITY              15 Seconds  08:13:42
*---- SYSTEM (CPUs:  1 /  0 ) ----* *------------ CICS : DBDCCICS ------------*
|CPU      :  16%   I/O/Sec:    *  | |No. Tasks:     944   Per Second :     *  |
|Pages In :    0   Per Sec:    *  | |Dispatchable:    6   Suspended  :     3  |
|Pages Out:    0   Per Sec:    *  | |Peak Active :    7   MXT reached:     0  |
*--------------------------------* *----------------------------------------*
Priority: Z,Y,P,C,BG,FA,F9,F8,F7,F6,F5,F4,F2,FB,F3,F1

 ID S JOB NAME  PHASE NAME  ELAPSED     CPU TIME   OVERHEAD   %CPU       I/O
 F1 1 POWSTART    IPWPOWER  172:14:47     712.56     356.27    10%      3,657
 F3 3 VTAMSTRT    ISTINCVT  172:14:38      44.05      12.06             10,241
 FB B SECSERV     BSTPSTS   172:14:48        .56        .18              1,099
 F2 2 CICSICCF    DFHSIP    119:21:14     655.42     174.31     4%     34,672
 F4 4 CICSOLD     DFHSIP    172:14:36      76.37      20.61              3,063
 F5 5 GENERATE    ASSEMBLY   00:00:14        .82        .05                380
 F6 6 <=WAITING FOR WORK=>                 .00        .00                  2
 F7 7 ARISSTRT    ARISQLDS   19:31:28       5.69       5.49     2%      1,276
 F8 8 <=WAITING FOR WORK=>                 .00        .00                  2
*F9 9 ICFBAC      DTSUTIL    00:01:13        .22        .18                34
 FA A <=WAITING FOR WORK=>                 .00        .00                  2
 BG 0 PAUSEBG     LIBR       00:02:43        .45        .34             2,542
PF1=HELP      2=PART.BAL.   3=END        4=RETURN     5=DYN.PART   6=CPU
```

Figure 3. Example of a System Activity Display

A system activity display is updated automatically at fifteen second intervals. The values that are of interest are shown in the columns CPU TIME and I/O. If a program uses up CPU time but does not increase the I/O count, it is likely to be in a loop. Look primarily at the batch partitions. If none of them indicates a problem, check the other partitions too.

Note: Many batch jobs show lots of CPU operations but relatively few I/O operations during most of their processing. These jobs normally should be run with lower priority than those jobs which are less CPU intensive and more I/O intensive.

What You Should Consider First

As a general rule, you should take the actions recommended below. If, **after doing that**, you are still unable to resolve the problem, try to shutdown the system *in an orderly fashion*. This is not always possible because the particular error situation may prevent just that.

After going through some of the actions suggested, you may come to a point where only a re-IPL is left as a last resort. If, after re-IPL, the loop appears again, contact IBM for support.

Error Diagnosis Steps

Note: Many processors include functions such as traces that assist you in diagnosing loops. Refer to the appropriate manual of your processor for such tools.

The following discussion assumes that you do not know which program is looping. In other words, you have to *locate* the loop.

If you are reasonably sure that the problem lies in the **online** part of the system, proceed with step 3 below. Otherwise, find out which jobs are running in the batch partitions by entering the VSE/POWER display command:

```
D A
```

If the D A command is accepted and the active batch jobs are displayed, proceed with step 1 below.

If the system responds with the message “PROCESSING ROUTINE ACTIVE”, wait a few seconds and then repeat the command. If you get message “COMMAND IGNORED”, issue the command

```
RC  (Request Communication)
```

before you try the D A command (or any other VSE/POWER command) again. If the RC command is not accepted, do instruction stepping via the *MODE SELECTION* panel. Write down 20 to 30 addresses that are displayed. If the loop is rather tight, you may be able to locate it in this way. If the system is up again, use the MAP command to identify the partition in which the addresses are located.

If you are not successful, do a STORE STATUS/MACHINE SAVE and take a stand-alone dump (see “Taking a Stand-Alone Dump” on page 115). Then re-IPL.

1. Cancel (with the PFLUSH command) the active batch partitions **one after another**. Afterwards cancel the CICS Transaction Server, then the VTAM, and then the VSE/POWER partition, if necessary.

   Note: If you want to take a dump, you must do it before entering the PFLUSH command. See step 2 below for the dump command.

   If you are monitoring the system, as described for a batch loop on page 38, and found a job that you suspect to be looping, let the corresponding partition be the **first** that you try to cancel.
2. Observe the behavior of the system. If it seems to be running normally again after you terminated the batch program, you know the loop was caused by that program.

Make sure that the loop is indeed an error situation. What seems a loop may have been intended: some applications require an immense amount of computing time only, with no input/output activity in between. Therefore, try to contact the person who owns the program.

The application programmer may need a partition dump for further problem analysis. You have to take the dump when the job is still running. Enter:

```
CANCEL pp,DUMP
```

where *pp* is the batch partition of the program that was looping. Take note of the dump ID which is displayed as part of message 0S30I. Save any printer output.

Proceed to step 3 if the system remains in a loop after you canceled the batch partitions.

3. **You now know** that the cause of the loop lies in the **online part** of the system, most likely in a transaction running under the CICS Transaction Server.

   Display the tasks that are currently running under the CICS Transaction Server (and VSE/ICCF). From the system console, issue the command:

   ```
   MSG F2
   ```

   The CICS Transaction Server then provides you with a *reply ID* (represented by 'nn' in the following example). You use this reply ID to request CICS master terminal (CEMT) functions.

   Whenever the system asks you for a console command, you must enter the command with the reply-id. Therefore, to display the tasks currently running under the CICS Transaction Server, enter:

   ```
   nn CEMT INQUIRE TASK
   ```

   Repeat this command several times, each time waiting a short interval of time. If you discover a transaction that remains endlessly in the system, besides yourself (CEMT) and the transaction IESO, terminate that task by issuing:

   ```
   nn CEMT SET TASK(tt) FORCE
   ```

   where *tt* is the number of the suspicious task. This may cause the problem to disappear. Be sure to inform the application programmer responsible for the transaction.

   Give the system some time to terminate the task. Then check whether the task is still running by entering:

   ```
   nn CEMT INQUIRE TASK
   ```

   Repeat the command after some time if the task is still running. If you do not succeed in terminating the task, try the following commands:

   ```
   nn CEMT SET TERM(termid) OUT FORCE
   nn CEMT SET TERM(termid) INS ACQ
   ```

   where *termid* is the terminal of the task in error. That should purge the task and put the terminal back into service again. If the commands fail, use VTAM commands to deactivate and activate the terminal in question where xx...xx is the VTAM netname (VTAM ID) of the terminal:

   ```
   V NET,INACT,ID=xx...xx,F,
   V NET,ACT,ID=xx...xx
   ```

Within a few seconds, the display station should be ready for sign-on. **Watch for any error messages** after you entered this command. They may give you a clue to the problem.

If these actions do not help, shut down the system in the proper order as described in steps 4 through 6 below.

4. Try to cancel any program that is running in an interactive partition under VSE/ICCF. First issue the command

   ```
   /MAP
   ```

   to determine which interactive partitions are active. Also, issue the /DISPLAY and the /USERS commands to get an overall picture of the VSE/ICCF environment. Then issue

   ```
   /CANCEL n
   ```

   where *n* is the interactive partition number (which you find in the output of the /MAP command).

5. Terminate the CICS Transaction Server by issuing, from the system console, the following commands:

   ```
   /WARN
   MSG F2
   nn CEMT PERFORM SHUTDOWN
   ```

   The /WARN command sends a warning message to all online users announcing that shutdown will be performed in 10 minutes time. 10 minutes is the default value and the smallest value that can be specified. 30 minutes is the maximum value.

   After some time the system should respond with message:

   ```
   1Q34I F2 WAITING FOR WORK ...
   ```

   In the example, F2 is the CICS Transaction Server partition. If you do not get this message, use a normal display station and check whether the CICS Transaction Server is still up. If yes, force a shutdown of the CICS Transaction Server with the command:

   ```
   CEMT PERFORM SHUTDOWN IMMEDIATE
   ```

   If the CICS Transaction Server terminates, go to step 6.

   If the CICS Transaction Server does not terminate, enter the following:

   ```
   CANCEL F2
   ```

   You may have to repeat the command several times. After you entered the CANCEL command, a lot of messages may appear. Ignore them. If the CANCEL command works, continue with step 6.

   If the system is unable to execute the CANCEL command, do a STORE STATUS and take a stand-alone dump as described in “Taking a Stand-Alone Dump” on page 115.

6. Restart the CICS Transaction Server.

Experienced User

As a more experienced user, for additional diagnosis information you may also refer to "Loop Symptom" on page 156. A stand-alone dump of a loop condition is shown in "Chapter 6. Using Dumps for Error Diagnosis" on page 67.

Data You Should Collect in Case of a Loop

You should collect the following data and have it available for error diagnosis:

- System console log (from the hardcopy file).
- Stand-alone dump (refer to "Taking a Stand-Alone Dump" on page 115), or partition dump (DUMP pp,cuu) if the problem can be isolated to a partition. Analysis routines help you interpret the contents of a dump. For details refer to "Chapter 6. Using Dumps for Error Diagnosis" on page 67.
- Output of the MAP and /MAP command.
- Any output produced by the looping program or task.
- Link map of the looping program (ACTION MAP).
- Source listing of the looping program or task.
- Retrace printout of the system history file.
- Notes from instruction stepping.

Wait Condition

A wait condition may affect the whole system or only a part of it; a partition or a number of display stations, for example.

Note that a VSE/ESA unattended node system (predefined environment C) has features to recover from wait conditions. For details, refer to "Unattended Node Environment" on page 8.

Recognizing a Wait

Usually, the symptom gives an indication as to which part of the system is in a wait.

- System Wait:
  - The system is not doing any work at all.
  - No messages appear at the system console.
  - No input/output activity occurs.

  For further information, consult the appropriate processor manual.
- Batch Partition Wait:

  In one or more batch partitions, no work is being done.
- Suspended Online Activities:

  If one, several, or all display stations do not respond, the online part of your system may cause the problem. Continue your search as described under "Suspended Online Activities" on page 45.

What You Should Consider First

Make sure that no unusual event or message escaped your attention. Check if there are any messages waiting for a reply. Enter at the system console:

```
REPLID
```

If the system does not accept the command, it is in a severe wait. At the system console, display the low core bytes and write them down. Use the explanations given in Volume 1 of the *VSE/ESA Messages and Codes* manual to identify the cause of the problem.

If you do not succeed, perform STORE STATUS and take a stand-alone dump. Both steps are described in "Taking a Stand-Alone Dump" on page 115.

If the REPLID command is accepted and no replies are outstanding, the system issues the following message:

```
1I88I NO REPLIES OUTSTANDING
```

If a message is outstanding, the system displays the associated partition number and the ID of the message. In the input line (==>), type

```
xx        (where xx is the partition ID)
```

and press the REDISPLAY PFkey (PF7, usually) to redisplay messages that have disappeared from the screen. Scan through the messages to find the one that is waiting for a reply. Respond to that message as required. Leave the redisplay mode by pressing the END PFkey (PF3, usually).

Diagnosing Steps for a System Wait

Determine Hard or Soft Wait

The processor's monitoring facilities offer a function to display the Program Status Word (PSW). The hexadecimal representation of the PSW is shown below:

02xxxx00 xxxxxxxx
: I/O mask bit: if this bit is '1', then the processor is enabled for I/O interruptions.

01xxxx00 xxxxxxxx
: External mask bit: if this bit is '1', then the processor is enabled for external interruptions.

xxx2xx00 xxxxxxxx
: Wait bit: if this bit is '1', then the processor is in the wait state.

In a disastrous error state, the most important bit in the PSW is bit 14, the **Wait** bit. (This is the bit X'02' in the second byte of the PSW). If the **wait bit is zero**, then the processor is active and you should conclude that the system is in a disabled loop.

The second full word in the PSW (the PSW address field) shows the instruction address where the processor has stopped. If you start and stop the processor repeatedly, you may be able to determine the scope of the loop. You could also try to activate the processors instruction trace facility to examine some loop details.

If the **wait bit is one**, then the processor is in the wait state. That is, the processor does not execute any instructions. In this wait state, the second full word of the PSW does not contain an instruction address but may contain useful information that identifies the reason why that wait state has been entered. Before you can draw such a conclusion, you need to examine bits 6 and 7 of the first byte of the PSW. If either of these two bits X'02' (the I/O mask bit) or X'01' (the external mask bit) is ON, then the processor is in a **SOFT WAIT** condition. The processor is in a **HARD WAIT** condition if both these bits are OFF.

Hard Wait Condition

A hard wait is caused by a hardware failure, by program errors like a program check in the supervisor program, or by errors in programs that control the system.

At the system console, display the low address storage bytes and write them down. Use the explanations given in Volume 1 of the *VSE/ESA Messages and Codes* manual to identify the cause of the problem. If you do not succeed, perform STORE STATUS and take a stand-alone dump. For details, refer to "Taking a Stand-Alone Dump" on page 115.

Re-IPL the system and analyze the dump. For details refer to "Example 4: Analyzing a Stand-Alone Dump" on page 87.

Soft Wait Condition

The system is probably waiting for the completion of an event. If message 0P08 asked you to make a device ready, then try to do so. In case the device cannot be made ready, issue the command RC (Request Communication). Cancel the I/O operation by entering:

```
15 CANCEL cuu
```

where cuu is the address of the device in error and 15 is the reply-id. Be aware that the partition to which the device belongs might be canceled. Report this error to IBM.

You may not be able to relate the soft wait to a device in error. In this case, try to find some error indication through a redisplay of messages. If you do not find a clue, do a STORE STATUS and take a stand-alone dump. For details refer to "Taking a Stand-Alone Dump" on page 115. Then re-IPL.

Experienced User

If you are a more experienced user, you may also refer to "Wait Symptom" on page 152 for additional diagnosis information.

Diagnosing Steps for a Batch Partition Wait

Find out whether a job (partition) is in a wait state. Select from the *System Status* panel:

```
1  (Display System Activity)
```

You get a display as shown in Figure 3 on page 38. This display is updated automatically in fifteen second intervals.

The values that are of interest are shown in the columns:

```
ELAPSED
CPU TIME
IO
```

A job (partition) that is in a wait would show an **increase** in ELAPSED time but **no change** in its CPU time and I/O values. If you find such a partition, take a dump. In the command input line, enter:

```
DUMP pp,cuu
```

then

```
PFLUSH pp
```

where *pp* is the identifier of the batch partition and *cuu* the address of the output device (tape or printer). Analyze the dump as described in **"Chapter 6. Using Dumps for Error Diagnosis" on page 67.**

Data You Should Collect in Case of a Wait

Collect the following data and have it available for error diagnosis:

- System console log (from the hardcopy file).
- In case of a system wait, create a stand-alone dump (refer to "Taking a Stand-Alone Dump" on page 115). If the problem can be isolated to a partition, create a dump with the attention routine dump command (DUMP pp,cuu).

  Analysis routines help you to interpret the contents of a dump. For details refer to "Chapter 6. Using Dumps for Error Diagnosis" on page 67.
- Any output produced shortly before the WAIT occurred.
- List of files and volumes used.
- EREP output.
- Retrace printout of the system history file.

Suspended Online Activities

If a diagnosis step does not apply to your installation, consult the documentation of the components you are using.

Introduction

This section describes error situations that affect the online users of your system. The source of such errors is often difficult to pinpoint since many software and hardware components are involved.

You must be able, in case of an error situation, to relate terminal (display station) x at location y to the associated networking definitions in the VTAM books and the CICS System Definition (CSD) file. It is therefore essential for error diagnosis that you have a list that shows the logical and physical structure of your local and/or remote network. Such a list is referred to as **configuration list**.

To create a configuration list for your installation, perform the following steps:

1. Start with the *VSE/ESA Function Selection* panel and select fast path 241. You get the panel *Hardware Configuration: I/O Address List*.
2. Press PF9 (PRINT). On the panel displayed you can select the type of configuration list you want; SNA or non-SNA, for example. After selecting one or more lists, press ENTER.
3. The configuration list(s) created are stored as library member CONFLIST in your VSE/ICCF primary library.
4. You can print the library member by selecting option 3 (PRINT) in the FULIST display of your primary library. The output is placed in the VSE/POWER list queue for printing.

Create a new list whenever a change is implemented.

Naming Convention for Terminals

VTAM provides two naming conventions for a networking environment: one with a 2-digit subarea number, the other with a 4-digit subarea number. The manual *VSE/ESA Networking Support* describes the naming conventions in detail. The

following terminal definitions are used for the diagnosis steps shown; the definitions for VTAM use the 2-digit subarea naming convention.

For a local display station:

VTAM netname: **D08001** (also known as VTAM ID)
CICS terminal ID: **D080**

For a remote display station:

VTAM netname: **A0208001** (also known as VTAM ID)
CICS terminal ID: **R001**

Terminal definitions are defined in the VTAM books and in the CICS System Definition (CSD) file. Terminal attachments and the VTAM and CICS Transaction Server relationships are shown in the manual *VSE/ESA Networking Support* under "VTAM and CICS Transaction Server Parameters".

Recognizing Suspended Online Activities

Usually, a display station user recognizes that communication with the system is no longer possible. This may affect one, several, or all display stations attached.

What You Should Consider First

1. A suspended online system may show the same error symptoms as a **LOOP or WAIT** condition. Therefore, make sure that no such condition exists. If you entered this section ("Suspended Online Activities") directly via the Error Symptom Tables, you did not refer to the LOOP or WAIT section. For a possible LOOP or WAIT condition refer to "Loop Condition" on page 37 and "Wait Condition" on page 42.
2. A display station may show information important for identifying the cause of the problem. Status information may be displayed on the status line at the bottom of the screen. In the bottom left-hand corner, connection indicators may be displayed. Record any error information displayed.
3. A display station user should also use the diagnostic guide of the terminal used, if available. It is usually attached under the cover of the keyboard.
4. Consider the possibility that startup processing was not correct. Check the system console messages that were issued during startup.

Error Diagnosis Steps

If **one or several display stations are not working**, continue with "Some Display Stations not Working" on page 47, otherwise, continue here.

All Display Stations not Working

Such a situation may also be caused by an unusual system status or activity:

- Is the system in the process of writing a dump? Usually, the writing of a dump is indicated by a message. Check the messages on the system console screen. If necessary, redisplay previous messages. If a dump is being written, let it finish and the problem will be gone. **The writing of a dump may take several minutes**.
- Is a shutdown of the CICS Transaction Server in progress? A short while after shutdown started, further online activity is inhibited.

- Did a full condition occur for the VSE/POWER queue, data, or account file? Messages like 1Q32I, 1Q38I, or 1QF4I indicate such a condition. Refer to "Chapter 7. Handling Resource Constraint Conditions" on page 97 if such a condition occurs.

If none of the above conditions applies, check whether the CICS Transaction Server partition ever came up:

- Was message

  ```
  F2 ... DFHSI1517  DBDCCICS Control is being given to CICS
  ```

  displayed on the system console? In the input line (==>), type

  ```
  F2
  ```

  to display the messages of the F2 partition at your console.
- Is the *VSE/ESA Online* panel for signing-on shown on display station screens?

If not, you have a startup problem; proceed as suggested in "CICS Transaction Server Startup Problem" on page 24. Especially watch out for the CICS Transaction Server message

```
DFHSI1572 APPLID  Unable to OPEN VTAM ACB ...
```

which points to conflicting VTAM and CICS definitions.

If the CICS Transaction Server partition did come up, continue with "What About Your VTAM Environment?" on page 50.

Some Display Stations Not Working

Proceed as follows:

1. Use a display station that is working and sign on as the administrator. Access the *Problem Handling* panel. Select:

   ```
   2  (Inspect Message Log)
   ```

   You get a display of the messages stored in the message log file. At the bottom of the last screen you may find a few lines describing why the display station(s) failed.

   For example, if the terminal ID is given as ????, the terminal is not defined in the CICS System Definition (CSD) file. Other explanations may require VTAM or CICS/VSE expertise.
2. Check the system console messages issued by VTAM during startup. They may reveal the problem.
3. Find out whether all affected display stations are attached to the same line (control unit).

If the above steps do not provide a clue to the problem, check the VSE/ICCF and VSE/POWER environment next. Ensure that they work correctly before you continue with the more complex CICS Transaction Server and VTAM environments.

VSE/ICCF

What About Your VSE/ICCF Environment ?

Proceed as follows:

- Check whether all interactive partitions are occupied. At the system console enter the following command:

  ```
  /DISPLAY
  ```

  Repeat the command a few times. If interactive partitions remain "IN USE" indefinitely, you must track down the related display station users. Enter the system console commands /MAP and /USERS. The output gives the IDs of the respective USERs and TERMs (display stations). Get in touch with the other users and ask them to finish their work.
- Your display station may be locked because the program you are running in an interactive partition entered a loop or a wait state. To cancel the program, press the PA2 key at your display station. You are now able (in most cases) to enter the VSE/ICCF DUMP command. For error diagnosis, you can display general registers, floating point registers, and program storage areas. For further details about the VSE/ICCF DUMP command, refer to the manual *VSE/ICCF User's Guide*.
- A display station may also be locked because the /WARN command was issued for announcing a planned shutdown. To reset the condition, you may issue the /WARN RESET command.

VSE/POWER

What About Your VSE/POWER Environment ?

Check whether the display station in error is logged on to VSE/ICCF and did any work involving VSE/POWER. This could be the submission of a batch job or requesting the display of the VSE/POWER queues. Review the messages at the system console and take proper action, if necessary. Issue the following commands:

```
D A   (to list active VSE/POWER tasks)
D M   (to list VSE/POWER messages)
D Q   (to list VSE/POWER files status)
```

If the VSE/POWER queue is full, proceed as suggested in section "VSE/POWER File Full Condition" on page 97.

CICS TS

What About Your CICS Transaction Server Environment ?

1. Use the *Inspect Message Log* dialog and check for CICS messages (prefix DFH) related to the terminals in error.
2. Use the following commands to verify the CICS Transaction Server and VTAM environment.
   - For the CICS Transaction Server, use the CICS master terminal function CEMT. Enter the following commands either from the system console or from a display station. From the system console, you must first issue the command:

     ```
     MSG F2
     ```

     The CICS Transaction Server then provides you with a *reply ID* (represented by 'nn' in the following example). Next, enter the command:

     ```
     nn CEMT I TERM
     ```

This command shows you whether a terminal is in the CICS status *released* or *acquired*.

- For VTAM, enter at the system console:

  ```
  D NET,TERMS
  ```

  This command shows you whether a terminal is in the VTAM status of ACTIVE or attached to a CICS session (ACT/SES). Compare the data provided by the commands.

If the data does not provide a clue to the problem, proceed with the next step.

3. Find out whether a **task** is attached to the display station in error; issue the command

   ```
   nn CEMT INQUIRE TASK
   ```

   The system displays all tasks together with the associated display stations. A line within the display might look as follows:

   ```
   Tas(00087) Tra(BLUE) Fac(D080) Run Ter Pri(001)
   ```

   Use this information for the following steps. The two important parameters in this context are:

   Tas The number the CICS Transaction Server has assigned to the task.

   Fac The device that activated the task:

   CNSL = the system console, nnnn = a specific display station (D080, for example).

   The reply you get for each task includes the parameters **Run** and **Sus**. **Run** indicates that the task is active and **Sus** that the task is suspended.

   a. **If a task is attached to the display station in error**, one of the following conditions might exist:

      1) A task is in a loop.
      2) A task has gone into an indeterminate WAIT.

      If a LOOP is suspected, repeat several times:

      ```
      nn CEMT INQUIRE TASK
      ```

      Exclude transaction **IESO** (required by VSE/ESA) from the following steps:

      - On each display you get, look for the task with the lowest number and whether its status is active. If that task continues to be the task with the lowest number, it is probably the task that is looping.
      - Try to determine whether this task is running correctly. If the task is not running correctly and if it can be safely purged, enter

        ```
        nn CEMT SET TASK(87) PURGE
        ```

        to purge the task.

        Note: Be sure that the task is in a loop. If you are in doubt, contact the owner or programmer of the application.

      If a WAIT is suspected, do the following:

      Take note of the task number of the TAS parameter. Terminate the task by entering:

```
nn CEMT SET TASK(87) PURGE
```

To ensure that the task did terminate, enter:

```
nn CEMT INQUIRE TASK
```

If the task has not yet terminated, set the display station OUT (out of service) and then INS (into service). Enter:

```
nn CEMT SET TERM(D080) OUTSERVICE PURGE
nn CEMT SET TERM(D080) INSERVICE
```

b.

If the problem remains or **no task is attached to the display station in error**, the display station itself may be the cause of the problem. Find out whether the display station is INS (in service) by entering:

```
nn CEMT INQUIRE TERM(D080)
```

Verify that the display station is connected to the CICS Transaction Server.

The system's response to the CEMT INQUIRE TERM command will tell you:
- Acq (short for Acquired) means connected.
- Rel (short for Released) means not connected.

Try to connect a non-connected display station by entering:

```
nn CEMT SET TERM(D080) INSERVICE ACQ
```

Note: If you did not succeed in removing the error, check VTAM and CICS definitions as described in "VTAM Startup Problem" on page 25. If the definitions are correct, return to here and continue with "What About Your VTAM Environment?" below.

VTAM

What About Your VTAM Environment ?

When you use VTAM commands, you specify the identification of the display station in error via the ID parameter, called the **VTAM ID**. The VTAM ID is identical to the **netname** specified for a terminal. VTAM provides two naming conventions for a networking environment: one with a 2-digit subarea number, the other with a 4-digit subarea number. The manual *VSE/ESA Networking Support* describes the naming conventions in detail. The examples shown use the 2-digit subarea naming convention:
- A0208001 for a remote display station.
- D08001 for a local display station.

Use your installations configuration list (refer to "Suspended Online Activities" on page 45) for the following steps. Proceed as follows:

1. At the system console, enter VTAM commands to determine the status of the display stations. Use the following commands:

   a.

   ```
   F NET,SUPP=NOSUP
   ```

   This command causes all error messages to be displayed on the screen, instead of just those defined as 'serious'.

b.

```
D NET,TERMS
```

This command displays the status of all display stations, terminal printers, and RJE work stations. You can display the status of a single terminal by adding the ID of the terminal in question. For example:

```
D NET,TERMS,ID=D08001
```

If the response indicates that a terminal is in normal condition, the following two steps are not necessary.

c.

```
V NET,INACT,ID=xx...xx,F
```

Where xx...xx is either the VTAM ID (netname) of a single terminal or a node name. Refer also to "Naming Convention for Terminals" on page 45.

This command sets the display station(s) to inactive.

d.

```
V NET,ACT,ID=xx...xx
```

This command activates the display station(s) again. Within a few seconds, the display station(s) should be ready for sign-on.

Watch for any error messages after you entered the command. They may give you a clue to the problem.

When you use a node name for deactivation, you deactivate **all** terminals of your installation that belong to this node. To avoid unnecessary interruption at your installation, use for xx...xx first:

- If local, the VTAM ID (netname) of the terminal in error. D08001, for example.
- If remote, the VTAM ID (netname) of the terminal in error. A0208001, for example.

Refer also to "Naming Convention for Terminals" on page 45.

2. For **local SNA or non-SNA terminals** make sure that the control unit(s) are powered on. Check that the Online/Offline switch of the control unit(s) is set to ONLINE. Enter commands as shown in step 1.
3. For **remote terminals (ICA connected)** make sure the control unit(s) are powered on. Check that the Online/Offline switch of a IBM 3274 control unit is set to ONLINE. Then enter commands as shown in step 1.
4. For **remote terminals (NCP connected)** make sure the IBM 37xx communications controllers are powered on and check that the NCP is loaded. Issue the commands as shown in step 1. You may get the following message:

   ```
   xxxxx LUB SYS005 NOT AVAILABLE
   ```

   This means that there is not enough space available in the VTAM partition to load the NCP into it before it is loaded into an IBM 37xx. You have two choices:

   a. You may try to load the NCP from a sequential file. There are a number of skeletons in library 59 of VSE/ICCF that provide support for this task. The names of these skeletons start with SKN. The skeletons are described in the manual *VSE/ESA Networking Support* under "NCP Load Module File

Skeleton SKNCPCLF", "ACF/SSP Independent Loader Utility Skeleton SKNCPLD", and "NCP Generation Workfile Skeleton SKNCPWKF".

If you were able to successfully load the NCP, repeat the commands of step 1.

b. Otherwise, use the NCP generation list to find out the size of the NCP used. Increase the partition allocation for the VTAM partition (F3, usually). Change the appropriate startup book accordingly.

If you have a problem in the initial startup of the NCP, check the generation list. If everything looks correct, enter

```
D NET,PATHTAB
```

and print the messages from the hardcopy file for the VTAM partition (F3, usually). Enter:

```
R RDR,PAUSEBG
0 // EXEC PRINTLOG
0 xx,NEW
```

where *xx* is the VTAM partition. With parameter NEW you get all messages since the last IPL.

To restrict the amount of output, you may specify a date instead (MM/DD/YY). For details on the parameters of the PRINTLOG program refer to manual *VSE/ESA System Utilities* under "Printing the Hardcopy File (PRINTLOG)".

Return the output to the NCP programmer, who should compare the specifications with the NCP source.

CU/CC Setup Correct

If the above steps showed that the Control Unit or Communications Controller setup is correct and you still have no sign-on panel, continue as follows:

1. Set the **TEST** switch of the terminal in error OFF and ON again. The panel with the remote applications should appear on your screen. If you do not get that panel, continue with step 3.
2. **If you get the remote applications panel**, enter

   ```
   A  (DBDCCICS)
   ```

   to get the sign-on panel. DBDCCICS is the IBM-provided application ID of the CICS Transaction Server. **If you get the sign-on panel**, your problem is gone.

   If you do not get the sign-on panel, VSE/ESA may redisplay the remote applications panel or display a message such as:

   - COMMAND ACCEPTED

     Just wait for completion.
   - LOGON PENDING

     There is already a request outstanding between your display station and VSE/ESA.
   - APPLICATION NOT ACTIVE

     The application you requested is not available. It may be in the process of being started.

- LOGON FAILED

  VTAM passed your logon (sign-on) request to the remote application but either the program or VTAM rejected it. Inspect the message log file. From the *Problem Handling* panel select:

  ```
  2  (Inspect Message Log)
  ```

- UNSUPPORTED FUNCTION

  Treat it as LOGON FAILED.

If you do not get any of the above messages or no remote application panel, check table **USSTAB** for wrong or missing definitions. If necessary, correct table USSTAB.

As a short-range solution you might try to force a display of the sign-on panel. Enter the following command:

```
LOGON APPLID(DBDCCICS)
```

where DBDCCICS is the IBM-provided application ID of the CICS Transaction Server.

If you do not succeed, go to step 4 if it is a remote display station, otherwise to step 5.

3. **If you did not get the remote applications panel**, enter:

   ```
   IBMTEST
   ```

   As a response, message IBMECHO should appear on your screen. If so, it indicates a network definition (USSTAB) error. Check table USSTAB for wrong or missing definitions.

   If message IBMECHO does not appear and if it is a remote display station, go to the next step. Otherwise, continue with step 5.

4. If the display station in error is a **remote** display station connected to a control unit, VTAM may inform you through a message that a higher node is in error. For example:

   ```
   IST608I  VARY ACT FOR ID=A0208001 FAILED  -  HIGHER NODE
            DPA08001 NOT ACTIVE
   ```

   Trying to set this node (the control unit) ACTIVE could lead to yet another such message, this time for the next higher node (the line).

   You must search 'upwards' until you find the unit (node) that is causing the problem. Then set to ACTIVE the appropriate nodes, proceeding in sequence from the highest to the lowest. Finally, set the display station back to INSERVICE:

   ```
   nn CEMT SET TERM(R001) INSERVICE ACQUIRE
   ```

   R001 is an assumed CICS terminal ID to be defined in table DFHTCT (for A0208001). Refer also to "Naming Convention for Terminals" on page 45.

   If you were unable to activate any of the higher nodes, check cables, plugs, modems (and the like). If this does not help, issue the command:

   ```
   D NET,ID=A0208001,E
   ```

   Request a listing of the hardcopy file (as described in "Printing the Hardcopy File" on page 107). Continue with the next step.

5. You could not identify the cause of the problem. From the system console, request two partition dumps by entering

```
DUMP pp,cuu   (for the VTAM partition, usually F3)
DUMP pp,cuu   (for the CICS Transaction Server partition, usually F2)
```

   where *pp* is the partition ID and *cuu* is the address of the tape unit or printer.

   Try to bring the running applications to an orderly completion. Shut down the system and re-IPL. Analyze the dumps as described in "Chapter 6. Using Dumps for Error Diagnosis" on page 67. If necessary, contact IBM for support.

See also Additional Tools below for other diagnosis tools in a networking environment.

Additional Tools

Additional tools are available for doing error diagnosis in the online part of your system:

- Network problem determination support is provided by the IBM VSE/ESA optional program NetView.
- IBM 37xx dump utility (NCPDUMP).

NetView allows you to monitor, record, retrieve and examine communications error data in a network environment. For details, refer to NetView manuals.

With the NCPDUMP utility of the network control program (ACF/NCP), you can dump (and later analyze) the storage of an IBM 37xx communications controller. For details about the dump utility, refer to the appropriate ACF/NCP and IBM 37xx documentation.

Data You Should Collect in Case of Suspended Online Activities

Before you contact IBM for support have the following available for error diagnosis:

- System console log (from the hardcopy file).
- Partition dumps.
- Network generation list.
- Assembler listings of programs or applications involved.
- Compiler listings of programs or applications involved.

Chapter 5. Online Analysis of CICS Transaction Abends

A CICS transaction may stop processing because of an error. This is called an **abend** - the short form for 'abnormal end'. When this happens, the **Online Problem Determination (OLPD)** program becomes active. It collects and saves important data related to the error situation.

OLPD analyzes the data collected and, to the extent possible, describes the cause of the error in plain language. Additional data may be displayed for analysis by the user. The data saved enables you to do online error diagnosis. You can display that data immediately after an abend occurred or later. The data is available until you or the system delete it. **Data that is older than seven days is deleted automatically during system startup**.

System Actions after a Transaction Abend

When VSE/ESA detects an abend condition it does the following:

1. Collects, saves, and analyzes error data.
2. Writes a transaction dump to the CICS Transaction Server dump file.

   This information can be used in addition to the information provided by the online problem determination program. Moreover, the system may not always be able to collect and save data in case of a transaction abend. The transaction dump is then the only source for a detailed error analysis.
3. Saves the panel in use at the time of the error. This panel is referred to as the **user screen**.
4. Notifies the user about the error by displaying a panel. This panel gives basic information about the transaction abend.
5. Redisplays the user screen together with message DFHAC2206I.

   Note: In exceptional situations, the system may not be able to redisplay the original user screen at all, or perhaps not exactly as it was when the error occurred.

Notifying the User About a Transaction Abend

A transaction abend and its related data is recorded by the system. To notify you about such an incident, the *Online Problem Determination Data Collection* panel is displayed on your screen.

Normally, an abend is identified by an abend code. In the example shown (Figure 4 on page 56), transaction IEXW finished with abend code ASRD. Online problem determination is provided for almost all CICS transaction abend codes from AACA to AZXB as they are documented in the *VSE/ESA Messages and Codes* manual.

Note: For technical reasons, online problem determination is not provided for the abend codes AKCP, ATPx, and other abend codes that cause a termination of the CICS Transaction Server.

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```
IESPRBDC1  ONLINE PROBLEM DETERMINATION DATA COLLECTION


        The transition you were executing ended abnormally.

        Information about this incident has been stored for
        later problem determination.

        Specifics about this incident are given below:


        Transaction ID: IEXW              Abend Code: ASRD
        Task ID:        37                Abend Date: 5/14
        Program ID:     IESXUML           Abend Time: 8:59:47


        Press ENTER to return to your application.

        Inform your system administrator about this incident.




===> PRESS ENTER TO CONTINUE.
```

Figure 4. Notification Panel for a Transaction Abend

Whenever such a panel is displayed on your screen, read it carefully and follow the instructions given. In the following discussion, this panel is referred to as notification panel. Information given for **transaction ID, task ID, program ID, abend code, abend date, and abend time,** are highlighted on the screen.

In this example, the redisplayed user screen (after you pressed enter) would show the following message:

```
DFHAC2206 8:59:47 DBDCCICS Transaction IEXW has failed with abend ASRD
```

How to Do Online Problem Determination

To find the cause of an abend, you have to interpret the data collected and stored for a specific incident. This requires CICS skill and experience. As far as possible, the cause of the error is described in plain language. However, it is sometimes necessary to analyze control block data. Usually, the programmer of a failing transaction, or the system administrator interprets and analyzes the incident data.

The incident data as it appears on your screen is referred to as the **incident report**. You can display an incident report in two ways:

- Directly, after an abend occurred (usually if you are a programmer).
- Through the initial panel of the OLPD program (for the administrator or a programmer).

Displaying an Incident Report Directly after an Abend Occurred

Assume that Figure 4 represents an abend that occurred when testing a program. To display the incident report right after the abend occurred, proceed as follows:

1. After copying important data from the redisplayed user screen, clear your screen.
2. Enter **OLPD**.

Your screen now shows the first page of the incident report (Figure 6 on page 58). For details on the incident report refer to “Structure and Contents of the Incident Report”.

Displaying an Incident Report During Normal Processing

Through the initial panel of OLPD you can display any incident report stored. To invoke the initial panel, select from the *Problem Handling* panel:

```
1  (Online Problem Determination)
```

To display an incident report, the initial panel offers two choices:

- Option 1 (Display the user’s last incident).
- Options 3 and 4 (List incidents; either of a single user or of all users). From such a list you can select any incident for display.

Follow these steps:

For Option 1:

1. Change the **user ID** (shown on the initial panel), if you want to display an incident report other than your own.
2. Select option **1** (Display the user’s last incident).

Your screen now shows the first page (Figure 6 on page 58) of the incident report requested.

For Options 3 and 4:

1. Change the **user ID** if you want to display an incident report other than your own.

   Select option **3** (List the user’s incidents), or option **4** (List all incidents for all users).
2. From the *List Display* panel displayed, select the incident you are looking for. Enter:

   ```
   1 (Display)
   ```

   in the option column. Refer to Figure 11 on page 63 for an example of a *List Display* panel.

Your screen now shows the first page (Figure 6 on page 58) of the incident report requested.

Structure and Contents of the Incident Report

An incident report consists of several pages. The text of each page is divided into one or more paragraphs. The number of pages and paragraphs varies from error to error. For each paragraph you can request the display of additional information. This additional information, called ‘level 2 information’, is of a more explanatory nature.

Figure 5 on page 58 shows the structure of the incident report for the example presented in Figure 4 on page 56. It includes 9 pages of level 1 information and 13 pages of level 2 information.

LEVEL 1 INFORMATION		LEVEL 2 INFORMATION
Page No.	Paragraph No.	
1	1	2 Pages
	2	
2	1 (only)	1 Page
3	1 (only)	1 Page
4	1 (only)	5 Pages

Figure 5. Level Structure of Incident Report

The following paragraphs discuss the first four pages of level 1 information and give one example of level 2 information.

Notes:

1. Most panels of an incident report allow you to use PF10 for redisplaying the user screen associated with the particular abend. To get back to the incident display screen, just press any PF key, the CLEAR, or the ENTER key.
2. The panel sequence of an incident report may not be the same for each abend.

First Page of Incident Report

Figure 6 shows the first page of the incident report.

```
IESPRBID1       ONLINE PROBLEM DETERMINATION INCIDENT REPORT      Page  1 of  9

P.NO.   ENTER PARAGRAPH NUMBER TO GET ADDITIONAL INFORMATION

  1     Transaction 'IEXW' encountered a 'ASRD' abend executing
        at 'A001'.  This occurred at offset X'00001A' in program
        'IESXUML '.   Program 'IESXUML ' starts at X'00529580'.
        This incident occurred for task ID '00037'
        at  8:59:47 on  5/14.

  2     The task has been abnormally terminated for one of these reasons:
          - A program contains an assembler macro call which is no longer
            supported by CICS/ESA.
          - An invalid attempt has been made to access the CSA or TCA.
          - A non-assembler program has been wrongly defined to CICS/ESA
            as an assembler program.
        This error appears as a program check.



PF1=HELP                    3=END        4=RETURN             6=PRINT
               8=FORWARD                10=USER SCREEN

==> 1
```

Figure 6. Incident Report (Level 1, Page 1 of 9)

Paragraph 1 summarizes the error situation. Part of this information was displayed on the notification panel (Figure 4 on page 56). The other paragraph describes the cause of the error as far as it could be determined.

To display second level information, enter the paragraph number (**1**), as shown in Figure 6 on page 58. This gives you the first page of second level information for paragraph **1**. This page is shown in Figure 7.

```
IESPRBID1       ONLINE PROBLEM DETERMINATION INCIDENT REPORT      Page  1 of  2



        Your session of application processing ('TRANSACTION')
        ended abnormally.  This happened while the 'PROGRAM'
        mentioned was executing.  For debugging purposes, the 'OFFSET'
        of that instruction which follows the instruction in error,
        is displayed.

        The four-character 'ABEND CODE' indicates the area within the
        online system in which the error occurred.

        An execution of a transaction is called a 'TASK'.  Each task is
        assigned a five digit 'TASK NUMBER'. By this number, you can
        distinguish between multiple executions of your transaction.

        The four-character 'FACILITY' name (AT '....') shows you
        normally the terminal id, possibly the transient data

PF1=HELP                    3=END        4=RETURN
               8=FORWARD

==> _
```

Figure 7. Incident Report (Level 2 Information for Paragraph 1 of Page 1)

Second and Third Page of Incident Report

For this type of transaction abend, the contents of the registers and selected storage areas are shown in Figure 8 and Figure 9 on page 60.

```
IESPRBID1       ONLINE PROBLEM DETERMINATION INCIDENT REPORT      Page  2 of  9

P.NO.   ENTER PARAGRAPH NUMBER TO GET ADDITIONAL INFORMATION

  1     The PSW at the time the operating system abend was
        scheduled was   ==>   07BD0000 0052959A

        The registers in effect at that time are shown below:

        REGS   0 -  3  02116080 00000000  016F67B8 81862CD0
        REGS   4 -  7  016F6A40 01863CCF  01864CCE 01865CCD
        REGS   8 - 11  01866CCC 80484D88  016F6D74 01916C60
        REGS  12 - 15  0044F000 0044F000  804C1820 00529580









PF1=HELP                    3=END        4=RETURN             6=PRINT
PF7=BACKWARD   8=FORWARD                10=USER SCREEN

==> _
```

Figure 8. Incident Report (Level 1, Page 2 of 9)

```
IESPRBID1       ONLINE PROBLEM DETERMINATION INCIDENT REPORT      Page  3 of  9

P.NO.   ENTER PARAGRAPH NUMBER TO GET ADDITIONAL INFORMATION

  1     The PSW at the time the operating system abend was
        scheduled was   ==>   07BD0000 0052959A

        The storage area near where the PSW points is shown below.

        Address   |<-------- S T O R A G E -------->|    Graphics
        00529580  47F0F016 10C9C5E2 E7E4D4D3 404040F9  .00..IESXUML   9
        00529590  F84BF1F2 F70090EC D00C183F 41403FFF  8.127........ ..
        005295A0  41504FFF 58005362 07004510 30340678  .&|.............
        005295B0  0052C020 58F03030 05EF18C1 50D0C004  .....0.....A&...




PF1=HELP                    3=END        4=RETURN              6=PRINT
PF7=BACKWARD   8=FORWARD                10=USER SCREEN

==> _
```

Figure 9. Incident Report (Level 1, Page 3 of 9)

Fourth Page of Incident Report

Depending on the type of the failing transaction, the fourth page of this incident report displays selected EXEC Interface Block information (Figure 10 on page 61).

The EXEC Interface Block

The EIB contains important information about the current activity of the task at the time of the abend. In the example used, the EIB information is not really important for identifying the cause of the error. But this depends on the type of error.

```
IESPRBID1  ONLINE PROBLEM DETERMINATION INCIDENT REPORT     PAGE 4 of 9

P.NO.  ENTER PARAGRAPH NUMBER TO GET ADDITIONAL INFORMATION

  1    Selected Data from the EXEC Interface Block -- DFHEIB

       EIBFN:       XX                  Function Code
       EIBRCODE:    XXXXXX              Response Code
       EIBCPOSN:       003              Cursor Position
       EIBAID:      C'''  (XX)          Attention ID
       EIBCALEN:       000              COMMAREA Length
       EIBDS:                           Data Set Name
       EIBREQID:                        Request ID
       EIBRSRCE:                        Resource Name
       EIBERRCD:    XXXX C'  '          Error Code Received




PF1=HELP                         3=END          4=RETURN
PF7=BACKWARD     8=FORWARD                    10=USER SCREEN

==> _
```

Figure 10. Incident Report (Level 1, Page 4 of 9)

Note: Page 5 of the incident report is not shown. It gives additional four lines of EIB information. In this example, the information is zero for all four lines.

Use the level 2 information provided for details on the EIB.

For a detailed analysis of the EIB information, refer to the manual *CICS Application Programming Reference*. The *CICS User's Handbook* may also be helpful.

Reviewing and Maintaining Incident Data

It is usually the system administrator or the programmer responsible for a transaction who reviews incident data for error diagnosis. In addition, the system administrator is responsible for maintaining the file in which the incidents are stored. The dialogs for these tasks are accessed through the initial panel of Online Problem Determination.

Accessing the Initial Panel

To access the initial panel of Online Problem Determination, select from the *Problem Handling* panel:

```
1  (Online Problem Determination)
```

The initial panel provides four options:

- 1 Display the user's last incident
- 2 Delete the user's last incident
- 3 List the user's incidents
- 4 List all incidents for all users

The following paragraphs describe the options in detail.

Using the Display Option

Use the display option for error diagnosis. It allows you to view and analyze the incident report of a user's last incident. For details refer to "Displaying an Incident Report During Normal Processing" on page 57.

The list options (options 3 and 4) also allow you to display an incident report. For details refer to "Displaying an Incident Report During Normal Processing" on page 57.

Using the Delete Option

Use the delete option to erase incidents. Although incident data is stored in wrap-around mode, there may be a need to delete incidents.

Wrap-around mode means, once the file is full, old incidents are overwritten by new ones. However, you may want to keep certain incidents. To prevent them from being overwritten, you have to delete other incidents to free space. During startup the system automatically deletes incidents that are older than seven days.

To delete a user's last incident:

1. Change the **user ID** (shown on the initial panel) if you want to delete an incident other than your own.
2. Select option **2** (Delete the user's last incident).

The list options (options 3 and 4) offer an extended delete function. For details refer to the following paragraphs.

Using the List Option

Two list options are available:

- Select option **3** (List the user's incidents) to list all incidents of a single user.
- Select option **4** (List all incidents for all users) to list all incidents for all users.

The panel layout is the same for both list options. Selecting option 4, for example, gives you a List Display panel as shown in Figure 11 on page 63. The latest incident is always first in the list.

```
IESPRBLD1  ONLINE PROBLEM DETERMINATION LIST DISPLAY        PAGE 1 of 1

ONLINE PROBLEM DETERMINATION FILE
OPTIONS:   1 = DISPLAY                  5 = DELETE

   OPT     USER ID  TRANSID ABCODE  FACILITY  DATE    TIME      TASK

    _        WACK     IEXW   ASRD     A002    5/14   8:59:47     37
    _        HERB     IESY   AEIP     A003    5/19   8:33:25     24
    _        HERB     IESY   ASRA     A003    5/20  13:23:43   1166









PF1=HELP                       3=END          4=RETURN
```

Figure 11. Example of a List Display Panel

Note: Such a list display may consist of several pages. The example assumes one page.

From this panel you can now select an incident for **display**, or one or more incidents for **deletion**.

- Select option **1** (Display) to display an incident report for error diagnosis.
- Select option **5** (Delete) to delete an incident.

Refer to "Structure and Contents of the Incident Report" on page 57 for a detailed description of an incident report.

Exceptional Error Situations

OLPD may not always be able to analyze a transaction abend. Also, collecting and saving incident data may not always be possible. If this happens, a message is shown on the notification panel (see Figure 4 on page 56). For example:

```
UNABLE TO STORE INFORMATION ABOUT THE INCIDENT.
DIAGNOSTIC INFORMATION HAS BEEN LOGGED.
```

Information related to such an error situation is gathered and stored in the message log file. This file is printed, together with the CICS Transaction Server log, at each CICS Transaction Server shutdown.

For error diagnosis, you can display the file during normal processing. From the *Problem Handling* panel select:

```
2  (Inspect Message Log)
```

You get a display of the messages stored in the message log file. At the bottom of the last screen (if it was the last event) you will find a few lines describing why normal error handling failed. If it was not the last event, review more than just the last few lines.

The CICS Transaction Dump

If an exceptional error situation occurs, the information shown on the notification panel (Figure 4 on page 56) becomes even more important. Write it down and use it to identify the **transaction dump** created by the system. The transaction dump is now the only source available for a detailed error analysis. Refer to "Handling CICS Transaction Dumps" on page 94 for how to print a CICS transaction dump for analysis.

Exceptional errors may also cause a CICS Transaction Server system or partition dump. Refer to "Chapter 6. Using Dumps for Error Diagnosis" on page 67 for details on how to use such a dump for error diagnosis.

DFHPEP Error Program

Programming Interface Information

VSE/ESA provides a DFHPEP program for CICS error information. It is available as phase DFHPEP in library IJSYSRS.SYSLIB and as a skeleton in VSE/ICCF library 59. Figure 12 on page 65 shows the contents of the library skeleton.

You can choose to use DFHPEP for your own error collection and problem handling. If you do, you must decide whether you want your error handling to execute before or after VSE/ESA collects its error data.

VSE/ESA does not alter the TCA of the failing transaction. However, because VSE/ESA uses CICS facilities, it writes entries in the storage chain. *If you do your error handling first and call on CICS facilities, your tracks in the storage chain may affect the accuracy of the incident record*.

- If you want your code to execute first, insert it into DFHPEP before the XCTL.
- If you want your code to execute after VSE/ESA data collection, change the XCTL to a LINK and place your code after the LINK.

Note: The DFHPEP phase provided by the CICS Transaction Server is called *DFHPEPDY*. It resides in library PRD1.BASE.

```
PEP      TITLE 'CUSTOMER INFORMATION CONTROL SYSTEM   P R O G R A M  E *
               R R O R  P R O G R A M'
         PUNCH ' CATALOG DFHPEP.OBJ REP=YES'
*-------------------------------------------------------------------*
*                                                                   *
* MODULE NAME = DFHPEP                                              *
*                                                                   *
* DESCRIPTIVE NAME = CICS/ESA    PROGRAM ERROR PROGRAM              *
*                                                                   *
* COPYRIGHT = SEE ABOVE                                             *
*                                                                   *
*                                                                   *
*-------------------------------------------------------------------*
*       THIS MODULE IS UPDATED TO PROVIDE THE HOOK TO THE ONLINE     *
*       PROBLEM DETERMINATION (OLPD) DATA COLLECTOR, IESOPDC.        *
*-------------------------------------------------------------------*
*                                                                   *
DFHEISTG DSECT ,
*********************************************************************
* * *         R E G I S T E R   D E F I N I T I O N           * * *
*********************************************************************
         DFHREGS ,
         DFHEJECT
*********************************************************************
* * *         D U M M Y   S E C T I O N S                     * * *
*********************************************************************
         DFHPCOM TYPE=DSECT
         DFHEJECT
*********************************************************************
* * * * *             P R O G R A M   E R R O R           * * * * *
* * * * *                  P R O G R A M                  * * * * *
*********************************************************************
DFHPEP   CSECT                    PROGRAM ERROR PROGRAM CSECT
DFHPEP   AMODE 31
DFHPEP   RMODE ANY
         XR    R1,R1
         ICM   R1,B'0011',EIBCALEN GET COMMAREA LENGTH
         BZ    RETURNX             NO COMMAREA; EXIT
         EXEC  CICS ADDRESS COMMAREA(R2) ,
         USING DFHPEP_COMMAREA,R2
         SPACE 3
```

Figure 12. DFHPEP Error Program of the CICS Transaction Server (Part 1 of 2)

DFHPEP Error Program

```
*-------------------------------------------------------------------*
*       IF THERE IS A NEED TO RESTRICT ACCESS TO NATIVE CICS IN     *
*       CASE OF A TRANSACTION ABEND AND WANT THE VSE/ESA SIGNON     *
*       SCREEN OR THE FUNCTION SELECTION PANEL DISPLAYED INSTEAD,   *
*       CHANGE THE TRANSID BELOW AS FOLLOWS:                        *
*              TRANSID=IEGM    (VSE/ESA SIGNON PANEL)               *
*              TRANSID=IEEP    (FUNCTION SELECTION PANEL)           *
*       AND REMOVE THE ASTERISK IN FRONT OF THE NEXT STATEMENT.     *
*-------------------------------------------------------------------*
*        EXEC  CICS START TRANSID(=C'XXXX') INTERVAL(0)              *
              TERMID(EIBTRMID) NOHANDLE ,
*-------------------------------------------------------------------*
         SPACE 3
*-------------------------------------------------------------------*
*                                                                   *
*       TRANSFER TO THE VSE/ESA ONLINE PROBLEM DETERMINATION        *
*                 DATA COLLECTION MODULE -- IESOPDC                 *
*                                                                   *
*-------------------------------------------------------------------*
         EXEC  CICS XCTL PROGRAM(=C'IESOPDC ') NOHANDLE,
*                                IF NOT THERE, FALL INTO RETURN
*-------------------------------------------------------------------*
         SPACE 3
         LA    R1,PEP_COM_RETURN_OK
         B     RETURN
         DFHEJECT
*
RETURNER DS    0H                 RETURN FOR ERROR CASE
         LA    R1,PEP_COM_RETURN_DISABLE
RETURN   DS    0H
         ST    R1,PEP_COM_RETURN_CODE
RETURNX  DS    0H
         EXEC  CICS RETURN ,
         LTORG *
         END   DFHPEP
```

Figure 12. DFHPEP Error Program of the CICS Transaction Server (Part 2 of 2)

End of Programming Interface Information

Chapter 6. Using Dumps for Error Diagnosis

If you want to analyze a dump stored in the dump library, go directly to "Analyzing Dumps" on page 72.

Overview

This chapter discusses how to use the saved contents of system storage, called a **dump**, for error diagnosis. VSE/ESA provides a tool for handling and analyzing a dump, the **Info/Analysis** program. You can use this tool in batch mode and analyze those dumps that are stored in the dump library. VSE/ESA stores most dumps in the dump library, others you can load from tape or disk into it.

The Info/Analysis program is described in *VSE/ESA Diagnosis Tools*.

The Dump Library

The dump library (SYSDUMP) contains up to 13 sublibraries. Up to 12 sublibraries called SYSDUMP.BG, and SYSDUMP.F1 through SYSDUMP.FB are assigned to the static partitions, and one sublibrary, called SYSDUMP.DYN is assigned to the dynamic partitions. Each sublibrary may contain one or more dumps. Figure 13 on page 68 gives an overview of the SYSDUMP library concept.

The number of the dumps contained in the library SYSDUMP influences the time performance of the Problem Determination dialogs and of the utility program INFOANA. It is therefore recommended to clean up the library from time to time and delete the dumps which are no more used, or offload those dumps to tape which may be used at a later time.

With the *Storage Dump Management* dialog, you can handle up to 56 dumps. If INFOANA is invoked in batch mode, you can process more than 56 dumps, but with more than that number of dumps you may encounter severe performance problems.

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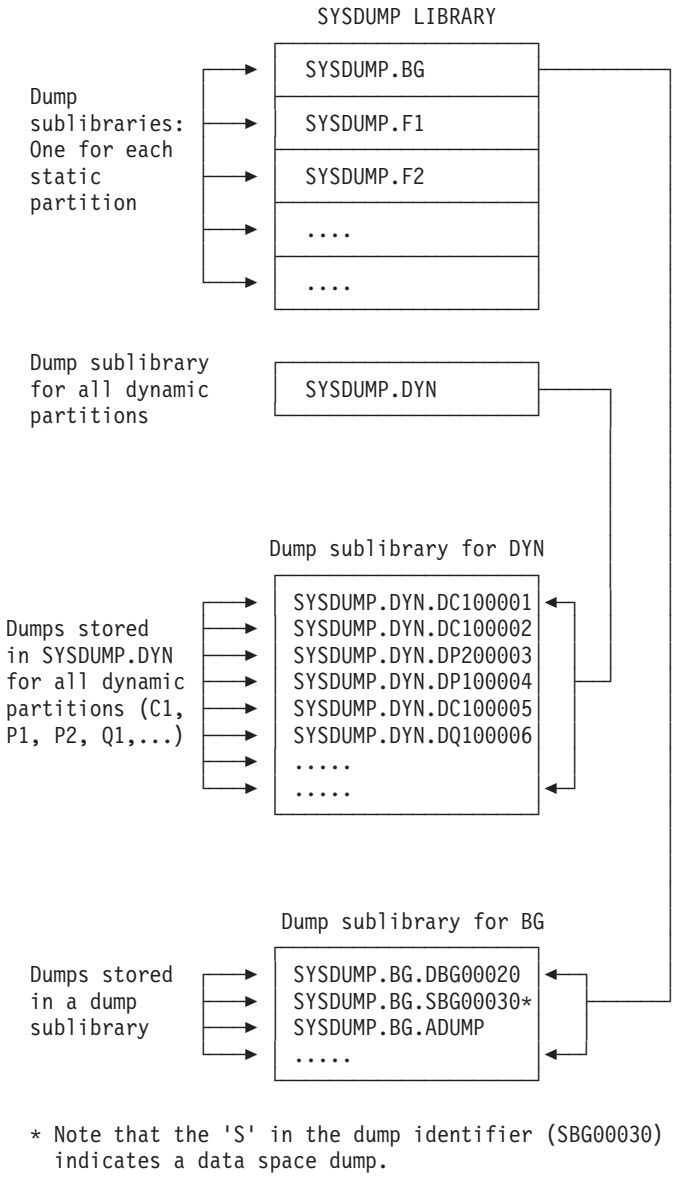

Figure 13. The SYSDUMP Library Concept

The job control // OPTION SYSDUMP statement or STDOPT SYSDUMP=YES indicates that dumps are to be written to the sublibrary which is active for the partition. Refer to the manual *VSE/ESA System Control Statements* for further details about these options.

Dump Types

Following is a description of the various dumps that are stored in the dump library. Either directly by the system or by you via tape.

- Abend dumps
- Macro dumps
- DUMP command dump (via tape)
- Stand-alone dump (via tape and disk)
- VSE/ICCF dump

Abend Dumps

Abend stands for **ab**normal **end**, that is, a program ends before normal completion because of an error. Whenever the **system** detects an abend situation, it terminates the program, creates a dump, and stores the dump in the dump library. The operator can use the CANCEL command to force the same sequence of steps.

Your job control specification for the DUMP operand (in the STDOPT command or // OPTION statement) determines the contents of an abend dump. You can request the following:

- A partition dump, or
- A system dump, and/or
- A data space dump.

Macro Dumps

A dump can also be requested through dump macros (DUMP, JDUMP, PDUMP, SDUMP, SDUMPX) and the CANCEL macro issued by **programs** written in assembler language. The job control specification of the DUMP operand (in the STDOPT command or // OPTION statement) and the resulting dump content is the same as described above for an abend dump.

DUMP Command Dumps

The **operator** can use the DUMP command to request a dump of a static or dynamic partition, or of specified storage areas or data spaces. The dump output device can be a tape or a printer. To be able to load the dump into the dump library for further analysis, a tape must be used.

Refer to "DUMP (Dump Storage Areas)" in the manual *VSE/ESA System Control Statements* for further details about the DUMP command.

Stand-Alone Dumps

With the stand-alone dump program the **operator** can take a dump of selected parts of virtual storage. The program records the page manager address spaces (PMRAS), the partitions, and the data spaces in separate files on one or more stand-alone dump tapes or on a disk device. The job control specification of the DUMP operand (in the STDOPT command or // OPTION statement) and the resulting dump content is the same as described above for an abend dump.

A stand-alone dump is initiated by the operator if the system has entered a severe error state and system operation is no longer possible. For example, the system entered a hard wait state or is in a continuous loop.

Refer to "Taking a Stand-Alone Dump" on page 115 for details on how to prepare a tape for a stand-alone dump and how to take the dump.

The VSE/ICCF Dump Facility

When running a job in an interactive partition of VSE/ICCF, you may get the following message:

```
K404D  ENTER DUMP COMMAND
```

This message is displayed on the condition that DUMP was specified in the VSE/ICCF job entry statement /OPTION. The message indicates the abnormal termination of a program. As a response you can enter the VSE/ICCF DUMP

command to display registers and program storage areas for error diagnosis. To create a dump of the complete interactive partition, enter:

```
SAVE [comment]
```

where "comment" is optional and can be any text used to identify the dump and its contents. Up to 24 characters are allowed. The dump created is stored in the dump library. You can analyze the dump with the Info/Analysis program as shown in this chapter.

Note: You may force the cancelation of a program in an interactive partition if a loop or wait condition is indicated. Press the PA2 key at your display station. In most cases you can then enter DUMP commands to display general registers, floating point registers, and program storage areas for error diagnosis.

For details about the DUMP commands provided by VSE/ICCF refer to the *VSE/ICCF User's Guide*.

Refer also to "Formatting and Analyzing VSE/ICCF Dump Data" on page 93 for how to analyze VSE/ICCF dump data saved on tapes.

Contents of a Dump

All dumps have basically the same layout. Each dump begins with the symptom record followed by data records.

The Symptom Record

The symptom record is a summary of relevant dump data collected by the system. It contains information about the machine environment, the failing component, and information related to the cause of the error.

The symptom record often provides sufficient data for error diagnosis and problem solving. If this is not the case, an analysis of the data records is required.

Data Records

Data records contain the actual dump data. They reflect the storage contents at the time of the error.

Using the Interactive Interface for Dump Processing

The Interactive Interface provides dialogs for dump processing. You access these dialogs from the *Problem Handling* panel. The panel offers the following dialogs for dump processing:

3 (Storage Dump Management)

4 (Inspect Dump Management Output)

6 (Dump Program Utilities)

which, in turn, offers:

7 (Format ICCF Dump Data)

These dialogs are described on the following pages.

Managing Dumps

To manage the dumps in the dump library, use the *Storage Dump Management* dialog. The dialog can handle up to 13 dump sublibraries and up to 56 dumps.

The dialog provides the following options for dump management:

5 = DELETE DUMP
(delete a dump from the dump library).

8 = ON/OFFLOAD DUMP
(load a dump from the dump library onto tape or from tape/disk into the dump library).

9 = ANALYZE CICS DUMP
(analyze CICS dump).

When you request the dialog you get a FULIST display that shows the names of the dumps that are already stored in the dump library or have been saved on tape. The options you can select are shown at the top of the FULIST display. Enter the option number in the "OPT" column next to the dump you want to process.

Delete Dump

Select option **5** if there are dumps in the library you no longer need. You should frequently delete such dumps to free space in the library.

Offload Dump

Select option **8** if you want to offload a dump from the dump library to tape. This may be necessary if you want to free space in the dump library. Dumps saved on tape can be later reloaded (ONLOAD DUMP) for analysis. When you offload a dump you are asked for the following information:

- Tape address
- Volume serial number

Onload Dump

Select option **8** if you want to ONLOAD a dump, written to tape with OFFLOAD DUMP, into the dump library. When you onload a dump you are asked for the following information:

- Tape label
- Tape address
- File number (optional)

Onload External Dump

The *Storage Dump Management* dialog offers in addition the *Onload External Dump* function. Use this function to load the following dumps into the dump library:

- Stand-alone dumps created either on tape or on disk.
- DUMP command dumps created on tape.

When onloading an external dump, you are asked for the following information:

- Sublibrary name
- Dump name
- Input device (tape or disk)

Analyzing Dumps

Dump analysis usually requires a skilled person. That person must have a general system skill as well as being familiar with subsystems like the CICS Transaction Server or VSE/POWER. To interpret a symptom record, might be relatively easy. But to locate and interpret error related dump data is usually a complex task. The Interactive Interface of VSE/ESA makes this task easier.

Storage Dump Management Dialog

With the *Storage Dump Management* dialog you retrieve selected dump information. The job stream created by VSE/ESA places the output in the VSE/POWER List Queue. The dialog provides the following options:

2 = PRINT SYMPTOMS
(print a symptom record).

3 = PRINT DUMP
(print a formatted dump or selected dump data).

4 = ANALYZES A DUMP
(analyze a stand-alone main dump file and print the data).

When you request the dialog you get a FULIST display that shows the names of the dumps that are stored in the dump library or have been saved on tape.

Inspect Dump Management Output Dialog

With the *Inspect Dump Management Output* dialog you access the output in the VSE/POWER List Queue created by the *Storage Dump Management* dialog. You can either display or print the output information.

The *Inspect Dump Management Output* dialog provides the following options:

1 = DISPLAY
(display output on your terminal).

2 = CHANGE
(change parameters of list queue entries).

5 = DELETE
(delete output in list queue).

When you request the dialog you are prompted for information to identify the output. You can request a FULIST of the VSE/POWER queue and specify, in addition, optional parameters: PREFIX, CLASS, and USER.

How to Analyze a Dump

The following steps are suggested:

1. First, display or print and analyze the **symptom record** contents.
2. If the symptom record information is not sufficient to solve the problem, create a **formatted dump**. A formatted dump gives you all the important supervisor control blocks, their contents and their addresses. For example:
   - PSW (Program Status Word)
   - COMREG (Partition Communication Region)
   - SYSCOM (System Communication Region)
   - TCBSAVE (Task Control Block Save Area)

3. In a third step you may use addresses retrieved from the symptom record and/or formatted dump to display/print **selected dump areas**. For example, areas of an application program in error.

When you select option 4 from the *Storage Dump Management* panel to analyze a **stand-alone** main dump file, VSE/ESA activates an analysis program. This program analyzes the stand-alone dump for you. In addition, you can treat a stand-alone dump as any other dump. That is, create a formatted dump or display/print selected areas.

Note: You can also create **unformatted** printouts from dumps on tape created by the stand-alone dump program or via the DUMP command. This may be necessary, for example:
- If none of your dump sublibraries is big enough to hold a stand-alone dump.
- If the dump was taken with the DUMP BUFFER,cuu command.

You can create an unformatted printout by using the DOSVSDMP utility program. For details, refer to chapter "The DOSVSDMP Utility" in the *VSE/ESA Diagnosis Tools*.

Dump Analysis Examples

In the following sections examples are used to show you how to perform dump analysis with the Interactive Interface. The following examples are used:
- Example 1: Displaying a Symptom Record
- Example 2: Displaying a Formatted Dump
- Example 3: Displaying Selected Dump Areas
- Example 4: Analyzing a Stand-Alone Dump

No example is shown for printing dump data on your local system printer. The sequence of steps is almost identical as shown for displaying dump data. The dialog for printing dump data will guide you. In addition, use the HELP text offered via the PF1 key.

If you want to analyze a stand-alone dump stored in the dump library, go directly to "Example 4: Analyzing a Stand-Alone Dump" on page 87.

Example 1: Displaying a Symptom Record

The panels for *Storage Dump Management* and the *List Queue* are shown for the first example. For the other examples it is assumed that you are familiar with these panels.

```
PRB$IDH1                STORAGE DUMP MANAGEMENT


LIST OF SYSTEM MANAGED DUMPS

OPTIONS: 2 = PRINT SYMPTOMS  3 = PRINT DUMP       4 = ANALYZE SA DUMP
         5 = DELETE DUMP     8 = ON/OFFLOAD DUMP  9 = ANALYZE CICS DUMP


                          RELATED  ON-                      TAPE    DATA
OPT -----DUMP NAME-----   DUMP     LINE   DATE      TIME    LABEL   SPACE

 _  SYSDUMP.BG.DBG00010    NONE        08/12/92  06:54:11  501715
 _  SYSDUMP.BG.DBG00009    NONE     X  08/12/92  06:53:28
 _  SYSDUMP.F4.DF400001   SF400002   X  08/11/92  11:51:35
 _                        SF400003
 _  SYSDUMP.F5.DF500001    NONE     X  08/11/92  11:03:26
 _  SYSDUMP.F5.DF500000    NONE     X  08/11/92  11:03:07
 _  SYSDUMP.F4.SF400002   DF400001   X  08/11/92  11:51:35          SDUMPDSP
 _  SYSDUMP.F4.SF400003   DF400001   X  08/11/92  11:51:35          TINE1



PF1=HELP       2=REDISPLAY        3=END              5=PROCESS    6=ADD
PF7=BACKWARD
```

Figure 14. Storage Dump Management Panel

To display a symptom record, proceed as follows:

1. Access the *Problem Handling* panel and select the *Storage Dump Management* dialog.
2. Enter

   ```
   2  (Print Symptoms)
   ```

   in the option column for the dump you want to analyze and press **PF5** (Process). See Figure 14.
3. From the *Problem Handling* panel select the *Inspect Dump Management Output* dialog to access the List Queue. A *List Queue* sample panel is shown in Figure 15 on page 75.

   Press PF1 to display HELP text. It gives you the PF-key settings for the display function you are going to use. For example, during display you can enter a character string and press PF6 for a search of that string.

```
 IESBQUL                    LIST QUEUE                       PAGE 1 of 1
                                                  Prefix= DMP

 OPTIONS: 1 = DISPLAY      2 = CHANGE      3 = PRINT       5 = DELETE

 OPT JOBNAME  NUMBER  SFX  S  PRI  DIS  CL  PAGES CC FORM  TO     FROM

  _  DMPSYM1   00349          8    H   A       3   1       SYSA  .SYSA
  _  DMPSYM2   00350          8    H   A       3   1       SYSA  .SYSA
  _  DMPANA3   00359          8    H   A     880   1       NASS  .NASS
  _  DMPANA6   00374          8    H   A    1168   1       NASS  .NASS
  _  DMPANA7   00391          8    H   A       3   1       NASS  .NASS
  _  DMPANA8   00392          8    H   A       3   1       NASS  .NASS
  _  DMPSYM9   00417          8    H   A       3   1       NASS  .NASS
  1  DMPSYM10  00418          8    H   A       3   1       NASS  .NASS




PF1=HELP           2=REFRESH      3=END          4=RETURN


LOCATE JOBNAME ==> ______
```

Figure 15. List Queue Panel

4. Enter

   1 (Display)

   in the option column for the related jobname and press **ENTER**.

As a result, the symptom record is displayed on your screen. The symptom record display is shown in Figure 16 on page 78.

Symptom Record Description

A symptom record is divided into four sections:

- Environment.
- Required Symptoms.
- Optional Symptoms, Structured Data Base (SDB).
- Optional Symptoms, Non-Structured Data Base (Non-SDB).

Diagnostic information is always provided in the environment and required symptoms sections but not necessarily in the optional symptoms sections.

Environment Section

The environment section of the symptom record describes the environment at the time the dump was taken. Except for the DUMPTYPE entry the information in the environment section is self-explanatory. The DUMPTYPE entry identifies why or how the dump was created. The following types may occur:

SCPREQ
: Identifies a dump as an abend dump.

IDUMP
: Identifies a dump as internally requested.

OPRREQ
Identifies a dump as operator dump; created with the DUMP command, for example.

SADUMP
Identifies a dump as a stand-alone dump.

SDUMP
Identifies a dump as a data space dump (requested with the SDUMP or SDUMPX macro).

Required Symptoms Section

Required symptoms are those essential for error diagnosis. The following entries may appear in this section:

AB/Sxxyy

where xx is the first cancel code, and where yy is the second cancel code or zero.

ADRS/address

where address is the absolute address of the instruction following the failing one (if the failing address is outside the LTA, SVA, or the partition). This address is identical with the PSW instruction address.

Note: An entry for ADRS is generated only if the PSW instruction address points to an area other than the LTA, SVA, or the partition.

MS/mmmmm

where mmmmm is the message number associated with the error.

OFFS/offset

where offset is the offset of the instruction following the failing one. The offset is relative to the phase start address (if the phase resides in the LTA or in the SVA), or relative to the partition start address (if the error occurred within partition). The offset is calculated by using the PSW instruction address.

Note: An entry for OFFS is generated only if the failing address points to the LTA, SVA, or to the partition.

OPCS/xxxxxx

where xxxxxx represents either
SVCxx
(xx = SVC code), or
CODExx
(xx = Program interrupt code).

Note: An entry for OPCS is generated only if an illegal SVC call or if a program check occurs. If an illegal SVC call occurs, the entry contains the SVC (error) code in decimal. If a program check occurs, the entry contains the program interrupt code.

PIDS/comp-id

where comp-id is the component identifier.

REGS/xxyyy

where xx is the general register number in hexadecimal which contains an address close to the point of failure; and

where yyy is the contents of register (xx) minus the PSW instruction address.

Note: Usually, two entries are generated for REGS. REGS shows those two registers which seem to be related to the failing instruction. These are those two registers where the difference between register contents and PSW instruction address is a minimum. If there is no register with a difference below 4K, the entry REGS/FFFFF is created.

RIDS/nnnnnnnn

where nnnnnnnn stands for the name of a phase (if the error occurred in the SVA or LTA), or the name of a program (if the error occurred in the partition).

VALU/nnnnnnnn

where nnnnnnnn represents either

- a phase name (together with AB/S2200 phase not found, for example), or
- SYSnnn (together with AB/S2600 SYSnnn not assigned, for example).

Optional Symptoms

Information for this section may be supplied by the issuer of the dump request, or by subsequently processed analysis routines. These additional symptoms are related to the problem and are in structured data base (SDB) or in non-structured data base (non-SDB) format.

Optional Symptoms of a Stand-Alone Dump

In addition to the symptoms described above, a symptom record of a stand-alone dump shows:

ACTIVE SPACE ID

which identifies the address space that was active at the time the dump was taken.

DATA DUMPED FROM SPACE ID

which indicates the address space from which this dump data file was dumped.

JOB NAME

which indicates the partition job name for this dump file.

DUMPED DATA

which shows what data is in this dump file.

Optional (Non-SDB) Symptoms of an ABEND Dump

The optional symptoms part of a partition dump shows whether there are any appended data space dumps or not. The symptom gives a list of all data space names which belong to the dumped partition:

```
DATA_SPACES=(aaaa,bb,cccccc)
where
   aaaa,bb,cccccc
is the name of the address space or data space.
```

The symptom record of the data space contains the following symptoms:

```
DATA_SPACE=aaaa
ALET=alet
RELATED_ABEND_DUMP=DF400001
```

Analyzing Symptom Record Information

To demonstrate the analysis of symptom record information, the information shown in Figure 16 is used.

```
// JOB DMPSYM10 PRINT DUMP SYMPTOMS
      .
      .
      .

                                  DUMP SYMPTOMS
SYSDUMP.F2.DF200000
ENVIRONMENT:
    CPU MODEL ....... 3090
    CPU SERIAL ...... CF5A05
    TIME ............ 07:56:09:00
    DATE ............ 94/11/17
    SYSTEM ID ....... 568606606
    RELEASE ......... 1
    FEATURE ......... 5C
    DUMPTYPE ........ SADUMP
    PROBLEM NUMBER .. """""""""


REQUIRED SYMPTOMS:

OPTIONAL SYMPTOMS (SDB):

OPTIONAL SYMPTOMS (NON-SDB):
    DATE_NOT_AVAILABLE
    MACHINE=ESA
    MODE=PAGING
    ACTIVE_SPACE_ID=0
    DUMPED_DATA_FROM_SPACE_ID=0
    PMR_ADDRESS_SPACE_ID=00
    DUMPED_DATA=SUPERVISOR+SVA
      .
      .
      .
```

Figure 16. Symptom Record Example

When displayed or printed the symptom record information is enclosed by job control information. Look for the heading DUMP SYMPTOMS. Below that heading you find the information important for error diagnosis. In the example used, the following diagnostic information is supplied:

SYSDUMP.F2.DF200000

Name of the dump. SYSDUMP is the name of the dump library. F2 is the name of the dump sublibrary (for partition F2). DF200000 is the number of the dump assigned by the system. Note that in the case of a data space dump, the letter D in the system-assigned dump number would be an S (SF200000).

DUMPTYPE ..... SCPREQ

SCPREQ indicates that the dump resulted from an abend.

AB/S2100

The first cancel code is 21, the second 00 (no meaning). Use the *VSE/ESA Messages and Codes* manual to look up the meaning of cancel code 21. You will find the following entry for cancel code 21:

```
21  0S04  ILLEGAL SVC - HEX LOCATION nnnnnnnn -
          SVC CODE HEX nn
```

REGS/01000
REGS/06978

Registers 1 and 6 seem to be related to the error. The value of 978 is the difference between the contents of register 6 minus the PSW instruction address. You can use this address to locate the suspected error area (location) in a formatted dump, or to display data selectively.

MS/0S04I

0S04 is the error message issued by the system to indicate the error situation. This message number is also shown for cancel code 21 (see AB/S2100 above). Refer to the *VSE/ESA Messages and Codes* manual for an explanation of the message.

RIDS/DTSCICS

DTSCICS is the name of the program or phase that caused the error.

ADRS/00000A76

A76 is the absolute address of the instruction following the failing one (outside SVA, LTA, and partition). You can use this address to locate the suspected error area (location) in a formatted dump, or to display data selectively. Use the MAP command to determine where address A76 is located.

OPCS/SVC02

An SVC (error) code of 02 was issued. This code also appears in the message text of message 0S04. Use the *VSE/ESA Messages and Codes* manual to look up the explanation for SVC code 02.

Analysis Summary for Symptom Record

You now know the name of the program or phase (DTSCICS). Together with the description of message 0S04 and SVC code 02 in the *VSE/ESA Messages and Codes* manual you have definite clues where to look for the error. If this information is not sufficient to solve the problem, you can use the addresses given in REGS and ADRS for further analysis. Create a formatted dump for that purpose. How to do this is shown in "Example 2: Displaying a Formatted Dump".

Example 2: Displaying a Formatted Dump

A formatted dump can be created from any dump stored in the dump library, including a stand-alone dump. The following example shows how to create a formatted dump. In a formatted dump the supervisor control block information is presented in an easy to read way. Input is the same dump as for the symptom record display in Example 1.

Proceed as follows:

1. Access the *Problem Handling* panel and select the *Storage Dump Management* dialog. (Figure 14 on page 74 shows the *Storage Dump Management* panel.)
2. Enter

   ```
   3  (Print Dump)
   ```

   in the option column for the dump you want to analyze and press **PF5** (Process). A selection panel is displayed on your screen.
3. From the *Print Dump: Select Function* panel select

   ```
   1  (Print complete formatted dump)
   ```

   and press **ENTER**.
4. From the *Problem Handling* panel select the *Inspect Dump Management Output* dialog to access the List Queue.

   The *List Queue* panel is displayed on your screen.

   Press PF1 for the display of HELP text. It gives you the PF-key settings for the display function you are going to use. For example, during display you can enter a character string and press PF6 for a search of that string.
5. Enter

   ```
   1  (Display)
   ```

   in the option column for the related jobname and press **ENTER**. For the example chosen, the entry line looks as follows:

```
1  DMPANA3  00359     8    H     A     880    1      .NASS     .NASS
```

   The complete *List Queue* panel is shown in Figure 15 on page 75.

As a result, the first page of the formatted dump is displayed on your screen. The following pages show parts of the formatted dump display. “Analyzing a Formatted Dump” on page 85 gives a description of the formatted dump displayed.

Note: In the following figure on some pages the two rightmost columns are not shown.

```
PRINT FORMAT
SYSDUMP.BG.TEST                                                                 PAGE 0004

NAME =          COMPONENT ID =          TYPE = OVERVIEW LIST


PSW                       HEXADECIMAL DATA
FREGS                     HEXADECIMAL DATA
GREGS                     HEXADECIMAL DATA
CREGS                     HEXADECIMAL DATA
AREGS                     HEXADECIMAL DATA
MESSAGE     HARDCOPY      TEXT DATA
DBUGHDR     IJBXDBUG      TEXT DATA
LOCATORS                  CONTROL BLOCK LIST
SYSDUMP.BG.TEST                                                                 PAGE 0005

NAME = PSW      COMPONENT ID =          TYPE = HEXADECIMAL DATA


       PSW     070F0000 0000A868
SYSDUMP.BG.TEST                                                                 PAGE 0006

NAME = FREGS    COMPONENT ID =          TYPE = HEXADECIMAL DATA


    FL REGS    0    4040404040404040
               2    4040404040404040
               4    4040404040404040
               6    4040404040404040
SYSDUMP.BG.TEST                                                                 PAGE 0007

NAME = GREGS    COMPONENT ID =          TYPE = HEXADECIMAL DATA


    GP REGS    0-3    00000000 40059A6A 00000000 00000000
               4-7    AA3120D1 00000006 00009140 8000A0D8
               8-B    000081F4 40059A6A 00FFEA80 00015590
               C-F    00041440 0001DD78 00051DC0 0000A09C
SYSDUMP.BG.TEST                                                                 PAGE 0008

NAME = CREGS    COMPONENT ID =          TYPE = HEXADECIMAL DATA


   CTL REGS    0-3    04B10E43 0015F001 00000000 40000000
               4-7    00000000 00355840 10000000 0015F001
               8-B    00000000 00000000 00000000 00000000
               C-F    00000000 0015F001 DF080354 0003F500
SYSDUMP.BG.TEST                                                                 PAGE 0009

NAME = AREGS    COMPONENT ID =          TYPE = HEXADECIMAL DATA


    AC REGS    0-3    00000000 00000000 00000000 00000000
               4-7    00000000 00000000 00000000 00000000
               8-B    00000000 00000000 00000000 00000000
               C-F    00000000 00000000 00000000 00000000
SYSDUMP.BG.TEST                                                                 PAGE 0010

NAME = MESSAGE  COMPONENT ID = HARDCOPY TYPE = TEXT DATA
   ⋮
```

Figure 17. Formatted Dump Example (Part 1 of 4)

```
NAME = LOCATORS COMPONENT ID =          TYPE = LOCATOR DATA
 BLOCK        COMP      BASE(ADDR)        KEYFIELD


LOWCORE       SYSTEM     00000000
SYSCOM        SYSTEM     00000420
UNATTCB       SYSTEM     00014F90
SMCOM         SYSTEM     000080E0
CLIM          SYSTEM     00034830
PCB           SYSTEM     00041440
SCB           SYSTEM     00040D04
PMRAS         SYSTEM     000413B8
PCB           BG         00042AC0
SCB           BG         00040D04
PMRAS         BG         000413B8
COMREG        BG         000005B0
PIBTAB        BG         00001538
PIB2TAB       BG         00001468
LUBTAB        BG         00001614
PCB           FB         000428E0
COMREG        FB         000049B0
PIBTAB        FB         00001548
PIB2TAB       FB         00001478
PCB           FA         00042700
COMREG        FA         00004880
PIBTAB        FA         00001558
PIB2TAB       FA         00001488
PCB           F9         00042520
COMREG        F9         00004750
PIBTAB        F9         00001568
PIB2TAB       F9         00001498
PCB           F8         00042340
COMREG        F8         00004620
PIBTAB        F8         00001578
PIB2TAB       F8         000014A8
PCB           F7         00042160
COMREG        F7         000044F0
PIBTAB        F7         00001588
PIB2TAB       F7         000014B8
PCB           F6         00041F80
COMREG        F6         000043C0
PIBTAB        F6         00001598
PIB2TAB       F6         000014C8
PCB           F5         00041DA0
COMREG        F5         00004290
PIBTAB        F5         000015A8
PIB2TAB       F5         000014D8
PCB           F4         00041BC0
COMREG        F4         00004160
PIBTAB        F4         000015B8
PIB2TAB       F4         000014E8
PCB           F3         000419E0
```

Figure 17. Formatted Dump Example (Part 2 of 4)

```
NAME=LOWCORE  COMPONENT ID=SYSTEM   BASE=00000000
 00000000  00080000 00000910 02000300 60FF0068 08000300 00000001 070F0000 0000A868 06 *............-...............*
 00000020  070D0000 004034AA 040C2000 00144564 00000000 00000000 070F0000 0000A868 06 *..... ......................*
 00000040  00000000 04000000 00000000 00000000 FF000000 00000000 040C0000 0000B708 06 *.............................*
 00000060  040C0000 0000B330 000C0000 0000B988 04080000 0001558E 040C0000 0000B798 06 *.............................*
 00000080  00000420 00001000 00020007 00040011 00008000 00000000 00000000 00000000 06 *.............................*
 000000A0  00000000 00000000 00000000 00000000 80000000 00000000 00010012 00003618 06 *.............................*
 000000C0  00000000 00000000 00000000 00000000 00000000 00000000 00007B83 B9F6AA01 06 *......................#..6..*
 000000E0  FFFFFFFF FFFF4000 00000000 00000000 00000000 00000000 00000000 00000000 06 *...... ......................*
 00000100  070F0000 0000A868 00000000 00000000 00000000 00000000 00000000 00000000 06 *.............................*
 00000120  00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 06 *.............................*
 00000140  TO NEXT LINE ADDRESS SAME AS ABOVE
SYSDUMP.BG.TEST                                                                                          PAGE 0016

 00000160  40404040 40404040 40404040 40404040 40404040 40404040 40404040 40404040 06 *                             *
 00000180  00000000 40059A6A 00000000 00000000 AA3120D1 00000006 00009140 8000A0D8 06 *.... ..........J....... ...Q*
 000001A0  000081F4 40059A6A 00FFEA80 00015590 00041440 0001DD78 00051DC0 0000A09C 06 *...4 .......... ............*
 000001C0  04B10E43 0015F001 00000000 40000000 00000000 00355840 10000000 0015F001 06 *......0..... ...... ......0.*
 000001E0  00000000 00000000 00000000 00000000 00000000 0015F001 DF080354 0003F500 06 *..................0.......5.*
 00000200  00006EFE 40404040 40404040 40404040 40404040 40404040 40404040 40404040 06 *..>.                         *
 00000220  0001AAA8 0001B844 0001B88C 00000000 00000000 00000000 00010012 0000FFFF 06 *.............................*
 00000240  50820014 0004C420 00001458 00041440 001C5A70 00040D04 00000000 00033170 06 *&;....D.... .................*
 00000260  00048778 00043700 00001468 00042AC0 8000C550 00000000 0000B330 00009140 06 *..............E&;.......... *
 00000280  070F0000 0000A868 00015590 00042AC0 0001DD78 00051DC0 0000A09C 00000000 06 *.............................*
 000002A0  40059A6A 00000000 00001538 AA3120D1 00000004 00009140 8000A0D8 00043700 06 * ..........J....... ...Q....*
 000002C0  00000F4C 001C5004 00000E7F 0008E5E2 C561C1C6 40F5F6F8 F6F0F6F6 F0F640F1 06 *..<..&;."VSE/AF 568606606 1*
 000002E0  F5C34040 F6F1F040 C4D9E560 F1F14040 E860C5E2 C1F1F061 F2F760F1 F64BF2F0 06 *5C  610     Y-ESA10/27-16.20*
 00000300  3F000000 60FF0001 01000000 20FF1000 01001000 60001000 01002000 60001000 06 *....-...........-.......-...*
 00000320  01003000 60001000 01004000 60001000 01005000 60001000 1F000000 60000001 06 *....-... .-....&;-.......-...*
 00000340  1F000000 60000001 07000000 60000001 37000000 60000001 37000000 60000001 06 *....-.....-.......-.......-...*
 00000360  02000800 200040A0 40404040 40404040 40404040 40404040 40404040 40404040 06 *...... .                    *
 00000380  40404040 40404040 40404040 40404040 40404040 40404040 40404040 40404040 06 *                             *
 000003A0  TO NEXT LINE ADDRESS SAME AS ABOVE
 00000400  00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 06 *.............................*

NAME=SYSCOM   COMPONENT ID=SYSTEM   BASE=00000420
 00000420  0002A0AC 00000F00 00009B26 00003318 000253DA 00000804 0004BE54 00005348 06 *.............................*
 00000440  00000000 020CB740 00FF003C 000CE657 00005800 0003F1F4 00000000 00052078 06 *....... .....W......14......*
 00000460  C04418FC 0020003E 01E00080 00007098 00000000 00000000 00000021 00000000 06 *.............................*
 00000480  00007210 00007990 00019380 00009BFC 000173E8 001336F0 00003AA4 00000900 06 *................Y...0........*
 000004A0  00000000 FFFF0000 00008E08 00000000 0001A3A4 00005EF0 0077006D 00000000 06 *..................;0..._....*
 000004C0  00000000 00000178 00000150 01400110 00000000 000080E0 00051DD8 00000000 06 *.........&; ............Q....*
 000004E0  00000000 00000000 FFFF8001 07F10001 00000000 00000000 0BF4001D 001C5970 06 *...........1.........4......*
 00000500  00008304 000900C1 00000000 00FDDFFF 00000000 C40DE000 00000000 001CFE70 06 *.......A..........D.........*
 00000520  80017C78 00006EF0 00000000 002A5000 0006BD38 000E2000 00000000 00007158 06 *..@...>0......&;............*
 00000540  000071E8 000085E8 00000000 001D3028 10000B94 00014F90 5B5BD1C3 D3C3C9F5 06 *...Y...Y............$$JCLCI5*
 00000560  000009C2 00000000 00034C74 00034830 00000000 0004C140 00000000 001C5AFC 06 *...B......<.......A .........*
 00000580  00031020 001CDEC0 01426FD8 0004CC10 00000000 00000000 0FFFC500 00000000 06 *.........?Q...........E.....*
 000005A0  00000000 00000000 00033108 00000000                                     06 *.................            *

NAME=UNATTCB  COMPONENT ID=SYSTEM   BASE=00014F90
 00014F80                                        000148A4 00015375 00015278 00014F14 06 *                 ............*
 00014FA0  00015234 00014F38 00000000 00000000 00000000 00000000 C0000000 00000081 06 *.............................*
 00014FC0  00000000 00000000 06000001 00000000 01000001 00000000 00000000 00000400 06 *.............................*
 00014FE0  E4D5C1E3 E3C3E3F1 00000000 00000000 00000000 00000000 00000000 00000000 06 *UNATTCT1.....................*
 00015000  AA311C49 88FAA313 40404040 40404040 00004040 40404040 40404040 40404040 06 *........       ..          *
 00015020  40404040 40404040 40404040 40404040 40404040 40404040 40404040 40404040 06 *                             *
 00015040  TO NEXT LINE ADDRESS SAME AS ABOVE
 00015060  40404040 40404040 00000000 00000000 00000000 00000000 00000000 00000000 06 *        .....................*
 00015080  00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 06 *.............................*
 000150A0  TO NEXT LINE ADDRESS SAME AS ABOVE
```

Figure 17. Formatted Dump Example (Part 3 of 4)

```
NAME=SMCOM    COMPONENT ID=SYSTEM   BASE=000080E0
SYSDUMP.BG.TEST                                                                                                  PAGE 0017

 000080E0  00001E80 00000029 00000004 0000005C 00808000 00500004 00000004 00300030 06 *..........*.....&;.........*
 00008100  00000000 00000000 00000000 C9D1C2E2 E2D70000 000CDFFF 000CE000 000DDFFF 06 *.........IJBSSP............*
 00008120  000DE000 002CFFFF 002D0000 003FFFFF 00400000 013FFFFF 002C0000 002CFFFF 06 *.............. ..............*
 00008140  001C2000 002A4FFF 002D0000 01400000 015FFFFF 014A1000 015FFFFF 20000040 06 *......... ................. *
 00008160  C9D1C2D5 C6C30000 000F7000 00F8EFFF 00F8F000 00FD9FFF 00FDA000 00FDDFFF 06 *IJBNFC......8...80..........*
 00008180  00000E98 00000004 00FFFFFF 001C5000 015DC800 C9D1C2D4 C3C20000 00000000 06 *...........&;.)H.IJBMCB.....*
 000081A0  C9D1C2E7 D4E20000 00000000 00000000                               06 *IJBXMS.............       *

NAME=CLIM     COMPONENT ID=SYSTEM   BASE=00034830
 00034820                                  003E0001 000007FE E2E3C4D7 D9D6C640 06 *            ........STDPROF *
 00034840  00500030 000A00FF 001E0020 000C001E 000C00D4 00FF0000 0000000A 00010080 06 *.&;............M.............*
 00034860  04000080 00780000 00142000 07FD                                     06 *.............              *

NAME=PCB      COMPONENT ID=SYSTEM   BASE=00041440
 00041440  01E00000 80000000 00000000 00000000 00000000 00000BAA 00000000 00041440 06 *........................... *
 00041460  00000010 00000000 00000000 01020304 06080712 0B0D0C0F 0E101113 20000000 06 *............................*
 00041480  00000000 00000000 00000000 00000000 00200000 00040D04 00000000 00000E98 06 *............................*
 000414A0  0000008D 00000004 00000004 00000000 00000000 00000000 00000000 00000000 06 *............................*
 000414C0  00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 06 *............................*
 000414E0  00000000 00000000 00000000 00000000 00000000 00044CCF 00000000 00000000 06 *..................<.........*
 00041500  00000000 017C7B6F 80041508 90408000 80041510 91408000 80041518 92408000 06 *.....@#?..... ..... ..... ..*
 00041520  80041520 93418000 80041528 94408000 80041530 95408000 001CA000 00000000 06 *........... ....... ........*
 00041540  00000000 00000000 00000000 00000000 00000000 00000000 C9D1C2D7 C1D90000 06 *....................IJBPAR..*
 00041560  015DC840 00355840 00041440 00000000 00000000 00000000 00000000 00000000 06 *.)H ... ... ................*
 00041580  00000000 00000210 00000000 00000000 00FDA000 00FDDFFF 00000000 00000000 06 *............................*
 000415A0  00058850 81810001 00000000 00000000 001D1000 00000000 00000000 00000000 06 *...&;.......................*
 000415C0  00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 06 *............................*
 000415E0  015DC010 00000000 00000000 00000000 00000000 00000000 00280000 00000000 06 *.)..........................*
 00041600  0000C1D9 00003CA0 001C4000 00000000 00001528 00001458 00000000 00000000 06 *..AR..... .................*

NAME=SCB      COMPONENT ID=SYSTEM   BASE=00040D04
 00040D00           E2C3C240 F0400001 00040D88 00041334 40800000 00000400 00000000 06 *    SCB 0 ........ .........*
 00040D20  00405000 0015F001 00100000 00000000 00000000 00000000 00000000 00000000 06 *. &;..0.....................*
 00040D40  00000000 00000000 00000000 00000000 00000000 000413B8 00405400 00409400 06 *..................... ... ..*
 00040D60  00004000 00000400 00000000 0040A400 00000000 00030000 00000000 00000000 06 *.. .......... ..............*
 00040D80  00000000 00000000                                                   06 *........                  *

NAME=PMRAS    COMPONENT ID=SYSTEM   BASE=000413B8
 000413A0                                                          E2C3C2D7 F0F00000 06 *                    SCBP00..*
 000413C0  000413B8 000413B8 20000000 00000080 00000000 00400000 00FDA001 00000000 06 *................. ..........*
 000413E0  00404000 0041FFFF 00404000 00000000 00000000 00000000 00000000 00000000 06 *.  ......  ..................*
 00041400  00000000 00000000 000413B8 00400400 00400800 00000080 00000080 00000000 06 *.......... ... .............*
 00041420  00000000 00000000 00000001 00000000 00000001 00000000 00000000          06 *........................   *

NAME=PCB      COMPONENT ID=BG       BASE=00042AC0
SYSDUMP.BG.TEST                                                                                                  PAGE 0018

 00042AC0  01E00000 00080000 00000000 00010000 00000000 00000F36 00000000 00042AC0 06 *............................*
 00042AE0  00100000 00000000 00000000 21000000 00000000 00000000 00000000 00000000 06 *............................*
 00042B00  00000000 00000000 00000000 00000000 00000000 00040D04 00040D04 00000000 06 *............................*
 00042B20  00000000 00000000 00000000 00400000 00496000 00400000 00500000 00000000 06 *......... ....-.. ...&;.....*
 00042B40  00000000 00500000 00000000 00000000 00000000 00000000 00000000 00000000 06 *.....&;.....................*
 00042B60  00000000 00000000 00000000 00000000 00000000 00000000 00000000 000000AA 06 *............................*
 00042B80  00000000 000000CC 80042B88 90408021 80042B90 91408000 80042B98 92408000 06 *.......... ..... ..... ..*
 00042BA0  80042BA0 93418000 80042BA8 94408000 80042BB0 95408000 001CA370 00042E58 06 *.......... ..... .........*
 00042BC0  00000000 00000000 00000000 00000000 00000000 00000000 C9D1C2D7 C2C70000 06 *....................IJBPBG..*
 00042BE0  015DC840 00355840 00042AC0 00000000 00000000 00800000 00000000 00000000 06 *.)H ... ....................*
 00042C00  00000000 000033E2 0000334A 00000000 00000000 00000000 00000000 00000000 06 *.......S....................*
 00042C20  00000000 00000000 00000000 00000000 001D1180 00000000 00000000 00000000 06 *............................*
 00042C40  00000001 00000000 00000000 00000000 00000000 00000000 00000000 00000000 06 *............................*
 00042C60  015DC028 00000000 00000000 00000000 00000000 00000000 00280000 10000000 06 *.)..........................*
 00042C80  0010C2C7 000005B0 00001614 00004ADC 00001538 00001468 00000000 0004BEA0 06 *..BG.......................*
   ⋮
```

Figure 17. Formatted Dump Example (Part 4 of 4)

Analyzing a Formatted Dump

For the following description refer to Figure 17 on page 81. The figure does not show the complete dump. Only selected parts are shown.

A formatted dump is divided into three parts.

The **first part** contains diagnostic information associated with the error, such as:
- Control registers (CREGS)
- Floating point registers (FREGS)
- General purpose registers (GREGS)
- Access registers (AREGS)
- Program Status Word (PSW)
- Hardcopy file messages (MESSAGE)

Start diagnosis with the sections listed above. Ignore the job control information that precedes the dump.

The **second part** of a formatted dump (identified by NAME = LOCATORS) lists system control blocks. For each control block the start address is given; see column BASE (ADDR). You can thus identify the address of a control block and look for its contents in part three of the formatted dump. Also, you can use such an address or the address found in a control block to display dump data selectively. This is shown in Example 3.

Note: In the formatted version of a stand-alone dump of an **unattended node** system the following locator entries are of special interest:

UNATTCB
UNATTCBN

UNATTCBN identifies the REIPL control block and the related hard wait information of the last re-IPL. UNATTCB identifies the same for the re-IPL preceding the last one. You find these entries after the SYSCOM entry.

The **third part** of a formatted dump shows the contents of the control blocks listed in part two. It starts with the lower area of processor storage (LOWCORE), followed by the system communication region (SYSCOM). It requires good system knowledge to analyze and interpret the contents of control blocks. But if a difficult problem arises you may contact IBM for support and you may then be asked for data that a formatted dump provides.

Example 3: Displaying Selected Dump Areas

In Example 1 and Example 2 several addresses came up that are related with the error. You can use these addresses to display the related areas. You would do this if you cannot solve a problem with the information provided in the symptom record and the formatted dump. But you should realize that additional expertise is required to analyze unformatted dump data.

To display selected dump areas proceed as follows:

1. Access the *Problem Handling* panel and select the *Storage Dump Management* dialog. (Figure 14 on page 74 shows the *Storage Dump Management* panel.)
2. Enter

   ```
   3  (Print Dump)
   ```

   in the option column for the dump you want to analyze and press **PF5** (Process). A selection panel is displayed on your screen.

3. From the *Print Dump: Select Function* panel select

   ```
   2  (Print selective parts of the dump)
   ```

   and press **ENTER**. You get a panel to define the dump area.
4. In the *Print Selected Dump* panel define the area you want displayed. Define either

   ```
   FROM ADDRESS  and  TO ADDRESS
   ```

   or

   ```
   FROM ADDRESS  and  LENGTH
   ```

   The system places the output of the submitted job in the VSE/POWER List Queue.
5. From the *Problem Handling* panel select the *Inspect Dump Management Output* dialog to access the List Queue.

   The *List Queue* panel is displayed on your screen.

   Press PF1 to display HELP text. It gives you the PF-key settings for the display function you are going to use. For example, during display you can enter a character string and press PF6 for a search of that string.
6. Enter

   ```
   1  (Display)
   ```

   in the option column for the related jobname and press **ENTER**. For the example chosen, the entry line looks as follows:

```
1  DMPANA8  00392      8   H    A     3   1    .NASS    .NASS
```

   The complete *List Queue* panel is shown in Figure 15 on page 75.

As a result, the selected area is displayed on your screen. Following is the example of a selected area display. The FROM ADDRESS was 00000580.

Note: In the following figure, the rightmost portion of the display is not shown. This portion shows for each line the hex values translated into the corresponding characters.

```
      // JOB DMPANA8 PRINT SELECTIVE PARTS OF A DUMP
                  .
                  .
00000580                                  F0F961F0 F761F9F2 61F1F900 00000000 00 *            09/07/94/19.....*
000005A0  00000000 00000000 C9D5C6D6 C1D5C140 00495FFF 004006D1 004006D1 00000010 00 *......INFOANA .... .J. .J....*
000005C0  014FFFFF FF5FCCD3 1000CCD0 19000800 30F8A642 3FD7BE7B 1440144D 145C38F0 00 *.......L......8...P.#. .(.*.0*
000005E0  F9F0F7F9 F2F2F5F1 00001370 00000078 46400000 F1F90000 00000010 F0400000 00 *90792251...... ..19......0 ..*
00000600  00008A59 00171D30 00000940 12A00000 00000000 059011E1 00248000 40600F40 00 *......... ..............  -. *
00000620  40404040 40404000 40404040 40404000 00000000 00000000 0016E000 02140042 00 *       .     ..............*
00000640  00000000 00000000 00173000 00000000 00000000 00000000 004FE000 00000000 00 *.....................*
00000660  C9D1C2C6 C2C70000 C4C1E3C1 E3E2E3F1 00000000 00000000 00000000 004000E0 00 *IJBFBG..DATATST1.......... ..*
                  .
                  .
```

Figure 18. Selected Dump Area Example

Example 4: Analyzing a Stand-Alone Dump

A stand-alone dump is a dump of selected parts of virtual storage of your system. The stand-alone dump program produces a main dump file of the system areas, dump files containing page manager data and one additional dump file for each partition and/or data space to be dumped.

Format of the Stand-Alone Dump Tape:

File 1: Stand-alone dump program

File 2: Work file

File 3: Main dump file

The main dump file includes the symptom record, the dump data, control block locators (LBD entries) for supervisor control blocks, and the last 200 messages of the hardcopy file.

File 4 to n: Page manager address spaces

Each file includes a symptom record and a storage dump of the page manager address space.

File n+1 to m: Dumps of partitions and/or data spaces.

Each file includes a symptom record and a storage dump of the partition or data space, respectively.

The order of the dumped partitions and/or data spaces depends on the specification of the // OPTION SADUMP job control statement.

A stand-alone dump is created by the operator when a severe error occurred. For example, a WAIT or a LOOP. In such an error situation most often a new startup is necessary to return to normal processing. Before the new startup is initiated a stand-alone dump should be taken. Refer to "Taking a Stand-Alone Dump" on page 115 for details on how to take a stand-alone dump.

To load the dump from tape or disk into the dump library, select from the *Storage Dump Management* panel ADD DUMP (PF6).

If the stand-alone dump has been (off)loaded to tape before, select ON/OFFLOAD DUMP (option 8).

If a stand-alone dump is too big to be loaded into a dump sublibrary, you can create an unformatted printout directly from tape by using the DOSVSDMP utility. For details, refer to "The DOSVSDMP Utility" in the manual *VSE/ESA Diagnosis Tools*.

When you request analysis of a stand-alone dump, programs IJBXDBUG and IJBXSDA are activated. The programs analyze the stand-alone main dump file for you and create an analysis report that you can display or print.

To request an analysis report, proceed as follows:

1. Access the *Problem Handling* panel and select the *Storage Dump Management* dialog. (Figure 14 on page 74 shows a *Storage Dump Management* panel.)
2. Enter

   ```
   4  (Analyze SA Dump)
   ```

in the option column for the stand-alone dump you want to analyze and press **PF5** (Process). You can then specify the file number of the file on the stand-alone dump tape you want to analyze. No specification causes the system to analyze the main dump file (File 3).

VSE/ESA places the output of the job created and submitted in the VSE/POWER List Queue.

3. From the *Problem Handling* panel select the *Inspect Dump Management Output* dialog to access the List Queue. The *List Queue* panel is displayed on your screen.
4. Enter

   ```
   1  (Display)
   ```

   in the option column for the related jobname and press **ENTER**.

As a result, the analysis report is displayed on your screen. To interpret the analysis report, system skill is required. The following section describes the contents of an analysis report.

Analysis Report Contents

The analysis report contains general and specific information.

General Information

The general information is provided for each dump and is independent of the error condition. General information includes header entry and address validation data.

Header Entry

Service level identifier.
Supervisor ID.
Supervisor name.
Date the dump was taken.
Dump type.
System status.
Current task.
Owner of LTA and transient name (if active).
DOC screen image buffer (if applicable).
Console message reply status ASYNOC (if applicable).

Address Validation

The program validates addresses during analysis. It checks whether the address is:

- Within the range of high and low limits of the affected areas:
  - Supervisor.
  - Partition.
  - SVA.
- Referenced more than 1000 times.
- Contained in the dump 500 times in one sequence.

When an address is found to be invalid, the address and related information are added to the analysis report. For example:

```
INVALID ADDRESS FF0002 ENCOUNTERED DURING ANALYSIS.
ADDRESS OF: PUB TABLE FROM BG COMREG
```

Specific Information

Specific information included in the report depends on the error situation. The following error conditions can be recognized by the analysis program:

- Hard Wait Condition.
- Soft Wait Condition or System Running Condition (Loop).

Hard Wait Conditions

The following information is always included:

- Wait state code, and
- General purpose registers at the time of the failure.

Depending on the specific hard wait code, the following information is included additionally:

For WAITFFA, WAITFFB, WAITFFF:

- Type of program check.
- Program check address.
- Instruction at the program check address.
- Overwritten instruction information (if applicable).
- Name of transient which caused program check and the displacement within the transient (if applicable).
- Transient areas checked are LTA, PTA, DOC, and RTA.
- Name of the SVA phase which program checked and the displacement within the phase (if applicable).
- 64 bytes of data pointed to by each register.

For WAITFF9, WAITFFE:

- Last device to which a sense was issued.
- Sense data address.
- Sense data.
- 64 bytes of data pointed to by each register.

For WAITFF4:

- Error recovery phase which has not been found.
- Registers at the time of the failure.
- 64 bytes of data pointed to by each register.

For WAITFF8:

- CRT phase which has not been found.
- Registers at the time of the failure.
- 64 bytes of data pointed to by each register.

For WAITFD0:

- IPL cancel code.
- Registers at the time of the failure.
- 64 bytes of data pointed to by each register.

For other Hard Waits:

- Registers at the time of the failure.
- 48 bytes of data pointed to by each register.

Soft Wait Conditions or System Running (Loop) Conditions

All analysis reports for soft wait or a system running (loop) condition, contain the status of all active non-telecommunication devices and all active tasks.

A device is active if:
- It is flagged busy in the PUB table.
- It has a channel queue entry queued to the PUB table.

A task is active if it is not unbatched, stopped, or flagged as not active in the TIB (Task Information Block). Tasks of VSE/POWER are classified as not active if VSE/POWER has flagged the task as waiting for work. The following information is provided:

Device Status Information:
- Device address.
- Device type.
- Task ID of first channel queue entry.
- I/O request status (I/O started or not started).
- Reason I/O not started (CSW stored, intervention; for example).
- CSW from channel queue entry if interrupt has been presented.
- A list of additional tasks with I/O queued for this device.
- The device which last presented an interrupt to the system.

Task Status Information:
- Task name.
- Serviced task name.
- Main task name for subtask.
- Status.
- What the task is waiting for.
- Task information (LTA active, VSE/ICCF interactive partition; for example).
- Subsystems running in the partition.

On the following pages, examples of analysis reports are shown (first page only):
1. Example of Hard Wait Condition.
2. Example of Soft Wait Condition.
3. Example of Running System (Loop) Condition.

Example of Hard Wait Condition

```
DATE DUMP WAS TAKEN:  01/19/95                    DUMP TYPE:  SADUMP
SUPERVISOR ID:  Y-ESA12/15-09.11                  SUPERVISOR NAME:  $$A$SUPX
SYSTEM STATUS:  HARD WAIT                         HARD WAIT CODE:  FFF
CURRENT TASK:  BG MAIN TASK                       BASE PHASE:  NO NAME


HARD WAIT REASON CODE:  24 - PROGRAM CHECK IN SUPERVISOR

PROGRAM OLD PSW INDICATES BC MODE.

PROGRAM CHECK TYPE:  0000 (UNKNOWN TYPE)
ADDRESS OF PROGRAM CHECK:  0000B63C
PROGRAM CHECK INSTRUCTION:  9098028058D0

INSTRUCTION LENGTH CODE ZERO.


SYSTEM STATUS:  HARD WAIT
CURRENT TASK:  BG MAIN TASK                       BASE PHASE:  NO NAME



DEVICE ANALYSIS FOR ACTIVE NON TP DEVICES ONLY:

DEV  TYPE  TSK  I/O REQUEST STATUS AND INFORMATION
---  ----  ---  ------------------------------------------------------------
001  N/A   N/A  LAST I/O INTERRUPT WAS FROM THIS DEVICE
                DEVICE NOT FOUND IN PUB TABLE
(NO BUSY DEVICES AND NO DEVICES WITH I/O QUEUED)



TASK ANALYSIS FOR ACTIVE TASKS ONLY:

TASK NAME     STATUS    TASK INFORMATION
------------  --------  --------------------------------------------------
CST TASK      WAITBND   WAIT FOR I/O OR ECB POST    CCB/ECB ADDRESS: 000000
                        SVC RETRY INDICATOR ON      SVC: 1D (HEX)
T13 TASK      WAITBND   WAIT FOR I/O OR ECB POST    CCB/ECB ADDRESS: 03EBC0
AR TASK       WAITBND   WAIT FOR I/O OR ECB POST    CCB/ECB ADDRESS: 000000
                        SVC RETRY INDICATOR ON      SVC: 1D (HEX)
BG MAIN TASK  WAITBND   WAIT FOR I/O OR ECB POST    CCB/ECB ADDRESS: 403504
                        JOB CONTROL ACTIVE IN THIS PARTITION
                        OCCF SERVICE REQUEST PENDING
  .
  .
  .
```

Figure 19. Hard Wait Analysis Report

Example of Soft Wait Condition

```
DATE DUMP WAS TAKEN:  11/17/94                    DUMP TYPE:  SADUMP
SUPERVISOR ID:  Y-ESA10/27-16.20                  SUPERVISOR NAME:  $$A$SUPX
SYSTEM STATUS:  SOFT WAIT
CURRENT TASK:  BG MAIN TASK                       BASE PHASE:  NO NAME



DEVICE ANALYSIS FOR ACTIVE NON TP DEVICES ONLY:

DEV  TYPE  TSK  I/O REQUEST STATUS AND INFORMATION
---  ----  ---  ------------------------------------------------------------
(NO BUSY DEVICES AND NO DEVICES WITH I/O QUEUED)



TASK ANALYSIS FOR ACTIVE TASKS ONLY:

TASK NAME     STATUS    TASK INFORMATION
------------  --------  ------------------------------------------------------
CST TASK      WAITBND   WAIT FOR I/O OR ECB POST    CCB/ECB ADDRESS: 000000
                        SVC RETRY INDICATOR ON      SVC: 1D (HEX)
T13 TASK      WAITBND   WAIT FOR I/O OR ECB POST    CCB/ECB ADDRESS: 03F1F0
AR TASK       WAITBND   WAIT FOR I/O OR ECB POST    CCB/ECB ADDRESS: 000000
                        SVC RETRY INDICATOR ON      SVC: 1D (HEX)
BG MAIN TASK  WAITBND   WAIT FOR I/O OR ECB POST    CCB/ECB ADDRESS: 403504
                        JOB CONTROL ACTIVE IN THIS PARTITION
                        OCCF SERVICE REQUEST PENDING

SYSDUMP.BG.TEST

NAME = LOCATORS COMPONENT ID =          TYPE = LOCATOR DATA
   .
   .
   .

   .
   .
   .
```

Figure 20. Soft Wait Analysis Report

Example of Running System (Loop) Condition

```
DATE DUMP WAS TAKEN:  01/18/95                    DUMP TYPE:  SADUMP
SUPERVISOR ID:  Y-ESA12/15-09.11                  SUPERVISOR NAME:  $$A$SUPX
SYSTEM STATUS:  RUNNING                           PSW:  040C0000 0001AB0C
CURRENT TASK:  BG MAIN TASK                       BASE PHASE:  CANCTEST

AREA POINTED TO BY PSW:  SUPERVISOR

DEVICE ANALYSIS FOR ACTIVE NON TP DEVICES ONLY:

DEV  TYPE  TSK  I/O REQUEST STATUS AND INFORMATION
---  ----  ---  ------------------------------------------------------------
00E  1403  BG   I/O NOT STARTED, REASON UNKNOWN

TASK ANALYSIS FOR ACTIVE TASKS ONLY:

TASK NAME     STATUS    TASK INFORMATION
------------  --------  ------------------------------------------------------
CST TASK      WAITBND   WAIT FOR I/O OR ECB POST    CCB/ECB ADDRESS: 000000
                        SVC RETRY INDICATOR ON     SVC: 1D (HEX)
T13 TASK      WAITBND   WAIT FOR I/O OR ECB POST    CCB/ECB ADDRESS: 03EBC0
AR TASK       WAITBND   WAIT FOR I/O OR ECB POST    CCB/ECB ADDRESS: 000000
                        SVC RETRY INDICATOR ON     SVC: 1D (HEX)
BG MAIN TASK  READY     READY TO RUN
                        TERMINATOR ACTIVE FOR TASK
```

⋮

⋮

Figure 21. Running System (Loop) Analysis Report

Formatting and Analyzing VSE/ICCF Dump Data

You can format and analyze interactively VSE/ICCF dump data saved on one of the following tapes:

- Stand-alone dump tape.
- Dump tape created with the DUMP command.

To analyze VSE/ICCF dump data, perform the following steps:

1. Access, from the *Problem Handling* panel, the *Dump Program Utilities* panel and select the *Format ICCF Dump Data* dialog.
2. You are requested for the tape address (**cuu**) and the dump type. For the dump type specify:

   1

   (if it is a stand-alone dump)

   2

   (if it is a DUMP command dump)

   VSE/ESA places the output of the job created and submitted in the VSE/POWER list queue.
3. To view and analyze the output use the *Problem Handling* panel and select the *Inspect Dump Management Output* dialog.

   The *List Queue* panel is displayed on your screen.

4. Enter

   ```
   1  (Display)
   ```

   in the option column for the related jobname and press **ENTER**.

   The requested VSE/ICCF information is displayed on your screen for analysis. To interpret the data shown, VSE/ICCF skill is required.

Using the Info/Analysis Program in Native Mode

The VSE/ESA dialogs for dump processing create job streams which invoke the Info/Analysis program for dump analysis. In addition, you can use the Info/Analysis program as described below.

Using the Info/Analysis Program in Batch Mode

You run Info/Analysis in a VSE/ESA partition and invoke its functions via control statements. These can be entered either from the system console or from SYSRDR. The output goes to SYSLST. For a detailed description of the functions available see “Info/Analysis:Introduction” in the manual *VSE/ESA Diagnosis Tools*.

Using the DOSVSDMP Program

With the DOSVSDMP utility program you can create unformatted dump printouts directly from tape or disk. This is required if a stand-alone dump file is too big to fit into any of the existing dump sublibraries. DOSVSDMP can also be used for printing the output of the SDAID program and for scanning the contents of a dump tape or dump file on disk. For details, refer to “The DOSVSDMP Utility” in the manual *VSE/ESA Diagnosis Tools*.

Handling CICS Transaction Dumps

When a CICS transaction comes to an abnormal end, a transaction dump is taken. In VSE/ESA, the Online Problem Determination program is activated as well. It collects error data and determines the cause of the error. For most errors the program is able to determine the cause of it. But for certain error situations the Online Problem Determination program may not be able to do that. The transaction dump is then the only data available for error diagnosis.

A transaction dump shows all the CICS areas related to the transaction that abended. Among them:

- The task control area (TCA).
- The common system area (CSA).
- The terminal control table (TCT).
- Transaction storage.
- Program Storage.

Analyzing a transaction dump requires a good knowledge of the CICS Transaction Server. Before you can analyze a transaction dump you have to print it.

Printing a CICS Transaction Dump

A transaction dump resides in the CICS Transaction Server dump file. The dump file is split into the DFHDMPA and DFHDMPB file. One of the two files is active, the other inactive. The CICS Transaction Server always writes a transaction dump into the active file. However, you can only print a dump stored in the **inactive** file. If more than one dump is stored there, all the dumps are printed. This may cause

a problem for identifying a particular dump. For that reason, consider printing a dump as soon as it has been created. To print a dump, select the CICS master terminal function (CEMT) from the *System Status* panel and enter:

```
INQUIRE DUMP
```

Find out whether the dump you want to print is in the active file. If so, set it inactive by switching the two files. Enter:

```
SET DUMP SWI
```

VSE/ESA provides jobs in the VSE/POWER reader queue for printing:

Job **PRTDUMPA** for printing file DFHDMPA.
Job **PRTDUMPB** for printing file DFHDMPB.

If these jobs were accidentally removed, modify and use skeleton SKCOLD to reload them into the VSE/POWER reader queue. Refer to the manual *VSE/ESA Administration* for details about skeleton SKCOLD.

Notes:

1. If you try to print the active file, the CICS Transaction Server may abend.
2. When switching the dump file, the contents of the new active dump file is erased.
3. If you have a CICS Coexistence Environment, to print the dump files under CICS/VSE you must use:

   Job **PRTDUCOA** for printing file DFHDMPA.
   Job **PRTDUCOB** for printing file DFHDMPB.

Analyzing a CICS Transaction Dump

To analyze a transaction dump, select, from the *Problem Handling* panel, option 3: *Storage Dump Management* and enter

```
9  (Analyze CICS dump)
```

Note that the partition size must be at least 4MB.

Chapter 7. Handling Resource Constraint Conditions

This chapter describes how to handle **resource full conditions** and **partition size** constraints.

Full Conditions

System storage areas may now and then reach their storage capacity. If a system file, for example, has reached its limit, it is no longer available to the system. However, VSE/ESA system files are created with sufficient space to satisfy the needs of the majority of VSE/ESA users.

This chapter describes what to do when such an exceptional situation occurs. It points to warning signals so that you can take measures before a full condition becomes a reality.

VSE/POWER File Full Condition

A full condition may be caused by the queue file, the data file, or the account file. The queue file holds pointers to areas on the data file where the data elements are stored. The account file is used for saving account information.

VSE/POWER maintains and uses the following queues:

- The RDR (reader) queue which holds jobs submitted for execution in a batch partition.
- The LST (list) queue which holds temporarily printer output that has not yet been printed on an actual printer.
- The PUN (punch) queue which holds temporarily punch output. This output can be read into a VSE/ICCF member. Also, members being exchanged between interconnected systems are stored in the punch queue of the receiving system.
- The XMT (transmit) queue which holds temporarily job streams and files to be exchanged between interconnected systems.

Any new element stored in a queue or in the account file may lead to a full condition. If this happens, the program trying to store something in a queue or in the account file goes into a wait. The system issues messages such as:

```
1Q38I  NO DASD SPACE AVAILABLE FOR task,cuu
1Q32A  NO MORE ACCOUNT FILE (IJAFILE) SPACE FOR task,cuu
1QF4I  NO FREE QUEUE RECORD AVAILABLE FOR task,cuu
```

When using one of the VSE/ESA *Manage Batch Queues* dialogs, a display station user may get a message that the queue file is not accessible. If this happens, go to the system console to either delete or print the job.

Preventive Measures

To avoid a full condition, keep track of the amount of VSE/POWER space available. Enter:

```
D Q
```

The system responds with the following messages:

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```
1R49I  nnnnn FREE QUEUE RECORDS - QUEUE FILE nnn% FULL
1R49I  nnnnnnnnn FREE DBLK GROUPS - DATA FILE nnn% FULL
1R49I  CURRENT DBLK SIZE=nnnnn, DBLK GROUP SIZE=nnnnn
1R49I  ACCOUNT FILE nn% FULL
1QF0I  DATA FILE nnn% FULL - QUEUE FILE mmm% FULL
```

If you notice critical values, consider doing the following:

- Start printer if it has not been started yet.
- Delete queue entries that are no longer needed.
- If possible, set in hold those jobs that produce a lot of print output.
- Use the POFFLOAD command to save entries from a queue and reload them later.

Handling a VSE/POWER File Full Condition

If a **data** or **queue** file full condition occurs, space is or can be made available as follows:

1. Automatically.

   Space is made available whenever the system removes a queue entry. For example, when a print operation finishes, the space occupied by the segment which was just printed is freed for reuse. Similarly, when a job finishes execution, the RDR queue entry and its space are freed, or when network transmission is completed, the XMT queue entry and its space is released. The VSE/POWER task or the program which encountered the full condition resumes processing.

2. Through operator action.

   You can clear the condition yourself. Scan the VSE/POWER queues for any data no longer needed. If the LST queue has output which will not be printed, delete it from the queue. If possible, release print output that you may have kept in hold status up to now.

   You may also use the POFFLOAD command to save entries from VSE/POWER queues on tape and reload them later. Consult the manual *VSE/ESA Operation* for details on the POFFLOAD command.

   When a **looping program** produces excessive output, you cannot completely recover simply by deleting something from the queue. In this situation, you have to cancel the partition (pp in the commands below) where the looping program is running. First try the

   ```
   PFLUSH pp
   ```

   command. If this does not lead to a cancelation, try:

   ```
   CANCEL pp,NODUMP
   ```

   If this command does not work either, try:

   ```
   RC
   15 CANCEL pp,NODUMP
   ```

   15 is the reply ID from the system response to the RC command. If you do not succeed in canceling the partition, take a stand-alone dump. Refer to “Taking a Stand-Alone Dump” on page 115 for details. Then re-IPL the system.

3. By extending the VSE/POWER files.

   For details, refer to “Extending the Space for the VSE/POWER Files” on page 99 below.

If the VSE/POWER **account file** causes a full condition, use the PACCOUNT command for removing the condition. For details about the PACCOUNT command, refer to the manual *VSE/ESA Operation*.

Extending the Space for the VSE/POWER Files

Refer to the manual *VSE/ESA Administration* which shows a sample job stream and describes the related tasks in detail under "Extending VSE/POWER Files".

Note: The VSE/POWER queue file should normally be designed for about 500-1000 queue file records. For performance reasons, excessive queue file space is not recommended.

Hardcopy File Full Condition

The system writes to the hardcopy file **any message** (each line of text) that appears on the system console screen. When 80 percent of the hardcopy file space is occupied, the system issues the following message:

```
0D20E  HARD COPY FILE SHOULD BE PRINTED
```

When this message appears on the system console, print the hardcopy file. A hardcopy file printout is essential for any error diagnosis. For details on printing the hardcopy file refer to "Printing the Hardcopy File" on page 107.

If you fail to notice the above message, the system will alert you once more. Message

```
0D25E  HARD COPY FILE IN OVERLAY MODE
```

is displayed if all available space has been used up. At that point, further recording of console messages continues at the beginning of the hardcopy file. As a result, the oldest part of the file is overwritten. You can still print what is left of the old file contents.

Recorder File Full Condition

The system writes information about **hardware (device) errors** to the recorder file. As more and more information accumulates, space on the recorder file may be exhausted. When this occurs, recording of error information is suspended and the following message is issued:

```
0T05E  RECORDER FILE FULL. RUN EREP
```

You may continue running your system. But you should run the EREP program as soon as possible to save and clear the recorder file. Afterwards, delete message 0T05E from the system console screen. Move the cursor to the message line and press ENTER. This enables the system to continue recording device errors.

For further information refer to "Printing the Recorder File" on page 107.

Preventive Measures

You can keep track of the amount of space available on the recorder file. During IPL, after the first job starts running, the following message appears:

```
1I93I RECORDER FILE IS nnn% FULL [RUN EREP]
```

Watch out for this message or check your latest listing of the hardcopy file for this message. **If the recorder file becomes full, no further recording is done**. This may cause the loss of information essential for error diagnosis.

VSE/VSAM Space Full Condition

A VSE/VSAM space full condition may be caused by one of the following:

- A new file or library is being created but the space available is insufficient for primary allocation.
- During processing, VSE/VSAM tries to allocate additional space to a file or library. But the space available is insufficient for a secondary allocation.

Note: VSE/VSAM allocates additional space according to the value specified for secondary allocation. For the first allocation on a volume, VSE/VSAM always uses the value specified for primary allocation.

From time to time, monitor the system's use of VSE/VSAM space. Try to prevent VSE/VSAM from reaching a situation where no more space is available. A job affected by a shortage of VSE/VSAM space is canceled. Use the Interactive Interface of VSE/ESA to monitor space utilization. From the *File and Catalog Management* panel select the *Display or Process a Catalog, Space* dialog. Select option:

```
1  (Show Space)
```

The display shows, for the catalog specified, the values of the catalog space and of the data space(s) per volume. Figure 23 on page 110 shows a sample display. For further details on monitoring VSE/VSAM space refer to "Displaying VSE/VSAM Space Usage" on page 110.

You can increase the amount of available VSE/VSAM space by performing one of the following tasks:

- Deleting files.
- Defining additional VSE/VSAM space.

Deleting VSE/VSAM Files

You may delete VSE/VSAM files no longer needed. Access the *File and Catalog Management* panel and select:

```
1  (Display or Process a File)
```

You get a fulist of the files managed by the catalog specified. Select the DELETE option for the file you want to delete. The manual *VSE/ESA Programming and Workstation Guide* describes the dialog in detail under "Display or Process a File".

You may also save files on tape and delete them afterwards. Save important files twice on different tapes. To save files on tape, access the *Backup/Restore VSAM Objects* panel and select the

```
3  (Backup VSAM File)
```

dialog. The manual *VSE/ESA Operation* describes the dialog in detail under "Backing Up VSE/VSAM Files".

Defining Additional VSE/VSAM Space

From the *File and Catalog Management* panel select the *Display or Process a Catalog, Space* dialog. Select the DEFINE SPACE option. With this option you can assign free space on a volume to VSE/VSAM. For details about the dialog, refer to the *VSE/ESA Administration* manual under "Displaying or Processing a Catalog or Space".

VSE/VSAM User File Full Condition

This condition occurs if a file reaches the maximum of 123 possible secondary allocations. You must redefine the file and increase the values for primary and secondary allocations. Proceed as follows:

1. Save the file on tape.

   Save an important file twice on different tapes. To save a file, select the COPY option of the "Display or Process a File" dialog. The manual *VSE/ESA Programming and Workstation Guide* describes the dialog in detail.

2. Delete the file.

   From the *File and Catalog Management* panel select the "Display or Process a File" dialog. Select the DELETE option for the file to be deleted. The manual *VSE/ESA Programming and Workstation Guide* describes the dialog in detail.

3. Define a new file.

   From the *File and Catalog Management* panel select the "Define a New File" dialog. Select larger values for the primary and secondary allocations of the file. The new primary allocation should be at least as large as the original primary allocation plus all original secondary allocations. For further details about the dialog, refer to the manual *VSE/ESA Administration*.

4. Restore the file from tape.

   To restore the file, select the COPY option of the "Display or Process a File" dialog as you did when saving the file. The manual *VSE/ESA Programming and Workstation Guide* describes the dialog in detail.

VSE/VSAM User Catalog Full Condition

With the LISTCAT function of VSE/VSAM or with the dialog *File and Catalog Management* you must first determine the contents of the catalog. Proceed as follows:

1. Save all VSE libraries managed by the catalog by using the BACKUP function of the Librarian program.
2. Save the remaining VSE/VSAM files by using the BACKUP function of VSE/VSAM.
3. Now delete all files in the catalog and also the VSE/VSAM space. Be aware of the fact that system files cannot be erased by using the dialogs. For such files, the generated jobs have to be modified and submitted for processing. It is also not possible to erase files that are currently in use.
4. When all files and spaces associated with the catalog have been deleted, the corresponding catalog can be deleted and redefined with new values.
5. Next you have to redefine the libraries and restore their contents by using the Librarian program LIBR.
6. Finally, restore the remaining VSE/VSAM files by using the RESTORE function of VSE/VSAM. If system files are contained in the catalog, you should not use the Interactive Interface until all files have been restored. The same is true for other applications, which means that the applications should not be used until the catalog has been completely repaired.

Non-VSE/VSAM User File Full Condition

If one of your non-VSE/VSAM files becomes full, you can extend the space defined for it as follows:

1. Use the *Display VTOC* dialog to obtain disk volume information needed for extending space. For details on the dialog, refer to "Displaying the Table of Contents (VTOC) of a Disk Volume" on page 112.

2. Save the file on tape.

   Save an important file twice on different tapes. Use the DITTO/ESA for VSE program which is part of VSE/ESA.
3. Update the label area information by enlarging the EXTENT values as required.
4. Restore the file from tape.

   Use the DITTO/ESA for VSE program which is part of VSE/ESA.

   Note: VSE/ESA provides the application profile IESDITTO. Adding this profile to a selection panel for a user provides access to DITTO via the Interactive Interface.

   Consult also the DITTO/ESA for VSE documentation.
5. Do not forget to update label procedure STDLABUS.

VSE Library Space Full Condition

Monitor your libraries to detect a possible full condition before it occurs. Use the Librarian command LISTD to create a listing of the library directory. This listing indicates how many blocks or tracks are occupied by a particular library. For details on the LISTD command refer to "LISTD Librarian Command" on page 118. When a library is full, the system issues one of the following messages:

```
L201I  LIBRARY xx...xx IS FULL

L268I  MAXIMUM NUMBER OF EXTENTS (16) ALLOCATED TO LIBRARY
       xx...xx - NO FURTHER EXTENSION POSSIBLE

L278I  VSAM DATA SPACE EXHAUSTED WHEN ATTEMPTING TO EXTEND
       LIBRARY xx...xx
```

Try to regain library space by:

1. Deleting library members, **if possible**. Use the DELETE command of the Librarian program LIBR. For details, refer to "Delete a Library, Sublibrary, or a Member" in the *VSE/ESA Guide to System Functions*. Before you issue the DELETE command, ensure that no library members are deleted which are still being shared and used by another partition or CPU.
2. Issuing the Librarian RELEASE command. This should be done if the library directory shows a substantial value for DELAYED SPACE. Create a library directory listing with the LISTD command to find out about delayed space.

   For details about the LISTD command, refer to "LISTD Librarian Command" on page 118.

   For details about the RELEASE command, refer to "Release Space for a Library or Sublibrary" in the *VSE/ESA Guide to System Functions*.

If you cannot regain space in this way, you have to extend the library space. You must distinguish between libraries in VSE/VSAM and non-VSE/VSAM managed space.

Extending a User Library in VSE/VSAM Managed Space

VSE/VSAM Space Exhausted: Message **L278I** indicates that no more VSE/VSAM space is available for secondary allocations. To extend the VSE/VSAM space, access the *File and Catalog Management* panel and select the "Displaying or Processing a Catalog or Space" dialog. Select the DEFINE SPACE option. With this option you can assign free space on a volume to VSE/VSAM. For details about this dialog, refer to the *VSE/ESA Administration* manual.

Secondary Allocations for Library Exhausted: Message **L268I** indicates that the maximum number of 16 secondary allocations has been reached. To regain library space, you must perform a backup/restore run and specify new values for the primary and secondary allocations of the library. Proceed as follows:

1. Save the library on tape. Save an important library twice on different tapes. Access the *Backup/Restore Library Objects* panel. Select the dialog:

   ```
   1  (Backup VSE Library on Tape)
   ```

   For further details about this dialog, refer to the manual *VSE/ESA Operation* under "Backing Up VSE Libraries".
2. Delete the library.

   Use the Librarian program LIBR and create a job stream to delete the library.

   Refer to "Delete a Library, Sublibrary, or a Member" in the *VSE/ESA Guide to System Functions*.
3. Delete the file definition.

   From the *File and Catalog Management* panel select the "Display or Process a File" dialog. Select the DELETE option to delete the VSE/VSAM file definition for the library. For details about this dialog, refer to the *VSE/ESA Programming and Workstation Guide* manual.
4. Define a new library.

   From the *File and Catalog Management* panel select the "Defining a Library" dialog. Select larger values for primary and secondary allocation. The new primary allocation should be at least as large as the original primary allocation plus 16 times the original secondary allocation. For further details about the dialog, refer to the manual *VSE/ESA Administration*.
5. Restore the library from tape.

   Access the *Backup/Restore Library Objects* panel. Select the dialog:

   ```
   2  (Restore VSE Library from Tape)
   ```

   For details about this dialog, refer to the manual *VSE/ESA Operation* under "Restoring VSE Libraries".

Extending a User Library in Non-VSE/VSAM Managed Space

Message **L201I** is issued if a library full condition occurs. For libraries in VSE/VSAM managed space, additional messages appear. If message L201I appears alone, it indicates that a library in non-VSE/VSAM space is full.

VSE/ESA provides skeleton SKLIBEXT for extending such a library. Refer to the manual *VSE/ESA Administration* under "Extending a VSE User Library in Non-VSE/VSAM Space" for details about the skeleton.

Use the *Display VTOC* dialog to obtain disk volume information needed for extending the library space. Refer to "Displaying the Table of Contents (VTOC) of a Disk Volume" on page 112 for details about the dialog.

VSE/ICCF DTSFILE Full Condition

All VSE/ICCF libraries are part of the **DTSFILE**. During startup, a message informs you of the DTSFILE space status:

```
K088I  HI FILE RECORDS=nnn (mm%)
```

The nearer the value of mm is to zero, the less space is available.

Handling Full Conditions

If the space limit of the DTSFILE has been reached, the following VSE/ICCF message is displayed at a user display station:

```
*LIBRARY FILE IS FULL
```

As a short term solution, a display station user might try to purge library members owned (using the /PURGE command). Other users might do the same and delete members that are no longer needed.

As a long term solution, increase the amount of space that is allocated to the DTSFILE.

VSE/ESA provides skeleton SKDTSEXT for extending the DTSFILE. *VSE/ESA Administration* describes the skeleton and the related tasks in detail under "Using Skeleton SKDTSEXT".

Dump Library Full Condition

The system uses the dump library for storing partition or system dumps created by the system or requested by the operator. If many dumps are produced, during program testing for example, the dump library may become full.

You can remove that condition by deleting dumps no longer needed or by saving dumps on tape. For details on saving dumps on tape interactively refer to "Using the Interactive Interface for Dump Processing" on page 70.

System Library (IJSYSRS.SYSLIB) Full Condition

In a **DASD-sharing environment**, VSE/ESA saves system control information in IJSYSRS.SYSLIB during startup. The members created by VSE/ESA are deleted but the space occupied is not released. This may eventually cause a full condition. To avoid it, perform a MINI startup from time to time and issue the librarian RELEASE command for system library IJSYSRS.SYSLIB.

Partition Size Constraints

Changing VSE Partition Allocations

Each VSE partition is split into two parts:

- A "SIZE" part which is used primarily to hold the programs that are being executed.
- A "GETVIS" part where programs reserve dynamically temporary buffer space during processing.

The partitions of your VSE/ESA system have been allocated according to the environment chosen during initial installation. It may happen that a program needs more partition space than allocated. The system informs you by issuing messages. For example:

```
0S00I  xx name CANCELED
0P77I  INVALID STORAGE ADDRESS
4879I  GETVIS FAILED RC=001
1Q26I  GETVIS AREA TOO SMALL
```

A frequent occurrence of message

```
1Q85I  task,cuu WAITING FOR VIRTUAL STORAGE, xxxxxxxx BYTES REQUESTED
```

also indicates a lack of GETVIS storage.

VSE/ESA provides skeletons (SKALLOCx) to let you tailor the static partition allocations. The manual *VSE/ESA Administration* describes the skeletons in detail under "Skeletons for Static Partition Allocations". For dynamic partitions, you must update the dynamic class table described in the same manual.

Changing Interactive Partition Allocations

If there is a need to change the size of your interactive partitions, you must tailor VSE/ICCF with new size values. VSE/ESA provides a skeleton (SKICFGEN) that helps you perform this task. The manual *VSE/ICCF Administration and Operation* describes skeleton SKICFGEN.

Chapter 8. Using Utilities and Commands

In the following sections several job streams are shown. As documented, these job streams are to be run in the BG partition. Note, however, that these job streams can be run in any batch partition of your system.

Printing the Hardcopy File

The system writes to the hardcopy file each line that appears at the system console.

During processing there may be a need to print the hardcopy file or parts of it. For example, the hardcopy file becomes full. You should then print its contents before it is overwritten (see "Hardcopy File Full Condition" on page 99). Also, there may be a need to check what happened during the day so far or which messages were issued for a certain partition. A printout of selected data from the hardcopy file provides that information.

To request a printout of the hardcopy file, proceed as follows:

1. Type // EXEC PRINTLOG and press ENTER. The following message appears on the screen:

   ```
   ENTER OPTIONS FOR PRINTLOG OR ? FOR A LIST OF OPTIONS
   ```

   By entering a ?, the following list of options is displayed:

   ```
   VALID OPTIONS:          (CHOOSE MAX ONE OF EACH LINE)

   ALL OR NEW              TOTAL FILE OR ONLY NEW RECORDS
   CMD, IPL, AR, BG, F1... COMMANDS, IPL-MSGS OR PARTITION ID
   A, S OR N               ACTION, SUPPRESSED OR 'NETVIEW' RECORDS
   JOBNAME=NAME            ONLY RECORDS OF THAT JOB
   MM/DD/YYYY              ONLY RECORDS OF THAT DATE
   ```

2. Select the desired options and enter them. The options must be separated by commas; intervening blanks are not permitted.

   You may enter a null line (just press ENTER). The system then uses the option **ALL** by default.

Refer to the manual *VSE/ESA System Utilities* for further details about the PRINTLOG utility and the options available.

Printing the Recorder File

Whenever a hardware error occurs, the system writes error information into the recorder file. With the **Environmental Recording, Editing and Printing (EREP)** program you can produce reports based on this error information.

You are not expected to interpret these reports. They are intended for use by IBM's service personnel who will instruct you to provide a particular report.

The EREP program produces two types of reports:

1. Statistics of device failures, tailored to each device type. Here the input is the original recorder file, that is: still on disk. This type of report should be produced right after the device malfunction became apparent.

   How to request a particular EREP report, is described in the manual *EREP User's Guide*.

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2. All records of the recorder file.

   Input to the EREP program is a magnetic tape. This tape is created by copying the recorder file (from disk) to tape.

You should save the information stored in the recorder file if you have a full condition. Proceed as follows:

1. If you want to perform POWER OFF or IML after running the EREP program, you should first issue the ROD command. Otherwise, go directly to step 2.

   The ROD command saves specific hardware information that might otherwise be lost. Enter at the system console:

   ```
   R RDR,PAUSEBG
   0 ROD
   ```

   0 is the partition ID.

2. To invoke EREP, enter the following job stream at the system console:

   ```
   R RDR,PAUSEBG
   0 // TLBL HISTOT
   0 // ASSGN SYS009,cuu
   0 // EXEC IFCOFFLD,SIZE=AUTO
   ```

   where 0 is the BG partition ID. The TLBL and ASSGN statement define the tape on which the recorder file is saved. *cuu* is the tape unit.

   The job stream does the following:

   - It creates a system summary report of the data stored in the recorder file. The system summary report is printed on SYSLST.
   - It writes the contents of the recorder file to the tape defined.
   - It reinitializes the recorder file.

Displaying VSE/VSAM File Information Online

As a VSE/ESA user you can display file information directly at a user display station. Proceed as follows:

1. Select the *File and Catalog Management* panel.
2. From it, select the *Display or Process a File* dialog.

   You get a FULIST display of the files stored under the catalog name displayed. The catalog name displayed is user-profile defined. Usually, the catalog name displayed is the master catalog (IJSYSCT). You can change that name if your file is defined in another catalog.

3. The FULIST display you get identifies the files by **file ID** and **file name**. Enter

   ```
   1  (Show)
   ```

   in the option column for the file you are looking for. You get a display similar to that shown in Figure 22 on page 109.

Use **PF10** to display space information for a particular file.

```
File Attributes:        Attribute Values:

FILE ID:                CICS.CSD
FILE NAME:              DFHCSD
CATALOG NAME:           VSESPUC

FILE ORGANIZATION:      2          1=Non keyed  (ESDS)  3=Numbered   (RRDS)
                                   2=Keyed      (KSDS)  4=Numbered   (VRDS)
                                                        5=Sequential (SAM ESDS)

FILE ADDRESSABILITY:    1          1=Not Extended       2=Extended  (KSDS only)

FILE ACCESS:            2          1=Multiple Read OR Single Write
                                   2=Multiple Read AND Single Write
                                   3=Multiple Read AND Write (no integrity)
                                   4=Multiple Read AND Write (with integrity)

FILE USAGE:             1          1=File is used as a Data File (NOREUSE)
                                   2=File is used as a Work File (REUSE)


CREATION DATE:             1998253
EXPIRATION DATE:           0000000

ALLOCATION UNIT:           2         1=Cylinder, 2=Track, 3=Block
PRIMARY ALLOCATION:        12
SECONDARY ALLOCATION:      4
AVERAGE RECORD SIZE:       120
MAXIMUM RECORD SIZE:       500
KEY LENGTH:                22
KEY POSITION:              0         Position 0 starts at the beginning
```

Figure 22. Example of a File Information Display

Printing the Contents of a VSE/VSAM File

You can print the contents (records) of a VSE/VSAM file on the system printer. Proceed as follows:

1. From the *File and Catalog Management* panel select the *Display or Process a File* dialog.

   You get a FULIST display of the files stored under the catalog name displayed. You may change the catalog name in the *File and Catalog Management* panel.

2. Enter

   3 (Print)

   in the option column for the file you are looking for. You can now specify the characteristics of your printout:

   - Print format (character, hexadecimal, or both)
   - Print entire or partial file.

     If you choose 'partial', you can start printing with a particular key (KSDS files only) or with a particular record number. You stop printing by specifying the last key (KSDS files only) or the number of records (last record number for RRDS files).

You can submit the job stream created by VSE/ESA immediately or later. The job stream is saved as member F$xxxx in your primary VSE/ICCF library, where xxxx is your user ID.

The output is stored in the VSE/POWER List Queue. As long as the output is in the List Queue you can display it on your screen before it is printed on the system printer.

Displaying VSE/VSAM Space Usage

You can monitor how VSE/ESA uses the space defined for VSE/VSAM files. This information is stored in the VSE/VSAM catalog(s). To obtain a display, proceed as follows:

- From the *File and Catalog Management* panel select the *Display or Process a Catalog, Space* dialog.

  You get a FULIST display of the VSE/VSAM catalogs.
- Enter

  1 (Show Space)

  in the option column for the catalog you are looking for. You get a display similar as that shown in Figure 23.

```
CATALOG:   VSESP.USER.CATALOG                                VSESPUC

                                          BLOCKS / TRACKS
                 VOLID   TYPE         ALLOCATED   USED     FREE

CATALOG SPACE:   SYSWK1  3380             150      150        0

DATA SPACE(S):   DOSRES  3380            2010      684     1326
                 SYSWK1  3380             975      842      133
```

Figure 23. Example of VSE/VSAM Space Usage Display

Your VSE/VSAM space is most likely distributed over several volumes. To determine the free space available for extension on a particular volume, you need the information provided by a VTOC display. Refer to "Displaying the Table of Contents (VTOC) of a Disk Volume" on page 112 for details.

Printing a VSE/VSAM Catalog

A printout of a VSE/VSAM catalog gives you detailed information about the volumes, VSE/VSAM space, and VSE/VSAM files stored on disk devices. For example:

- Creation date.
- Key length (if applicable).
- Record length (average and maximum).
- Statistics
  - Total number of records in the file.
  - Number of records deleted.
  - Number of records inserted.
  - Number of records updated.
- Number of blocks (cylinder/tracks) allocated.
- Disk areas ('extents') used for the allocation.

To obtain a printout, proceed as follows:

1. From the *File and Catalog Management* panel select the *Display or Process a Catalog, Space* dialog. You get a FULIST display of the VSE/VSAM catalogs.
2. Enter

   ```
   3  (Print Catalog Contents)
   ```

   in the option column for the catalog you are looking for.

   You can submit the job stream created by VSE/ESA immediately or later. The job stream is saved as member F$xxxx in your primary VSE/ICCF library, where xxxx is your user ID. You can change the member name assigned by the system.

   The output is stored in the VSE/POWER List Queue. As long as the output is in the List Queue you can display it on your screen before it is printed on the system printer (SYSLST).

The printout is a detailed account of **all VSE/VSAM files** and **all volumes** that hold VSE/VSAM files related to the catalog specified. Look for the serial numbers of those volumes that contain your VSE/VSAM files. The following figure shows a volume portion of a catalog printout. The volume serial number is SYSWK7. For CKD disk devices you get a similar printout. The space unit is then a TRACK instead of a BLOCK.

```
 ...
CLUSTER ------- CICS.AUTO.STATS.A
 ...
CLUSTER ------- CICS.AUTO.STATS.B
 ...
VOLUME  ------- DOSRES
 ...
VOLUME  ------- SYSWK1
 ...
VOLUME  ------- SYSWK7
     HISTORY
       RELEASE-------4
     CHARACTERISTICS
       BLKS/MIN-CA------62   DEVTYPE--------------FBA
       BLKS/MAX-CA-----744   VOLUME-TIMESTAMP          MAX-EXT/ALLOC ...
       BLOCKS/VOL---558000        X'97CCA9C6436C0000'
     DATASPACE
       DATASETS---------16   FORMAT-1-LABEL            ATTRIBUTES
       EXTENTS-----------1   RRNUM-----------------7   SUBALLOC
       SEC-ALLOC---------0   TIMESTAMP                 EXPLICIT
       TYPE----------BLOCK        X'929BC705FEB60000'
       CLASS-------------0
       EXTENT-DESCRIPTOR
       BLOCKS-TOTAL--19964   BEG-BLOCK---------130014   SPACE-MAP ...
       BLOCKS-USED----8432
       DATASET-DIRECTORY

         DSN---CMASTR.BASE.DATA                         ATTRIBUTES
         DSN---CMASTR.BASE.INDEX                        ATTRIBUTES
                  .                                         .
                  .                                         .
 ...
```

Figure 24. Portion of a VSE/VSAM Catalog Printout

Displaying the Table of Contents (VTOC) of a Disk Volume

A VTOC display helps you determine the following for a particular disk volume:
- Free space.
- Files stored.
- Volume layout.

To get a VTOC display, proceed as follows:

1. From the *Resource Definition* panel select the *Display VTOC* dialog. You get a FULIST display of the volumes attached.
2. In the option column enter one of the following options for the volume you are looking for:

   1 (Free Space)

   2 (Files List)

   3 (Volume Layout)

You get displays similar as those shown on the following pages.

Free Space Display

```
IESADMFREC             VOLUME FREE SPACE INFORMATION             Page  1 of  1
VOLUME: DOSRES               ADDRESS: 150              TYPE: 3380

TOTAL NUMBER OF TRACKS:  13259       FREE TRACKS:    893        94 % FULL

  BEGIN          END            EXTENT          RESERVED FOR
 CYL  TRK       CYL  TRK      RELTRK  NUMTRKS      SYSTEM USE

   67  8         67 14         1013       7           *
  210  0        210 10         3150      11           *
  392 10        408 14         5890     245           *
  842  0        883 14        12630     630
```

Figure 25. Example of a VTOC Free Space Display

Note: To get correct free space values in a VTOC listing, all files must have been opened. The space of a file that has not been opened is shown as free space.

Files List Display

```
IESADMLSTC                   VOLUME FILES LIST                    Page  1 of  1
VOLUME: DOSRES              ADDRESS: 150              TYPE: 3380

                                                    BEGIN     END      EXTENT
FILE ID                                        SEQ  CYL TRK  CYL TRK RELTRK NUMTRK
1...5...10...15...20...25...30...35...40....
***     VTOC EXTENT      ***                    0   210 11   210 14   3161      4
DOS.LABEL.FILE.FF0681759672.AREA1              0    64  0    66 14    960     45
DOS.PAGING.FILE.FF0681759672                   0   414  0   457 14   6210    660
                                               1   458  0   841 14   6870   5760
VSE.POWER.QUEUE.FILE                           0    67  0    67  7   1005      8
VSE.SYSRES.LIBRARY                             0     0  1    63 14      1    959
VSE.SYSTEM.HISTORY.FILE                        0   409  0   413 14   6135     75
Z9999992.VSAMDSPC.TB108E9D.T349072C            0   211  0   392  9   3165   2725
Z9999992.VSAMDSPC.TB108E9D.T70AF620            0    76  0   209 14   1140   2010
Z9999996.VSAMDSPC.TB108E9D.T20E4BE4            0    68  0    75 14   1020    120



PF1=HELP                     3=END        4=RETURN
                             9=SRT.BEGIN 10=SRT.NAME
```

Figure 26. Example of a VTOC Files List Display

Volume Layout Display

```
IESADMLAYC                     VOLUME LAYOUT                      Page  1 of  2
VOLUME: DOSRES                ADDRESS: 150               TYPE: 3380

                                                  BEGIN     END     NUMBER SYSTEM
VTOC ENTRY                                       CYL TRK   CYL TRK  OF TRKs  USE
1...5...10...15...20...25...30...35...40....
VSE.SYSRES.LIBRARY                                 0  1     63 14     959    *
DOS.LABEL.FILE.FF0681759672.AREA1                 64  0     66 14      45    *
VSE.POWER.QUEUE.FILE                              67  0     67  7       8    *
***     FREE EXTENT      ***                      67  8     67 14       7    *
Z9999996.VSAMDSPC.TB108E9D.T20E4BE4               68  0     75 14     120    *
Z9999992.VSAMDSPC.TB108E9D.T70AF620               76  0    209 14    2010    *
***     FREE EXTENT      ***                     210  0    210 10      11    *
***     VTOC EXTENT      ***                     210 11    210 14       4    *
Z9999992.VSAMDSPC.TB108E9D.T349072C               211  0    392  9    2725    *
***     FREE EXTENT      ***                     392 10    408 14     245    *
VSE.SYSTEM.HISTORY.FILE                           409  0    413 14      75    *
DOS.PAGING.FILE.FF0681759672                      414  0    457 14     660    *
DOS.PAGING.FILE.FF0681759672                      458  0    841 14    5760    *

PF1=HELP                     3=END        4=RETURN
               8=FORWARD
```

Figure 27. Example of a VTOC Volume Layout Display

Listing I/O Assignments

The listing shows the device I/O assignments per partition. The output device can be the system console (SYSLOG) or SYSLST.

To request the listing on SYSLOG, enter the following commands at the system console:

```
R RDR,PAUSEBG
0 LISTIO ALL
```

where 0 is the BG partition ID. If using the command in the format // LISTIO, the output is directed to SYSLST. For further details refer to "LISTIO (Query I/O Assignments)" in the manual *VSE/ESA System Control Statements*.

Printing Label Information

Some error messages recommend to list label information. Use the LSERV program for that purpose. The output shows the relation between the DLBL and EXTENT statements. At the system console, enter the following :

```
R RDR,PAUSEBG
0 // EXEC LSERV
```

VSE/ESA stores the output in the VSE/POWER list queue. When displaying the output, you get a panel similar as that shown in Figure 28.

```
IJQFILE
       FILE IDENTIFIER                          VSE.POWER.QUEUE.FILE
       FILE SERIAL NUMBER                       DOSRES
       VOLUME SEQUENCE NUMBER                   01
       CREATION DATE                            OMITTED
       EXPIRATION DATE                          1999/365
       FILE TYPE                                DIRECT ACCESS
  EXTENT INFORMATION
       EXTENT SEQUENCE NUMBER                   000
       EXTENT TYPE                              1 (PRIME DATA)
       RELATIVE START ADDRESS IN TRACKS/BLOCKS  055862
       NUMBER OF TRACKS/BLOCKS                  372
       SYMBOLIC UNIT                            SYS001  LOGICAL UNIT
       VOLUME SERIAL NUMBER                     DOSRES

PRD1
       FILE IDENTIFIER                          VSE.PRD1.LIBRARY
       FILE SERIAL NUMBER                       DOSRES
       VOLUME SEQUENCE NUMBER                   01
       CREATION DATE                            OMITTED
       EXPIRATION DATE                          1999/365
       FILE TYPE                                SEQUENTIAL
  EXTENT INFORMATION
       EXTENT SEQUENCE NUMBER                   000
       EXTENT TYPE                              1 (PRIME DATA)
       RELATIVE START ADDRESS IN TRACKS/BLOCKS  138136
       NUMBER OF TRACKS/BLOCKS                  063240
       SYMBOLIC UNIT                            OMITTED
       VOLUME SERIAL NUMBER                     DOSRES
          .
          .
```

Figure 28. Example of a LSERV Display

For further details refer to the manual *VSE/ESA System Utilities*.

Printing the System History File

The printout of the system history file gives you an up-to-date change level record of your system. Whenever you apply a change to your system (a PTF, for instance) you should create such a printout.

To request the listing, access the *Problem Handling* panel and select:

```
5  (Retrace History File)
```

The manual *VSE/ESA System Upgrade and Service* provides further details about this dialog under "Selection 6 – Retrace History File".

Taking a Stand-Alone Dump

At various points, this manual suggests to take a stand-alone dump. A stand-alone dump is a dump of selected parts of virtual storage. The program records the shared space and the partitions in separate files on the stand-alone dump tape or on a disk device.

Notes:

1. You should take a stand-alone dump only if normal system operation is no longer possible. In cases where a loop or wait condition can be isolated to a partition, create a partition dump with the DUMP command, as described under "DUMP (Dump Storage Areas)" in the *VSE/ESA System Control Statements* manual. The partition in error may then be canceled and restarted and normal system operation in other partitions need not be interrupted.
2. A stand-alone dump tape created on an IBM 9346 tape drive can only be used once. After the tape has been IPLed, the DOSVSDMP Create function must be used to recreate the stand-alone dump tape before it can be IPLed again.

To be able to take a stand-alone dump on tape, you first have to prepare the output tape. You need a running system to do that. For that reason, always have a number of prepared tapes for stand-alone dumps available. If you have an error situation that requires a stand-alone dump, it is too late to prepare a tape.

Creating the Stand-Alone Dump Program on Tape or Disk

VSE/ESA provides a dialog to create the stand-alone dump program, either on tape or on disk. From the *Problem Handling* panel select

```
6  (Dump Program Utilities)
```

From the Dump Program Utilities select

```
1  (Create Stand-Alone Dump Program on Tape)
```

or

```
2  (Create Stand-Alone Dump Program on Disk)
```

Option 1 requests you to enter the tape address (cuu) and, optionally, the density/mode of the tape. VSE/ESA creates and submits a job stream to write the stand-alone dump program to tape. The job stream includes a // PAUSE statement that allows you to mount the tape.

Option 2 requests you to enter the address of the disk to hold the stand-alone dump program. Alternatively, you can create the stand-alone dump program on the system disk DOSRES. The dialog further requests you to enter the starting address and the length of the dump file (in tracks or blocks).

Taking the Dump

To take a stand-alone dump, follow the steps as outlined under "Taking a Stand-Alone Dump" in the *VSE/ESA Diagnosis Tools* manual.

Scanning the Dump Files on Tape or Disk

The SCAN function provides a file directory of the dump files on tape or disk. You can scan the files by entering, from the *Dump Program Utilities* panel:

```
4  (Scan Dump Files on Tape)
```

or

```
5  (Scan Dump Files on Disk)
```

The dialog requests you to enter the address of the tape or disk to be scanned by the dump program.

The SCAN function can be used to scan stand-alone dump tapes, dump files on disk, or dump tapes created with the AR DUMP command.

Removing the Stand-Alone Dump Program from Disk

You can **remove** the stand-alone dump program from a disk by entering, from the *Dump Program Utilities* panel:

```
3  (Remove Stand-Alone Dump Program from Disk)
```

Other Utilities and Commands

MAP Command

The MAP command provides information about virtual and real storage areas of the system, individual static or dynamic partitions, or the SVA. The output shows, for example:

- Address space identifier.
- Start address.
- Size.
- Execution mode (virtual or real).
- Name of job per partition.

In many cases a MAP display provides valuable information for error diagnosis. For example, the partition addresses provided may be needed for dump analysis. At the system console, enter:

```
MAP
```

You get a display similar as that shown in Figure 29 on page 117.

```
map
AR 0015  SPACE AREA       V-SIZE   GETVIS   V-ADDR   UNUSED NAME
AR 0015    S   SUP          656K                0          $$A$SUPX
AR 0015    S   SVA-24      1680K    1696K    A4000      64K
AR 0015    0   BG V        1280K    4864K   400000   45056K
AR 0015    1   F1 V         788K     812K   400000       0K POWSTART
AR 0015    2   F2 V        2048K   49152K   400000       0K CICSICCF
AR 0015    3   F3 V         600K    5544K   400000       0K VTAMSTRT
AR 0015    4   F4 V        2048K   18432K   400000       0K CICSOLD
AR 0015    5   F5 V         768K     256K   400000       0K
AR 0015    6   F6 V         256K     256K   400000       0K
AR 0015    7   F7 V        1024K   11264K   400000       0K
AR 0015    8   F8 V        2048K   49152K   400000       0K
AR 0015    9   F9 V         256K     256K   400000       0K
AR 0015    A   FA V         256K     256K   400000       0K
AR 0015    B   FB V         256K     256K   400000       0K SECSERV
AR 0015    S   SVA-31      7100K    7236K  3600000
AR 0015        DYN-PA         0K
AR 0015        DSPACE      5472K
AR 0015        SYSTEM      1024K
AR 0015        AVAIL      79008K
AR 0015        TOTAL     256000K   <----'
AR 0015 1I40I  READY
```

Figure 29. Example of a MAP Display

Note: To display the actual partition and SVA values during processing, VSE/ESA provides the "Display Storage Layout" dialog. The manual *VSE/ESA Administration* describes the dialog in detail under "Using the Display Storage Layout Dialog".

You can also use the MAP command to display the address limits of all currently defined **dynamic** partition classes in the system. At the system console, enter:

```
MAP CLASS=ALL
```

If you are interested in a specific dynamic class only, enter:

```
MAP CLASS=class
```

For details, see "MAP (Display Storage Layout)" in the *VSE/ESA System Control Statements* manual.

/MAP Command

With the /MAP command you can display the following information about the interactive partitions of VSE/ICCF:

- Partition number and ID.
- Scheduling class(es).
- Virtual start address.
- Size.
- Status.

You may need part of this information to analyze a dump, for example. At the system console, enter:

```
/MAP
```

You get a display similar as that shown in Figure 30.

```
/map
AR 0015 1C39I COMMAND PASSED TO VSE/ICCF
F2 0091 K119I  *** INTERACTIVE PARTITION MAP ***
F2 0091   P=01(1) CLS=I    ADR=9C0000 SIZ=1024K USER=     WORK=4
F2 0091   P=02(2) CLS=A    ADR=AC0000 SIZ=0384K USER=     WORK=4
F2 0091   P=03(3) CLS=A    ADR=B20000 SIZ=0384K USER=     WORK=4
F2 0091   P=04(4) CLS=BA   ADR=B80000 SIZ=0512K USER=     WORK=4
F2 0091   P=05(5) CLS=BA   ADR=C00000 SIZ=0512K USER=     WORK=4
```

Figure 30. Example of a /MAP Display

LISTD Librarian Command

Use the LISTD librarian command to display at the system console library status and contents. Assume the system could not find a phase requested for execution, or you need to know the free space of a library. These are typical problems where the LISTD command can help you. Enter at the system console:

```
R RDR,PAUSEBG
0 // EXEC LIBR
```

You are requested for further information like:

```
0 LISTD LIB=IJSYSRS OUTPUT=STATUS
0 LISTD SUBLIB=IJSYSRS.SYSLIB
```

The first LISTD command gives you the STATUS DISPLAY of libary IJSYSRS; the second the DIRECTORY DISPLAY of sublibrary IJSYSRS.SYSLIB. For both displays refer to Figure 31 on page 119. For further details on the LISTD command refer to "List Library, Sublibrary, or Member Information" in the *VSE/ESA Guide to System Functions*.

```
 STATUS DISPLAY      LIBRARY=IJSYSRS                DATE: 1999-02-18
                                                     TIME: 12:09
 ---------------------------------------------------------------------
 FILE-ID        : (NOT DISPLAYED FOR IJSYSRS)
 CREATION DATE  : 1999-02-02   19:24
 SUBLIBRARIES   :        1

 LOCATION (BAM) : DEVICE=3380  VOLID=DOSRES CYL =     0.08 -    63.14

 LIBRARY BLOCK  : SIZE=  1024 BYTES   DATA SPACE=   988 BYTES

 TOTAL   SPACE  :   29512 LIBRARY BLOCKS   (100 %)
 USED    SPACE  :   21219 LIBRARY BLOCKS   ( 72 %)
 DELAYED SPACE  :      40 LIBRARY BLOCKS   (  0 %)
 FREE    SPACE  :    8253 LIBRARY BLOCKS   ( 28 %)

 ---------------------------------------------------------------------
 SUBLIBRARY CREATION   SPACE     NO. OF      USED  DELAYED    % LIBR.
            DATE       REUSAGE   MEMBERS     LB'S  LB'S       SPACE
 ---------------------------------------------------------------------
 SYSLIB     1999-02-02   AUTO       2655    21214       40      72 %


 =====================================================================
0 LD $I*.PHASE
 DIRECTORY DISPLAY    SUBLIBRARY=IJSYSRS.SYSLIB      DATE: 1999-02-18
                                                     TIME: 12:09
 ---------------------------------------------------------------------
  M E M B E R      CREATION   LAST     BYTES    LIBR CONT SVA  A- R-
  NAME     TYPE     DATE      UPDATE   RECORDS   BLKS STOR ELIG MODE
 ---------------------------------------------------------------------
 $IESEDEF PHASE    99-02-02   -  -     2640 B       3 YES  NO  31 ANY
 $IJBALE  PHASE    99-02-02   -  -     8104 B       9 YES YES  31 ANY
 $IJBALET PHASE    99-02-02   -  -     2040 B       3 YES YES  31 ANY
 $IJBAR   PHASE    99-02-02   -  -    94104 B      96 YES YES  24  24
 $IJBASGN PHASE    99-02-02   -  -     2880 B       3 YES YES  24  24
 $IJBATTN PHASE    99-02-02   -  -     2704 B       3 YES YES  24  24
 $IJBCJC  PHASE    99-02-02   -  -     2936 B       3 YES YES  24  24
 $IJBCRT  PHASE    99-02-02   -  -   136336 B     138 YES YES  31 ANY
 $IJBCSIO PHASE    99-02-02   -  -   176296 B     179 YES YES  31 ANY
 $IJBCSIW PHASE    99-02-02   -  -    82224 B      84 YES YES  31 ANY
```

Figure 31. Example of a LISTD Display

Device Support Facilities (DSF)

The DSF program contains a set of device utilities. You need them to initialize a new disk device or to assign an alternate track or block, for example. DSF is part of VSE/ESA. For details on how to use a particular utility consult the manual *Device Support Facilities User's Guide and Reference*.

Data Interfile Transfer, Testing and Operations Utility (DITTO)

DITTO/ESA for VSE is a general-purpose utility program. It can scan, display, list, alter, and create files or parts of files on card, tape, disk, and diskette input/output devices.

Note: VSE/ESA provides the application profile IESDITTO. Adding this profile to a selection panel for a user provides access to DITTO via the Interactive

Interface.

For a detailed description of DITTO functions refer to the DITTO/ESA for VSE documentation.

VSE/POWER Disk Dump Program

If you report a VSE/POWER problem to IBM, you may be asked to supply a dump of the VSE/POWER files. Program IPW$$DD serves this purpose. IPW$$DD prints the data requested on the printer assigned to SYSLST.

For further details refer to *VSE/POWER Administration and Operation* under "Requesting a Dump of the Spool File".

VSE/VSAM Catalog Check Service Aid

The Catalog Check Service Aid helps determine whether a catalog has been damaged. It also determines the type and extent of the damage. In certain situations VSE/VSAM calls the Catalog Check Service Aid automatically. In addition, you should run the aid in the following situations to assess catalog integrity:

- After a system failure.
- When a file or catalog is not behaving as expected.
- As part of regular system maintenance.

For further details refer to the *VSE/VSAM User's Guide and Application Programming* under "VSE/VSAM Catalog Check Service Aid".

VSE/VSAM Snap Dump (IKQVEDA)

Several VSE/VSAM modules contain a SNAP dump facility. IBM may ask you to create a SNAP dump to provide error diagnosis information.

Refer to the *VSE/VSAM User's Guide and Application Programming* under "VSE/VSAM Snap Dump (IKQVEDA)" for how to activate and run a SNAP dump.

The CICS Snap Dump

The Snap Dump is available with the CICS Transaction Server and (if you have a CICS co-existence environment) with CICS/VSE. For details refer to the *CICS Problem Determination Guide*.

Utilities and Commands Documented in Other Manuals

In the manual *VSE/ESA System Utilities* you find details about the following utilities:

- Clear Disk (CLRDK)
- Copy and Restore Diskette (CRDR)
- VSE/Fast Copy
- Initialize Tape (INTTP).

In the manual *VSE/ESA Diagnosis Tools* you find details about the following utilities and commands:

- LIBLIST (display library chains).
- LOG (print job control statements).
- LIST (print language translator source code).
- ACTION (print linkage editor map).
- STOP/PAUSE (suspend program execution).

- LISTLOG (list job related information).
- System console functions:
  - DSPLY/ALTER command.
  - Display/Alter feature.
  - Instruction stepping feature.
  - Stop-on-address compare feature.

VM Commands

If your VSE/ESA system runs as a virtual machine under an IBM VM operating system, you will not have the hardware functions like Alter/Display and Stop-on-Address available. Instead, VM provides CP commands to perform such functions. Below, a selection of CP commands is shown:

TRACE

Use the TRACE command to trace virtual machine activity and to display the results at the terminal, or on a virtual spooled printer, or on both.

ADSTOP

Use the ADSTOP command to halt the execution of a virtual machine at a virtual instruction address. Execution halts when the instruction at the address specified in the command is the next instruction to be executed.

DISPLAY

Use the DISPLAY command to display the virtual machine components at your terminal.

STORE

Use the STORE command to alter the contents of specified registers and locations of the virtual machine.

DUMP

Use the DUMP command to print the contents of various components of the virtual machine on the virtual spooled printer.

You should see the appropriate VM documentation or the VM HELP function (if available) for more information on the use of CP commands.

Chapter 9. Using Traces

This chapter introduces the Interactive Trace Program and SDAID program and documents traces of the following VSE/ESA base programs:

- VSE/POWER
- CICS Transaction Server
- CICS/VSE
- VTAM

In addition, this chapter describes the Workstation File Transfer Trace provided by VSE/ESA.

Interactive Trace Program

The Interactive Trace Program traces the execution of user programs running in static or dynamic partitions. It operates at the level of machine instructions and virtual storage addresses, similar to the CP debugging facilities in VM/ESA. VSE/ESA users may activate the trace program independently in different partitions.

For a detailed description of the Interactive Trace Program, refer to the manual *VSE/ESA Diagnosis Tools*.

SDAID Event Traces

You can use the SDAID program to trace internal events such as:

- Branch instructions.
- Buffer contents (when overflow).
- Cancel or EOJ condition.
- External Interrupt.
- All or selected instructions.
- I/O interrupts.
- Monitor calls.
- Program checks.
- Program fetch/load.
- SSCH (Start Subchannel) instructions.
- Storage alterations.
- Supervisor calls.
- VTAM buffers.
- VTAM I/O operations.

The output, called event records, can be stored in a wraparound buffer, written to magnetic tape, or printed on a line printer.

The SDAID Event Traces are described in "SDAID Overview" of the *VSE/ESA Diagnosis Tools* manual.

Printing and Analyzing SDAID Information

VSE/ESA provides a dialog to analyze and print the contents of an SDAID trace tape. Two types of trace files may be processed:

- The output written to tape by the **SDAID** trace program.

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- The output of the attention command **DUMP BUFFER,cuu**.

One or more SDAID files of either type may be stored on the same tape.

You can analyze SDAID information on your screen by performing the following steps:

1. Access the *Problem Handling* panel and select the *Print SDAID Tape* dialog.
2. You are requested for the tape address **cuu** and the file number (**1** through **9999**). Enter the file number of the SDAID file you want to analyze.

   VSE/ESA places the output of the job created and submitted in the VSE/POWER List Queue.
3. To view and analyze the output use the *Problem Handling* panel and select the *Inspect Dump Management Output* dialog.

   The *List Queue* panel is displayed on your screen.
4. Enter

   ```
   1 (Display)
   ```

   in the option column for the related jobname and press **ENTER**.

   The requested SDAID information is displayed on your screen.

Note: To interpret SDAID trace information, a good system knowledge is required.

VSE/POWER RJE,BSC and PNET Trace Facility

VSE/POWER provides a combined input/output (I/O) and buffer content trace. Together with the system console log and dump information, the output from the trace area helps you identify PNET and RJE,BSC problems. For example, it allows you to reconstruct I/O sequences. :p For a detailed description of the commands mentioned in this section, refer to the manual *VSE/POWER Administration and Operation*.

The operator can activate the trace by specifying the TRACE operand in the PSTART command. Tracing takes place as long as the RJE,BSC line or the connection to the other node is active.

A trace record is written if one of the following VSE/POWER events occurs:
PNET,BSC/CTC I/O completed.
PNET,SNA SEND request completed.
PNET,SNA RECEIVE request completed.
RJE,BSC I/O completed.

Each trace record is 256 bytes long. The following types of trace records are created:

- PNET,BSC/CTC trace record.

  Figure 32 on page 126 describes the contents of this record.
- PNET,SNA SEND/RECEIVE trace record.

  Figure 33 on page 127 describes the contents of this record.
- RJE,BSC trace record.

  Figure 34 on page 128 describes the contents of this record.

The trace records created by VSE/POWER are recorded in wraparound mode. The amount of storage allocated for the trace area is specified with the TRACESZ=xx(x) parameter of the VSE/POWER generation macro.

As shipped with VSE/ESA, VSE/POWER does not include a trace area and does not support the RJE, BSC and PNET function. If you re-generate VSE/POWER and specify RJEBSC=YES or PNET=phasename, VSE/POWER defines a trace area with a default size of 12K. You can change this value with the TRACESZ parameter. The maximum value allowed is 252K.

The trace area is divided into two parts, the primary and the alternate trace area. Both trace areas are of the same size. If one trace area is full, VSE/POWER switches automatically to the other one. To avoid that the contents of a trace area is overwritten, you can save the contents of the active trace area in the dump sublibrary of the VSE/POWER partition. You save a trace area by issuing the PSTART DUMPTR command. A message notifies the operator if the contents of a trace area has been saved.

Analyzing Trace Information

There are three ways to analyze trace information:

1. You can print the contents of the active trace area. Issue first the PDISPLAY TRINFO command to get the following addresses:
   - Trace area start address.
   - Trace area end address.
   - Address of the next free trace area entry.

   Use these addresses together with the attention routine DUMP command to print the trace area content on the system printer.
2. You can display and analyze the contents of a trace area saved in the dump sublibrary with the VSE/ESA *Dump Management* dialogs. The dialogs are described in “Chapter 6. Using Dumps for Error Diagnosis” on page 67.

Trace Record Formats

PNET BSC/CTC Trace Record Format

Bytes (hex)	Data Length	Format	Data Description
00-0F	16	binary	CCB
10-37	40	binary	Last 5 executed CCWs
38-3F	8	-	Reserved
40-5F	32	char	Sent buffer content (first 16 and last 16 bytes)
60-7F	32	char	Received buffer content (first 16 and last 16 bytes)
80-81	2	binary	Sense bytes 1 and 2
82-83	2	-	Reserved
84-87	4	binary	Last executed CCW + 8
88-8B	4	packed	Time of day (0HHMMSSF)
8C-8F	4	-	Reserved
Status of Communication			
90-93	4	binary	Address of input buffer in use
94-97	4	binary	Address of output buffer being sent
98-9B	4	binary	Address of buffer used by read CCW
9C-9F	4	binary	Address of buffer used by write CCW
A0	1	binary	Expected block sequence count (BCB)
A1	1	binary	Transmitted block sequence count (BCB)
A2-A3	2	binary	Received FCS bytes
A4-A5	2	binary	Transmitted FCS bytes
A6	1	binary	Request code for I/O manager
A7	1	binary	Last sent request code
A8	1	binary	Last non-NAK request sent
A9	1	binary	Request from line-driver
AA	1	binary	Interface flags I/O manager
AB-AF	5	-	Reserved
Error Counts			
B0-B3	4	binary	Total transmission count
B4-B5	2	binary	Total time out count
B6-B7	2	binary	Error count
B8	1	binary	Retry count
B9	1	binary	Time out retry count
BA	1	binary	Error count
BB-BF	5	-	Reserved
Status of Node			
C0-C1	2	binary	Action bytes 1, 2
C2	1	binary	Process byte
C3-C5	3	binary	Status bytes 1, 2, 3
C6	1	binary	Termination code
C7	1	binary	Termination subcode
C8	1	binary	Stop code qualifier
C9-F7	47	-	Reserved
F8-FB	4	char	Task ID of task writing trace record
FC	1	-	Reserved
FD-FF	3	char	Line address (cuu)

Figure 32. PNET BSC/CTC Trace Record Format

PNET, SNA SEND/RECEIVE Trace Record Format

Bytes (hex)	Data Length	Format	Data Description
00-07	8	char	Remote node name
08-1F	24	binary	Buffer header
20-83	100	binary	VTAM RPL
84-87	4	packed	Time of day (0HHMMSSF)
88-97	16	char	First 16 bytes of data
98-A7	16	char	Last 16 bytes of data
Status of Node			
A8-A9	2	binary	Action bytes 1, 2
AA	1	binary	Process byte
AB-AC	2	binary	Status bytes 1, 2
AD	1	-	Reserved
AE	1	binary	Node termination code
AF	1	binary	Termination subcode
B0	1	binary	Termination code qualifier
B1-B3	3	-	Reserved
B4-B5	2	binary	Number of receivers active
B6-B7	2	binary	Number of transmitters active
B8-BB	4	binary	Address of free input buffer queue
BC-BF	4	binary	Address of to-be-sent queue
C0-C3	4	binary	Tail pointer to-be-sent output queue
C4-C7	4	binary	Address of receive buffer
C8-CB	4	binary	Address of send buffer
CC-CD	2	binary	Buffer size
CE	1	binary	Maximum number of input buffers
CF	1	binary	Maximum number of output buffers
D0-D1	2	binary	Number of acquired input buffers
D2-D3	2	-	Reserved
D4-D7	4	binary	Address of input buffer in use
D8-DB	4	binary	Address of output buffer sent
DC-E7	12	-	Reserved
E8-EB	4	binary	Address of suspended buffer queue
EC-EF	4	binary	Address free input buffer ahead queue
F0-F3	4	binary	Address send ahead queue
F4	1	binary	Send gate
F5	1	binary	Receive gate
F6-FA	5	binary	Session status byte 1 to 5
FB	1	-	Reserved
FC-FF	4	binary	Task ID of task writing trace record

Figure 33. PNET, SNA SEND/RECEIVE Trace Record Format

RJE, BSC Trace Record Format

Bytes (hex)	Data Length	Format	Data Description
00-0F	16	binary	CCB
10-37	40	binary	Last 5 executed CCWs
38-77	64	binary	Data sent and received
78-7B	4	binary	Address of last executed CCW in trace
7C-7D	2	binary	Sense bytes 1 and 2
7E	1	binary	Last request code
7F	1	binary	Current request code
80	1	binary	Stop code
81-83	3	binary	LCB flag bytes 1, 2 and 3
84-85	2	binary	PUB pointer
86-87	2	-	Reserved
88-89	2	binary	Transmission count
8A-8B	2	binary	Session time out count
8C-8D	2	binary	Error count
8E-8F	2	binary	Time out count
90-91	2	binary	Invalid response count
92	1	binary	Time out count (pre-signon)
93	1	binary	Terminal error count
94	1	binary	Retry count
95	1	binary	Retry count
96-97	2	-	Reserved
98	1	binary	Message index (remote message queue)
99	1	binary	Line mode control byte
9A	1	binary	Output switches
9B	1	binary	Activity control byte
9C-A1	6	binary	LCB PLINE entry
A2-B9	24	binary	LCB PRMT entry
BA-BB	2	-	Reserved
BC-C3	8	packed	Time when channel end processed
C4-D3	16	-	Reserved
D4-D7	4	binary	LST DCT flags
D8-DB	4	binary	PUN DCT flags
DC-DF	4	binary	MSG DCT flags
E0-E3	4	binary	RDR DCT flags
E4-EF	12	binary	Reader buffer status
F0-FB	12	binary	Writer buffer status
FC-FE	3	char	Line address (cuu)
FF	1	binary	Remote ID

Figure 34. RJE, BSC Trace Record Format

PNET BSC/CTC Console Trace

This trace can be used to record the sequence of input/output (I/O) events that occur between two nodes linked by a BSC communication line or a channel-to-channel adapter. The trace can be used to check whether a node or both nodes follow the protocol. Figure 35 on page 129 shows the information recorded at I/O completion time at the central operator's console.

The operator can start the trace with a PSTART CNSLTR command and stop it with a PSTOP CNSLTR command.

```
LINE=cuu CCB=cccc SENSE=ssss OUT: BCB=bb FCS=ffff BSC=aaaa RCB=rrrr
              IN: BCB=bb FCS=ffff BSC=aaaa RCB=rrrr
```

Figure 35. Record Format of PNET BSC/CTC Console Trace

The meanings are as follows:

LINE=cuu
is the 2-byte device address in binary format.

CCB=cccc
are the CSW status bits.

SENSE symbol=text=ssss
is the 2-byte sense information as returned from the device.

OUT or IN
is the direction of the buffer.

BCB=bb
is the block control byte either sent or received.

FCS=ffff
are the 2 bytes of the function control sequence field.

BSC=aaaa
are the first two BSC control characters used in the buffer being sent or received. Valid characters are:
- X'1070' - ACK0
- X'3D00' - NAK
- X'1002' - start of text (data)
- X'012D' - SOH ENQ

RCB=rrrr
is the record control byte (RCB) and subrecord control byte (SRCB) of the first record in the buffer sent or received.

VSE/POWER Task Dispatching Trace

To aid in problem determination, a task dispatching trace parameter can be used with the PSTART and PSTOP commands. Once the trace is enabled, each VSE/POWER task dispatching event is recorded in wraparound mode in a trace area in processor storage. With the PVARY command, tracing may be enabled or disabled.

Because of the number of VSE/POWER tasks concurrently active it is extremely difficult (without a trace) to identify a task causing errors.

Using the Trace

To activate the trace, enter:

```
PSTART TASKTR,,6
```

This will start the trace and fill up an area of 6K with trace records in wraparound mode.
To stop tracing temporarily, enter:

```
PVARY TASKTR,DISABLE
```

To resume tracing again, enter:

```
PVARY TASKTR,ENABLE
```

To stop tracing definitely, enter:

```
PSTOP TASKTR
```

To print and analyze the trace information, you need a dump of the VSE/POWER partition and have this dump processed by the Info/Analysis program. You can use the dialogs described in “Chapter 6. Using Dumps for Error Diagnosis” on page 67 for that purpose. The trace area, if present, is included in the Info/Analysis output (section 6 of the symptom record) and pointed to by a locator entry.

Format of the Trace Output

The trace area has a minimum and default size of 2K (the maximum is 64K) and resides in real storage. Each trace entry is 96 (X'60') bytes long and the default trace area holds 21 trace entries.

The trace area begins at an address stored in field CATTRA located at address X'4E4' in the VSE/POWER partition. The first 32 bytes of the trace area contain a header with the following information:

```
0 - F      "DISPATCH TRACE"
10 - 13    Address of first trace entry
14 - 17    Address of last trace entry
18 - 1B    Address of last used entry during tracing
1C - 1F    Total number of bytes of the trace area including the header
```

This is followed by trace entries showing the history of the last n dispatched tasks and their status at dispatch time. This helps to identify errors which may otherwise no longer be visible at the time an error is noticed.

The following table shows the layout of a task dispatching trace entry.

Displacement	Type	Contents
0 - 7	Character	Task ID and cuu
8 - B	Binary	TCB address
C	Character	Function trace byte
D	Character	Termination byte
E	Character	1st byte of task selection field
F		Reserved
10 - 16	Binary	Flag bytes 2 - 8
17 - 18		Reserved
19 - 1F	Binary	Log. interface and function request bytes
20 - 57	Binary	Registers 12 - 9
58 - 5F	Binary	STCK value

CICS Traces

Execution Diagnostic Facility (EDF)

This trace is of interest to you if you are an application programmer. With it, you can trace the execution of a CICS/VSE or CICS Transaction Server online application program (transaction). This may be necessary during program development or after the program has been installed.

For details on EDF refer to the *CICS Application Programming Reference*.

The CICS Trace Facility

Both CICS/VSE and the CICS Transaction Server maintain a wraparound trace table in main storage. The entries reflect CICS macros or commands issued by an application program, or by CICS/VSE or the CICS Transaction Server themselves.

The trace entries can also be stored on auxiliary storage on disk. Since no wraparound occurs, all entries are preserved and a complete history is provided. For analysis, you can print selected entries or the complete contents of the auxiliary storage.

VSE/ESA provides skeleton DFHAUXPR in ICCF Library 59, including a job stream for printing. The CICS Trace Facility is described in the *CICS Application Programming Reference*.

VTAM Traces

VTAM provides traces like the following:

- VTAM Network Traces.

  Several traces are available to record the internal flow of network events. Each trace becomes active at a different point in the network. This allows reconstruction of the flow within the network. The trace records generated are stored in the VTAM trace file. The contents of the file can be printed for analysis.
- VTAM Buffer Use (SMS) Trace. The VTAM buffer use trace records information on the use and availability of VTAM buffer pools.

Refer to the VTAM documentation for details.

Workstation File Transfer Trace

This trace is available with the Workstation File Transfer support when exchanging data between IBM Personal Computers and a VSE/ESA host system.

During workstation file transfer a number of problems may occur, such as transmission of incorrect data or, more frequently, a hangup of either the host or the PC session. Such a hangup is, in many cases, due to an incorrect setup. For example, the Extended Data Stream (EXTDS) feature was not defined for a PC in DFT mode (Distributed Function Terminal attachment). The user, however, does not get any indication of what went wrong. For such problems, the file transfer trace is provided. It enables a user to easily obtain a trace of the transmitted data and to check for correct setup, that is, whether EXTDS has been defined for a PC in DFT mode.

However, a user will not be able to solve problems like incorrect data transmission or protocol errors. Such errors require support from IBM for trace output analysis.

Starting the Trace

You start the workstation file transfer trace at the PC by issuing the SEND or RECEIVE command with the TRACE or TRACECUT option.

Format

```
SEND pc-filename host-filename (TRACE|TRACECUT .. other options ..
RECEIVE pc-filename host-filename (TRACE|TRACECUT .. other options ..
```

For a complete description of the SEND and RECEIVE commands, refer to the manual *VSE/ESA Programming and Workstation Guide*.

Note: Use the TRACECUT option **only** if you are absolutely sure that your PC runs in CUT mode (Control Unit Terminal attachment). Using the TRACECUT option for a PC in DFT mode will result in a hangup of both the host and the PC sessions.

The TRACE and TRACECUT options are not supported by the workstation file transfer PC dialog. You must use the command format for SEND and RECEIVE.

Setup Checking

To perform file transfer with a PC running in DFT mode, the EXTDS (Extended Data Stream) feature must be set in the CICS System Definition file for this device. You can define a PC with EXTDS with the *Configure Hardware* dialog by selecting

```
19  (PS/2 PC DFT)
```

in the device selection panel.

During normal file transfer (without the trace being active), checking for CUT or DFT mode is controlled by the presence of the EXTDS attribute:

- If EXTDS is specified, a QUERY REPLY command is sent to the PC to determine whether the DFT mode is supported. If so, the DTF protocol is used. Otherwise, CUT mode is assumed.
- If EXTDS is not specified, CUT mode is assumed without further checking (no QUERY REPLY). Note that this will lead to a session hangup if it is a DFT device in reality.

If the file transfer trace is activated with the **TRACE** option, a QUERY REPLY command is **always** sent, regardless of whether the EXTDS attribute has been specified or not.

Note: If the PC is attached to a controller that does not have the EXTDS hardware feature, the QUERY REPLY command will result in a command reject. This causes CICS to set the session out of service. In such a case, use the TRACECUT option to activate the trace. Refer also to "Setup Errors (CUT Mode)" on page 145.

Output Files Created by the Trace

Each trace record is written to two files:

- A file in the VSE/POWER list (LST) queue:
  Name of file: IWSTRACE
  Disposition: L
  Class: A
  Destination (TO=): User ID of the requesting user.

  For each trace, a new entry with the name IWSTRACE and a new entry number is created. If the user ID starts with a number, the trace will not be generated

because the CICS Report Controller does not allow such user IDs. In order to trace the file transfer, please use a user ID starting with an alphabetic character.

- A file in a CICS temporary storage queue named CFTRTRCE.

  The output of several traces is added to the existing queue. If this is not desirable, purge the contents of the queue before you start a new trace. If you are repeatedly running a trace for a very large file, you should purge the queue to avoid using up all temporary storage.

If your system encounters a problem while writing into one trace file, it stores a corresponding message in the other file and writes the remaining output to that other file only.

Data Collected by the Trace

The trace output includes the following data:

- A general header containing:
  - The user ID and terminal ID of the requesting user.
  - The time and date of the request.
- Information about the setup of the host connection:
  - Whether the EXTDS feature is defined for this device.
  - Whether the PC runs in CUT or DFT mode.
- For each **inbound** and **outbound** transmission:
  - A header record describing the inbound or outbound transmission and showing the name of the host module that issued the request.
  - The data and control information that was transmitted.

For more information about inbound and outbound transmission, refer to "Trace Output Example DFT Mode" on page 134 and "Trace Output Example CUT Mode" on page 140.

Using the File Transfer Trace

Use the trace if you run into one of the following problems:

- Incorrect data

  The file transfer has completed and an INWxxxxI message was issued in the host session as well as in the PC session. However, the data was not transmitted correctly.

- Session hangup

  The file transfer was started at the PC, but no completion message was issued in the PC session or in the host session. Your PC may repeatedly issue the message:

  ```
  Host has not responded within timeout period
  ```

  and the host screen remains blank.

The procedures for these two error situations are described below.

Incorrect-Data Error

For error diagnosis, proceed as follows:

1. Repeat the SEND or RECEIVE command with the same options plus the TRACE option.
2. After file transfer is complete, switch to the host session. You get the message:

   ```
   INW0050I Trace complete - check TS queue CFTRTRCE or list queue IWSTRACE
   ```

   where nnnn is your user ID.

In the PC session, the normal file transfer completion or error message is displayed.

3. Display the contents of the CICS temporary storage queue (by using the CEBR command) or print the VSE/POWER LST queue entry IWSTRACE to analyze the data portions of the trace output.
   a. If your PC works in DFT mode, you can do a pre-analysis of the data to narrow down the source of the problem (for final analysis you need to contact IBM for support):
      - If you issued a SEND command, the trace output shows the data as received at the host from the PC. If the data is still intact at this point, the error occurred at the host. Otherwise, the data was destroyed during transmission from the PC to the host.
      - If you issued a RECEIVE command, the trace output shows the data before it is sent to the PC. If the data is still intact at this point, the error occurred during transmission to the PC or was caused by the PC control program. Otherwise, the data was destroyed at the host.
   b. If your PC works in CUT mode, the data is encoded and you need IBM support for final analysis.

Session-Hangup Error

For error diagnosis, proceed as follows:

1. In the host session, press the RESET key and then the PF2 key to end the session. Ignore message INW0002I.
2. Switch back to the PC session. If necessary, cancel the session by pressing the CTRL and BREAK keys and reissue the SEND or RECEIVE command with the TRACE option.

If the problem was caused by an incorrect setup, message INW0051I or INW0052I are displayed. An incorrect setup may be the missing specification of the EXTDS attribute if your PC is a DFT device. In some cases, depending on the type of error and the PC equipment, message INW0051I or INW0052 may not occur. The trace files, however, will contain information about the specific setup problem.

For other transmission errors, if the host does not respond to the PC (or vice versa), the session will go into a hangup state again when the TRACE is on. At this point you should, if possible, leave the host session at your PC undisturbed in its current state and look at the trace output in the CICS temporary storage queue from another terminal:

- If the last item in the queue is an **inbound** transmission, then the host did not respond.
- If the item was **outbound**, the PC failed to respond.

Note: If you cancel the host session that is in the hangup state, the keystrokes that you enter will also be recorded in the trace files.

Trace Output Example DFT Mode

Setup of the Trace

The trace examples given here were produced on an IBM 3270 PC in DFT mode with control program version 3.0. Traces obtained with other PC equipment may show slightly different output in the QUERY REPLIES returned by the PC.

Discussion of Output

The trace output shows each transmission from the PC to the host as INBOUND and from the host to the PC as OUTBOUND. Each line shows the host module of

the file transfer program (INWPCCOM) which received or sent the data. In addition, the trace includes an internal trace item number required by IBM personnel for error diagnosis.

Specifics:
- A line starting with "INFO:" gives information about the setup.
- A line starting with "ERROR:" indicates an invalid setup.

The actual data transmitted is shown in hexadecimal format in the left-hand column, and in edited format in the right-hand column. The data may be in ASCII or in EBCDIC format, depending on the direction of transfer and the specified options. Therefore, editing must be done for either the ASCII or the EBCDIC format. However, since VSE/ESA cannot know the format, the following is assumed:

- SEND command – The data is always in ASCII format.
- RECEIVE command with the ASCII option – The data is in ASCII format.
- RECEIVE command with the BINARY option – The data is in EBCDIC format.

For the IBM 5550 PC, where ASCII-EBCDIC translation is done at the PC, the following is assumed:

- SEND command with the JISCII or ASCII option – The data is in EBCDIC format.
- SEND command with the (implied) BINARY option – The data is in ASCII format.
- RECEIVE command – The data is in EBCDIC format.
- DBCS characters are treated as single-byte characters.

If these assumptions are not met, the data will not be edited correctly. In this case, the hexadecimal data in the left-hand column of the trace output must be used for error analysis.

For INBOUND transmission, the data is displayed as received from the PC and before further processing (conversion) is done at the host. For OUTBOUND transmission, the data is displayed before it is sent to the PC and after any necessary conversion at the host.

The file used for the trace examples included the following data:

```
THIS IS RECORD 0001
THIS IS RECORD 0002
THIS IS RECORD 0003
THIS IS RECORD 0004
THIS IS RECORD 0005
THIS IS RECORD 0006
THIS IS THE LAST RECORD
```

Output Examples

Figure 36 on page 136 shows the example of a trace output for a SEND command issued at a PC in DFT mode. Figure 37 on page 138 shows the example of a trace output for a RECEIVE command issued at a PC in DFT mode.

Note that the trace examples reflect error-free file transmissions. The sections following the examples point out the resulting changes in trace data in case of inbound transmission and setup errors.

SEND Command Used:

```
    SEND PCFILE HOSTFILE (ASCII CRLF TRACE

FILE TRANSFER TRACE:  USERID=SYSA TERMID=D1C2 DATE=89252 TIME=090120...01

INBOUND: INPUT COMMAND IND$FILE ..... MODULE=INWPROOT.......09
1140C1C9D5C45BC6C9D3C540D7E4E340C8D6E2E3C6C9D3C5 . AIND$FILE PUT HOSTFILE
404DC1E2C3C9C940C3D9D3C640E3D9C1C3C5              (ASCII CRLF TRACE

OUTBOUND: ERASE WRITE COMMAND TO CLEAR SCREEN... MODULE=INWPQUER.......20
F5C3                                             5C

INFO: EXTDS FEATURE DEFINED IN TCT ..... MODULE=INWPQUER.......04

OUTBOUND: SEND QUERY REPLY TO CHECK CUT OR DFT.. MODULE=INWPQUER.......21
000501FF02                                       .....

INBOUND: QUERY REPLIES RECEIVED FROM TERMINAL... MODULE=INWPQUER.......06
000F818080818586878895979 99DA6                  ..a..aefghnpr.w
00178181010000500018010001 0003006400C4090E0780  ..aa...&;.........D....
00108185000009100000000003000000                 ..ae............
00168186000800F4F1F1F2F2F3F3F4F4F5F5F6F6F7F7     ..af...411223344556677
000D81870400F0F1F1F2F2F4F4                       ..ag..0112244
00078188000102                                   ..ah...
000C819500000E000E000101                         ..an........
000681990000                                     ..ar..
001181A600000B0100005000 1800500018              ..aw......&;..&;.

INFO: TERMINAL IS IN DFT MODE ..... MODULE=INWPQUER.......17

OUTBOUND: OPEN REQUEST FOR DATA TRANSFER ..... MODULE=INWPOPN1.......30
0029D000120106010104030A0A000100000000100500552 .)...................P.R
03F0080627040DEF030946543A44415441               ....'.....FT:DATA

INBOUND: OPEN REPLY (POSITIVE) ..... MODULE=INWPOPN1.......31
0005D00009                                       .....

OUTBOUND: SET CURSOR / GETDATA REQUEST ..... MODULE=INWPPUT1.......41
000FD045110105000600090501030000 09D0461101040080 ...E.............F.....

INBOUND: GETDATA ACKNOWLEDGEMENT + DATA ..... MODULE=INWPPUT1.......42
CONTROL INFORMATION
00A8D04605630600000001C08061009D                 ...F.c.......a..
```

Figure 36. Trace Example for a PC in DFT Mode (SEND Command) (Part 1 of 2)

SEND Command Used:

```
    SEND PCFILE HOSTFILE (ASCII CRLF TRACE
USER DATA
5448495320495320524543 4F524420303030310D0A544849 THIS IS RECORD 0001..THI
5320495320524543 4F524420303030320D0A544849532049 S IS RECORD 0002..THIS I
53205245434F524420303030330D0A544849532049532052 S RECORD 0003..THIS IS R
45434F524420303030340D0A5448495320495320524543 4F ECORD 0004..THIS IS RECO
524420303030350D0A5448495320495320524543 4F524420 RD 0005..THIS IS RECORD
303030360D0A5448495320495320544845204C4153542052 0006..THIS IS THE LAST R
45434F52440D0A1A                                  ECORD...

OUTBOUND: SET CURSOR / GETDATA REQUEST ......... MODULE=INWPPUT1.......41
000FD045110105000600090501030000009D0461101040080 ...E.............F.....

INBOUND: END OF FILE ........................... MODULE=INWPPUT1.......43
0009D0460869042200                                ...F.i.".

OUTBOUND: CLOSE FILE REQUEST ................... MODULE=INWPCLS1.......34
0005D04112                                        ...A.

INBOUND: CLOSE FILE REPLY (POSITIVE) ........... MODULE=INWPCLS1.......35
0005D04109                                        ...A.

OUTBOUND: OPEN REQUEST FOR MESSAGE ............. MODULE=INWPOPN1.......33
0023D000120106010104030A0A0000000011010100500552 .#..................P.R
03F0030946543A4D534720                            ....FT:MSG

INBOUND: OPEN REPLY (POSITIVE) ................. MODULE=INWPOPN1.......31
0005D00009                                        .....

OUTBOUND: INSERT REQUEST FOR MESSAGE ........... MODULE=INWPGET1.......40
000AD047110105008000005AD04704C080610055494E5730 ...G.......Z.G...a.UINW0
3030314920204669 6C65207472616E7366657220636F6D70 001I  File transfer comp
6C6574652E202400000000000000000000000000000000000 lete. $.................
000000000000000000020202020202020202020202020202 .........
20202020

INBOUND: INSERT REPLY (POSITIVE) ............... MODULE=INWPGET1.......38
000BD04705630600000001                            ...G.c.....

OUTBOUND: SEND MESSAGE TO HOST SCREEN .......... MODULE=INWPMSG .......45
C9D5E6F0F0F5F0C94040E3998183854083969 4979385A385 INW0050I  Trace complete
4060408388 5839240E3E24098A485A48540C3C6E3D9E2E8  - check TS queue CFTRSY
E2C1409699409389A2A34098A485A48540C9E6E2E3D9C1C3 SA or list queue IWSTRAC
C5404040404040404040404040404040404040404040404040 E
4040404040404040404

E N D   O F   T R A C E                           MODULE=INWPMSG ..... .05
```

Figure 36. Trace Example for a PC in DFT Mode (SEND Command) (Part 2 of 2)

RECEIVE Command Used:

```
    RECEIVE PCFILE HOSTFILE (ASCII CRLF TRACE

FILE TRANSFER TRACE:  USERID=SYSA TERMID=D1C2 DATE=89252 TIME=090347...01

INBOUND: INPUT COMMAND IND$FILE ..... MODULE=INWPROOT.......09
1140C1C9D5C45BC6C9D3C540C7C5E340C8D6E2E3C6C9D3C5 . AIND$FILE GET HOSTFILE
404DC1E2C3C9C940C3D9D3C640E3D9C1C3C5              (ASCII CRLF TRACE

OUTBOUND: ERASE WRITE COMMAND TO CLEAR SCREEN... MODULE=INWPQUER.......20
F5C3                                             5C

INFO: EXTDS FEATURE DEFINED IN TCT ..... MODULE=INWPQUER.......04

OUTBOUND: SEND QUERY REPLY TO CHECK CUT OR DFT.. MODULE=INWPQUER.......21
000501FF02                                       .....

INBOUND: QUERY REPLIES RECEIVED FROM TERMINAL... MODULE=INWPQUER.......06
000F818080818586878895979 99DA6                  ..a..aefghnpr.w
00178181010000500018010001 0003006400C4090E0780  ..aa...&;.........D....
00108185000009100000000003000000                 ..ae............
00168186000800F4F1F1F2F2F3F3F4F4F5F5F6F6F7F7     ..af...411223344556677
000D81870400F0F1F1F2F2F4F4                       ..ag..0112244
00078188000102                                   ..ah...
000C819500000E000E000101                         ..an........
000681990000                                     ..ar..
001181A600000B01000050001800500018               ..aw......&;..&;.

INFO: TERMINAL IS IN DFT MODE .................. MODULE=INWPQUER.......17

OUTBOUND: OPEN REQUEST FOR DATA TRANSFER ....... MODULE=INWPOPN1.......30
0023D000120106010104030A0A000000001101010050055 2 .#...................P.R
03F0030946543A44415441                           ....FT:DATA

INBOUND: OPEN REPLY (POSITIVE) ................. MODULE=INWPOPN1.......31
0005D00009                                       .....

OUTBOUND: INSERT REQUEST FOR DATA .............. MODULE=INWPGET1.......37
CONTROL INFORMATION
000AD047110105008000 00A2D04704C08061009D        ...G.........G...a..
```

Figure 37. Trace Example for a PC in DFT Mode (RECEIVE Command) (Part 1 of 2)

RECEIVE Command Used:

```
    RECEIVE PCFILE HOSTFILE (ASCII CRLF TRACE

USER DATA
5448495320495320524543 4F524420303030310D0A544849 THIS IS RECORD 0001..THI
5320495320524543 4F5244203030320D0A544849532049 S IS RECORD 0002..THIS I
53205245434F5244203030330D0A544849532049532052 S RECORD 0003..THIS IS R
45434F5244203030340D0A5448495320495320524543 4F ECORD 0004..THIS IS RECO
5244203030350D0A5448495320495320524543 4F524420 RD 0005..THIS IS RECORD
303030360D0A5448495320495320544845204C4153542052 0006..THIS IS THE LAST R
45434F52440D0A1A                                 ECORD...

INBOUND: INSERT REPLY (POSITIVE) ..... MODULE=INWPGET1.......38
000BD04705630600000001               ...G.c.....

OUTBOUND: CLOSE FILE REQUEST ......... MODULE=INWPCLS1.......34
0005D04112                           ...A.

INBOUND: CLOSE FILE REPLY (POSITIVE) .... MODULE=INWPCLS1.......35
0005D04109                           ...A.

OUTBOUND: OPEN REQUEST FOR MESSAGE ..... MODULE=INWPOPN1.......33
0023D000120106010104030A0A0000000011010100500552 .#...................P.R
03F0030946543A4D534720               ....FT:MSG

INBOUND: OPEN REPLY (POSITIVE) ........ MODULE=INWPOPN1.......31
0005D00009                           .....

OUTBOUND: INSERT REQUEST FOR MESSAGE .... MODULE=INWPGET1.......40
000AD047110105008000005AD04704C080610055494E5730 ...G.......Z.G...a.UINW0
3030314920204669 6C65207472616E7366657220636F6D70 001I  File transfer comp
6C6574652E202400000000000000000000000000000000 lete. $.................
00000000000000000020202020202020202020202020202020 .........
20202020

INBOUND: INSERT REPLY (POSITIVE) ..... MODULE=INWPGET1.......38
000BD04705630600000001               ...G.c.....

OUTBOUND: SEND MESSAGE TO HOST SCREEN ... MODULE=INWPMSG .......45
C9D5E6F0F0F5F0C94040E3998183854083969 4979385A385 INW0050I  Trace complete
406040838885839240E3E24098A485A48540C3C6E3D9E2E8  - check TS queue CFTRSY
E2C1409699409389A2A34098A485A48540C9E6E2E3D9C1C3 SA or list queue IWSTRAC
C5404040404040404040404040404040404040404040404040 E
40404040404040404040

E N D   O F   T R A C E              MODULE=INWPMSG ..... .05
```

Figure 37. Trace Example for a PC in DFT Mode (RECEIVE Command) (Part 2 of 2)

Inbound Transmission Errors (DFT Mode)

Whenever an unexpected reply is received by the host from the PC, the corresponding INBOUND text line is replaced by its negative counterpart:

```
INBOUND: OPEN REPLY (POSITIVE) ..... MODULE=INWPOPN1.......31
INBOUND: OPEN REPLY (NEGATIVE) ..... MODULE=INWPOPN1.......32

INBOUND: INSERT REPLY (POSITIVE) ..... MODULE=INWPGET1.......38
INBOUND: INSERT REPLY (NEGATIVE) ..... MODULE=INWPGET1.......39

INBOUND: GETDATA ACKNOWLEDGEMENT + DATA ..... MODULE=INWPPUT1.......42
INBOUND: GETDATA REPLY (NEGATIVE) ..... MODULE=INWPPUT1.......44

INBOUND: CLOSE FILE REPLY (POSITIVE) ..... MODULE=INWPCLS1.......35
INBOUND: CLOSE FILE REPLY (NEGATIVE) ..... MODULE=INWPCLS1.......36
```

If negative replies occur during file transfer without any operator intervention, they indicate a malfunction of the host or the PC file transfer program, or of the hardware. If such an error occurs, contact IBM for support.

However, negative replies are also recorded if, after a session hangup, the operator presses any keys in the host session. It is, therefore, recommended to display the trace file in CICS temporary storage from another terminal to avoid disturbing the host session in the hangup state.

Setup Errors (DFT Mode)

If the EXTDS feature was not specified in the DFHTCT entry for this terminal, the error text

```
ERROR: TERMINAL IS IN DFT MODE - EXTDS REQUIRED. MODULE=INWPQUER.......15
```

is written to the trace file. File transfer is complete with message INW0051I.

Trace Output Example CUT Mode

Setup of the Trace

The following trace examples were produced on an IBM PC/AT with the IBM 3278/79 Emulation Adapter and the IBM PC 3270 Emulation Program, Entry Level Version 1.0.

Discussion of Output

The trace output shows each transmission from the PC to the host as INBOUND and from the host to the PC as OUTBOUND. Each line shows the host module of the file transfer program (INWPCCOM) which received or sent the data. In addition, the trace includes an internal trace item number required by IBM personnel for error diagnosis.

The actual data is shown in hexadecimal in the left-hand column, and in edited format in the right-hand column.

The data is transmitted in encoded form, that is, user data will be interspersed with additional control characters. Therefore, do not expect to recognize your data in the original format.

Specifics:

- A line starting with “INFO:” provides information about the setup.
- A line starting with “ERROR:” indicates an invalid setup.
- For INBOUND transmission, the data is displayed as received by the PC, before further processing (conversion) is done by the host.
- For OUTBOUND transmission, the data is displayed before it is sent to the PC, after a necessary conversion has been done by the host.
- The file used for the trace examples included the following data:

```
THIS IS RECORD 0001
THIS IS RECORD 0002
THIS IS RECORD 0003
THIS IS RECORD 0004
THIS IS RECORD 0005
THIS IS RECORD 0006
THIS IS THE LAST RECORD
```

Output Examples

Figure 38 shows the example of a trace output for a SEND command issued at a PC in CUT mode. Figure 39 on page 143 shows the example of a trace output for a RECEIVE command issued at a PC in CUT mode.

Note that the trace examples reflect error-free file transmissions. The sections following the examples point out the resulting changes in the trace data in case of inbound transmission and setup errors.

SEND Command Used:

```
    SEND PCFILE HOSTFILE (ASCII CRLF TRACE
```

```
FILE TRANSFER TRACE:  USERID=SYSA TERMID=D1CF DATE=89252 TIME=085427...01

INBOUND: INPUT COMMAND IND$FILE ............... MODULE=INWPROOT.......09
1140C1C9D5C45BC6C9D3C540D7E4E340C8D6E2E3C6C9D3C5 . AIND$FILE PUT HOSTFILE
404DC1E2C3C9C940C3D9D3C640E3D9C1C3C540D9C5D7D3C1  (ASCII CRLF TRACE REPLA
C3C5                                            CE

OUTBOUND: ERASE WRITE COMMAND TO CLEAR SCREEN... MODULE=INWPQUER.......20
F5C3                                            5C

INFO: EXTDS FEATURE NOT DEFINED IN TCT ......... MODULE=INWPQUER.......03

OUTBOUND: SEND QUERY REPLY TO CHECK CUT OR DFT.. MODULE=INWPQUER.......21
000501FF02                                      .....

INBOUND: QUERY REPLIES RECEIVED FROM TERMINAL... MODULE=INWPQUER.......06
00178181010000500018000002008900020085091007 80  ..aa...&;.....i...e....
001181A600000B01000050001800500018              ..aw......&;..&;.
000681988000                                    ..aq..

INFO: TERMINAL IS IN CUT MODE .................. MODULE=INWPQUER.......19

OUTBOUND: COMMAND ACKNOWLEDGEMENT (OPEN) ....... MODULE=INWPOPN0.......22
114040C3818181115D7A1DC113000000001D7C          .  Caaa.):.A......@

INBOUND: POSITIVE REPLY AID ENTER .............. MODULE=INWPOPN0.......23
115D7B                                          .)#

OUTBOUND: SEND EMPTY FRAME ..................... MODULE=INWPPUT0.......27
114040C21DC1C182115D7F1D7C                      .  B.AAb.)".@

INBOUND: DATA FRAME (DATA ENCODED) ............. MODULE=INWPPUT0.......29
CONTROL INFORMATION
1140C2C182C100A5                                . BAbA.v
```

Figure 38. Trace Example for a PC in CUT Mode (SEND Command) (Part 1 of 2)

SEND Command Used:

```
    SEND PCFILE HOSTFILE (ASCII CRLF TRACE

USER DATA
7EE3C8C9E240C9E240D9C5C3D6D9C440F0F0F0F15CD5D27E =THIS IS RECORD 0001*NK=
E3C8C9E240C9E240D9C5C3D6D9C440F0F0F0F25CD5D27EE3 THIS IS RECORD 0002*NK=T
C8C9E240C9E240D9C5C3D6D9C440F0F0F0F35CD5D27EE3C8 HIS IS RECORD 0003*NK=TH
C9E240C9E240D9C5C3D6D9C440F0F0F0F45CD5D27EE3C8C9 IS IS RECORD 0004*NK=THI
E240C9E240D9C5C3D6D9C440F0F0F0F55CD5D27EE3C8C9E2 S IS RECORD 0005*NK=THIS
40C9E240D9C5C3D6D9C440F0F0F0F65CD5D27EE3C8C9E240  IS RECORD 0006*NK=THIS
C9E240E3C8C540D3C1E2E340D9C5C3D6D9C45CD5D2       IS THE LAST RECORD*NK

OUTBOUND: SEND EMPTY FRAME ..................... MODULE=INWPPUT0.......27
114040C21DC1C183115D7F1D7C                       .  B.AAc.)".@

INBOUND: DATA FRAME WITH EOF INDICATOR *z ...... MODULE=INWPPUT0.......28
1140C2C183E500025CA9                             . BAcV..*z

OUTBOUND: COMMAND ACKNOWLEDGEMENT WITH MESSAGE.. MODULE=INWPOPN0.......24
114040C3848189C9D5E6F0F0F0F1C94040C689938540A399 .  CdaiINW0001I  File tr
8195A2868599408396949793 85A3854B405B000000000000 ansfer complete. $......
00000000000000000000000000000000000000040404040 ...................
4040404040404040404040404040115D7A1DC113000000                .):.A....
001D7C                                           ..@

INBOUND: POSITIVE REPLY AID ENTER ............... MODULE=INWPOPN0.......23
115D7B                                           .)#

OUTBOUND: SEND MESSAGE TO HOST SCREEN .......... MODULE=INWPMSG .......45
C9D5E6F0F0F5F0C94040E3998183854083969497 9385A385 INW0050I  Trace complete
4060408388858392 40E3E24098A485A48540C3C6E3D9E5C1  - check TS queue CFTRVA
E3D9409699409389A2A34098A485A48540C9E6E2E3D9C1C3 TR or list queue IWSTRAC
C540404040404040404040404040404040404040404040404040 E
40404040404040404040

E N D   O F   T R A C E                          MODULE=INWPMSG ..... .05
```

Figure 38. Trace Example for a PC in CUT Mode (SEND Command) (Part 2 of 2)

RECEIVE Command Used:

```
    RECEIVE PCFILE HOSTFILE (ASCII CRLF TRACE

FILE TRANSFER TRACE:  USERID=SYSA TERMID=D1CF DATE=89252 TIME=085826...01

INBOUND: INPUT COMMAND IND$FILE ................ MODULE=INWPROOT.......09
1140C1C9D5C45BC6C9D3C540C7C5E340C8D6E2E3C6C9D3C5 . AIND$FILE GET HOSTFILE
404DC1E2C3C9C940C3D9D3C640E3D9C1C3C5              (ASCII CRLF TRACE

OUTBOUND: ERASE WRITE COMMAND TO CLEAR SCREEN... MODULE=INWPQUER.......20
F5C3                                             5C

INFO: EXTDS FEATURE NOT DEFINED IN TCT ......... MODULE=INWPQUER.......03

OUTBOUND: SEND QUERY REPLY TO CHECK CUT OR DFT.. MODULE=INWPQUER.......21
000501FF02                                       .....

INBOUND: QUERY REPLIES RECEIVED FROM TERMINAL... MODULE=INWPQUER.......06
00178181010000500018000002008900020085091007 80  ..aa...&;.....i...e....
001181A600000B01000050001800500018               ..aw......&;..&;.
000681988000                                     ..aq..

INFO: TERMINAL IS IN CUT MODE .................. MODULE=INWPQUER.......19

OUTBOUND: COMMAND ACKNOWLEDGEMENT (OPEN) ....... MODULE=INWPOPN0.......22
114040C3818181115D7A1DC113000000001D7C           .  Caaa.):.A......@

INBOUND: POSITIVE REPLY AID ENTER .............. MODULE=INWPOPN0.......23
115D7B                                           .)#

OUTBOUND: SEND DATA FRAME (DATA ENCODED) ....... MODULE=INWPGET0.......25
CONTROL INFORMATION
114040C182E283D5                                 .  AbScN
```

Figure 39. Trace Example for a PC in CUT Mode (RECEIVE Command) (Part 1 of 2)

RECEIVE Command Used:

```
    RECEIVE PCFILE HOSTFILE (ASCII CRLF TRACE

USER DATA
5E7EE3C8C9E240C9E240D9C5C3D6D9C440F0F0F0F15CD5D2 ;=THIS IS RECORD 0001*NK
5E7EE3C8C9E240C9E240D9C5C3D6D9C440F0F0F0F25CD5D2 ;=THIS IS RECORD 0002*NK
5E7EE3C8C9E240C9E240D9C5C3D6D9C440F0F0F0F35CD5D2 ;=THIS IS RECORD 0003*NK
5E7EE3C8C9E240C9E240D9C5C3D6D9C440F0F0F0F45CD5D2 ;=THIS IS RECORD 0004*NK
5E7EE3C8C9E240C9E240D9C5C3D6D9C440F0F0F0F55CD5D2 ;=THIS IS RECORD 0005*NK
5E7EE3C8C9E240C9E240D9C5C3D6D9C440F0F0F0F65CD5D2 ;=THIS IS RECORD 0006*NK
5E7EE3C8C9E240C9E240E3C8C540D3C1E2E340D9C5C3D6D9 ;=THIS IS THE LAST RECOR
C45CD5D24C                                        D*NK<
CONTROL INFORMATION
115D7A1DC113000000001D7C                          .):.A......@

INBOUND: POSITIVE REPLY AID ENTER ............... MODULE=INWPGET0.......23
115D7B                                            .)#

OUTBOUND: SEND DATA FRAME WITH EOF INDICATOR *Z  MODULE=INWPCLS0.......26
114040C183E581835CA9115D7A1DC113000000001D7C     .  AcVac*z.):.A......@

INBOUND: POSITIVE REPLY AID ENTER ............... MODULE=INWPCLS0.......23
115D7B                                            .)#

OUTBOUND: COMMAND ACKNOWLEDGEMENT WITH MESSAGE.. MODULE=INWPOPN0.......24
114040C3848189C9D5E6F0F0F0F1C94040C689938540A399 .  CdaiINW0001I  File tr
8195A286859940839694979385A3854B405B000000000000 ansfer complete. $......
00000000000000000000000000000000000000040404040 ....................
40404040404040404040404040404040115D7A1DC113000000                .):.A....
001D7C                                            ..@

INBOUND: POSITIVE REPLY AID ENTER ............... MODULE=INWPOPN0.......23
115D7B                                            .)#

OUTBOUND: SEND MESSAGE TO HOST SCREEN ........... MODULE=INWPMSG .......45
C9D5E6F0F0F5F0C94040E399818385408396949793 85A385 INW0050I  Trace complete
406040838885839240E3E24098A485A48540C3C6E3D9E5C1  - check TS queue CFTRVA
E3D9409699409389A2A34098A485A48540C9E6E2E3D9C1C3 TR or list queue IWSTRAC
C540404040404040404040404040404040404040404040 E
40404040404040404040

E N D   O F   T R A C E                           MODULE=INWPMSG ..... .05
```

Figure 39. Trace Example for a PC in CUT Mode (RECEIVE Command) (Part 2 of 2)

Inbound Transmission Errors (CUT Mode)

If an unexpected reply is received by the host from the PC, the corresponding INBOUND text line:

```
INBOUND: POSITIVE REPLY AID ENTER ............... MODULE=INWPnnnn.......23
INBOUND: DATA FRAME (DATA ENCODED) ............. MODULE=INWPnnnn.......29
INBOUND: DATA FRAME WITH EOF INDICATOR *z ...... MODULE=INWPnnnn.......28
```

is replaced by:

```
INBOUND: NEGATIVE REPLY AID xx ................. MODULE=INWPnnnn.......18
```

The AID (Attention Identifier) may be one of the following:

F1 = The PC detected an error in the transmitted data. File transfer is terminated.

F2 = The PC detected an unrecoverable error. File transfer is terminated.

?? = An unexpected AID (other than F1, F2, or ENTER) was received. File transfer is terminated.

If these negative replies occur repeatedly without any operator intervention, contact IBM for support. However, negative replies are also recorded if, after a session hangup, the operator presses any keys in the host session that generates an AID. It is, therefore, recommended to display the trace file in CICS temporary storage from another terminal to avoid disturbing the host session in the hangup state.

Setup Errors (CUT Mode)

If a setup error is detected, diagnostic information is recorded in the trace files and an attempt is made to display a corresponding message. Depending on the type of error, the system may not be able to display such a message. Check the trace output for diagnostic information.

If the TRACECUT option was specified for a PC that has the EXTDS feature defined, message INW0052I is issued and the text shown below is recorded in the trace files:

```
INFO: CUT MODE ASSUMED DUE TO TRACECUT OPTION .. MODULE=INWPQUER.......16
INFO: EXTDS FEATURE DEFINED ................... .. MODULE=INWPQUER.......04
ERROR: EXTDS FEATURE INVALID FOR TRACECUT OPTION MODULE=INWPQUER.......08
```

If the TRACE option is used for a PC connected to a controller that does not support EXTDS, the QUERY REPLY command causes CICS to set the session out of service. If this happens, the session must be reactivated with the CICS command

```
CEMT SET TE(nnnn) INS ACQ
```

where nnnn is the terminal ID. The trace files will contain the following diagnostic information if the EXTDS feature was specified:

```
INFO: EXTDS FEATURE DEFINED ................... .. MODULE=INWPQUER.......04
OUTBOUND: SEND QUERY REPLY TO CHECK CUT OR DFT.. MODULE=INWPQUER.......21
ERROR: QUERY REPLY REJECTED ..................... MODULE=INWPQUER.......02
ERROR: TERMINAL WILL BE SET OUT OF SERVICE ..... MODULE=INWPQUER.......10
INFO: TERMINAL IS IN CUT MODE ................. .. MODULE=INWPQUER.......19
ERROR: TERMINAL DOES NOT SUPPORT EXTDS FEATURE.. MODULE=INWPQUER.......11
INFO: REMOVE EXTDS FEATURE FROM TCT AND ..... .. MODULE=INWPQUER.......12
INFO: RETRY TRACE WITH TRACECUT OPTION ...... .. MODULE=INWPQUER.......13
```

If EXTDS was not specified, the following diagnostic information will be recorded:

```
INFO: EXTDS FEATURE NOT DEFINED ............... .. MODULE=INWPQUER.......03
OUTBOUND: SEND QUERY REPLY TO CHECK CUT OR DFT.. MODULE=INWPQUER.......21
ERROR: QUERY REPLY REJECTED ..................... MODULE=INWPQUER.......02
ERROR: TERMINAL WILL BE SET OUT OF SERVICE ..... MODULE=INWPQUER.......10
INFO: TERMINAL IS IN CUT MODE ................. .. MODULE=INWPQUER.......19
INFO: RETRY TRACE WITH TRACECUT OPTION ...... .. MODULE=INWPQUER.......13
```

If this information is shown, repeat the trace with the TRACECUT option.

Chapter 10. Diagnosis Procedures for More Experienced Users

If you contact IBM for help, you may be asked to locate various control blocks in a formatted dump. For details on a formatted dump refer to "Chapter 6. Using Dumps for Error Diagnosis" on page 67.

Also, you may be asked to produce a trace with the SDAID program. For details on SDAID traces refer to "SDAID Overview" of the manual *VSE/ESA Diagnosis Tools*.

Incorrect Output Symptom

Errors in program logic or in the system setup for program execution may cause errors in the output. For example, the use of incorrect data for input, mistakes in device assignments, or incorrect job control statements and commands often result in unexpected output.

Data You Should Collect

- System console log (printout of hardcopy file).
- All output associated with the program in error.
- System/partition dump. If this is not available, rerun the job and take a dump when the incorrect output occurs again.
- Job stream used.
- A list of all I/O files and volumes used by the particular program.
- EREP output, if possible.

Diagnosing Steps

1. Identify the SYSLOG output for the job in error and, if possible, the input stream for the job submitted.
2. Was there any incorrect operator's response to a message during execution of the failing program? If so, rerun the program and ensure that the operator's responses are correct (see *VSE/ESA Messages and Codes*).
3. Find out whether input data read by the program from magnetic tape or disk is still available. If so, make sure that the data will be saved for later problem analysis.
4. Find out about the status of the hardware at the time the program was running (for example, whether an I/O unit used showed an error). Analyze possible effects of any unusual hardware status on the program.

   If you suspect that a hardware error may have caused the incorrect output, check the hardware and rerun the program.
5. Determine the execution environment.

   If the program was executed under control of VSE/POWER, find out whether other programs running under control of VSE/POWER were also generating incorrect output. If so, consult the documentation of VSE/POWER.
6. Classify the incorrect output by the type of the output error:
   - **Duplicate lines** written to the I/O device. This suggests unintended loops in the program's I/O routines.

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- **Missing data**. This suggests that specific routines of the failing program either did not receive control, or they lost control before they were completely executed.
- **Too much or unexpected output data**. I/O areas may have been overwritten or, if the output consists of variable-length records, these areas may not have been cleared properly.

If the incorrect output falls into one of the above categories, rerun the program with the SDAID trace on. Trace the (1) execution of instructions involved in building the output records and (2) alteration of storage areas in which the faulty output is built or written from. The trace information provided by SDAID should give you an indication of the cause of the incorrect output. If the incorrect output does not fall into one of those categories, continue with the next step.

7. Find out about the system condition at the time of program execution.

   Was there any abnormal interruption in system operation? If so, analyze the possible effects of that interruption on program execution and rerun the program.

8. Check the job stream used for the program.

   This check is also indicated if a cataloged procedure is used. Use LIBLIST to display library chains involved. When you have isolated the error, make the necessary corrections in the program and rerun it.

9. Determine whether the input is at fault.

   a. Verify the label information.

      Use program LSERV to list label information, program LVTOC to list VTOC information, and program IDCAMS to list catalog information. Compare the output of these programs with the label information provided in the job stream.

   b. Isolate suspected areas in the input files by comparing the input for the program with the associated output.

      For example, a missing record in the output could indicate an erroneous area in the appropriate input file. If the program's input is the output of another program, you may have to analyze the program whose output is used as input for the failing program.

      Obtain a dump of the suspected area(s) of the appropriate input file. It might be worthwhile to check file definitions (for example, DTF macros when logical IOCS is used or the CCB or CCW if physical IOCS is used) against the characteristics of data in the input file.

10. Examine the output of the partition dump.

    Inspect the contents of the I/O area(s) and, if the program's I/O routines use physical IOCS, also of the involved CCBs or IORBs. In the latter case, check also the channel program (CCW chain). If this does not help you in isolating the cause of the error, continue with the next step.

11. Rerun the program with the SDAID trace program.

    Use the program listings and the information obtained so far to determine the approximate area of the failure.

    Select the tracing instructions related to the incorrect output. Consider also a storage-alter trace. Requesting a program-load trace in addition may be helpful since it provides a record of the phases called by the program.

    Request SDAID to provide a dump of the I/O areas used by the program. If the program uses physical IOCS, let SDAID print the contents of the applicable CCBs or CCWs on certain events.

Evaluate the SDAID output:

- Compare the I/O areas as defined in the program listings with the contents of these areas in the SDAID dump.
- Inspect the contents of the CCBs or CCWs, if applicable.
- Check the sequence, names, and load- or entry-point addresses of the phases used by the failing program and compare them with the addresses given in the linkage editor map.
- Check the storage-alter trace output for possible field overlay in output (or input) records.
- Use the program listings and the SDAID dump output for inspecting the values in registers and storage locations used for intermediate results.

If any of the above steps help you finding the cause of the error, correct your program and rerun it.

12. Check for unusual conditions generated by the program and its input.

    Ensure that the program logic and control counters, if any, can handle unusual input. For example, changes in the date (year) or extraordinary changes in amounts and quantities.

13. Gather additional error information.

    Rerun the failing program with input that is known to be correct. Recreate the conditions identical to those which existed when the failure occurred. For this run, dump the contents of the I/O areas before and after an I/O operation using the PDUMP macro.

    If the program uses VSE/VSAM files, use the macros TESTCB or SHOWCB before and after each OPEN, GET, and PUT.

14. If necessary, contact IBM for support and have the data collected available for problem analysis.

Abend Symptom

Data You Should Collect

- System console log (printout of the hardcopy file).
- A dump taken when the job was canceled.
- SYSLST (or other printer) output of the failing program.
- Job stream of the failing program.
- Link map produced by the ACTION MAP linkage editor statement.
- Source listing (or source deck) of the program that caused the abend.

Diagnosing Steps

Determine the Type of Program Cancelation

Check the cancel message issued. The message indicates one of the following:

- Program check: Continue with the next step.
- Illegal SVC: Go to “Procedure: Program Canceled Because of Illegal SVC” on page 151.
- Other reason: Go to “Procedure: Program Canceled for Undetermined Reason” on page 152.

Determine Where the Program Cancelation Occurs

1. Determine whether the *failing instruction* was executed from within the *SVA* by examining the output of the system or partition dump if the program check

occurred in the SVA. The SVA phase containing the failing instruction is included in the dump output under the heading:

SVA PHASE IN ERROR = phasename ADR=xxxxxx

Locate the failing instruction in the system dump output. Try to determine the reason for the cancelation by investigating the interrupt code. If that instruction is part of an IBM-supplied phase, call IBM for support. If the instruction is part of another phase, consider the recommendations in steps 4c and 4d below for your code that is being executed from the SVA.

2. Determine whether the program check occurred in the *LTA*.

   This is indicated by message 0S08I, which displays the name of the phase that was last loaded into the LTA. This is most likely an IBM-supplied phase. If so, contact IBM for support.

   Analyze the dump:

   a. Examine the contents of the general registers for unreasonable or unexpected values. The symptom REGS/xxyyy shows you the registers which may be related to the failing instruction. Examine the code that loads those registers.

      For the symptom REGS/xxyyy, refer to "Example 1: Displaying a Symptom Record" on page 74.

   b. Locate the areas that were referred to by the code which loads those registers. Check the contents of those areas for validity, duplication, or lack of information. Examine (in the source listings) the code that manipulates those areas.

   If the above steps do not give an indication of the cause of the error, consider a rerun of the canceled program with the SDAID trace. Trace the execution of the instructions related to the problem and, as applicable, the program check and alterations of storage locations. This should give you sufficient error information for reporting the problem.

3. Check the symptoms RIDS and PIDS to determine whether the program check occurred within an *IBM Program* running in the partition where the canceled program was being executed. If so, contact IBM for support.

   For the symptoms RIDS and PIDS, refer to "Example 1: Displaying a Symptom Record" on page 74.

4. If the program check was caused by *your own code*, isolate the cause of the failure by using the techniques recommended below.

   a. Examine any *error message* that may have been issued during execution of the failing job and consult *VSE/ESA Messages and Codes* for an error indication. Examine the job stream, the program's source listings, or both, and evaluate your findings.

   b. If your failing program used an abnormal termination exit routine (defined by STXIT AB), examine the *cancel code* provided in register 0. For a list of these codes, see the *VSE/ESA Messages and Codes* manual.

   c. If, at this point, the gathered information is insufficient to isolate the cause of the problem, consider reassembling and relinking your program (phase) with:
      - The PRINT GEN assembler instruction (which prints the instructions generated by the assembler as the result of a macro), and
      - The PDUMP macro (to obtain a dump of selected areas such as I/O) and the DUMP or JDUMP macro (to obtain a dump of the partition *and* the supervisor) inserted in the critical routine(s) at a convenient point before the program check occurs.

Re-analyze the problem using the output obtained from the rerun of the malfunctioning program.

d. Locate the failing instruction in the dump and compare its hex representation with that of the instruction in the source listings. If they differ, find out why they differ. Either by further offline analysis of the source code or by a rerun of the job with the SDAID trace on. Trace the storage alter operation that changes the code of the particular instruction.

e. Locate (in the dump) the partition's save area and inspect the contents of the general purpose registers. If you find suspicious values in any register that is related to the failing instruction, locate, in the program listings, the code that loads those registers and inspect that code.

   Consider a rerun of the job with the SDAID trace on. Trace selected instructions like branch operations; specify appropriate address limits for this tracing activity. Request SDAID to provide a dump of critical areas on the occurrence of certain storage-alter or branch events.

f. Use the program listings and the linkage editor map (produced by ACTION MAP) to locate data areas used by the failing instruction in the dump output. Determine the relocation factor based on the partition's start address at the time when the failing phase was executed.

   Inspect the contents of these areas for validity, duplication, missing information, or sequence errors, whichever applies depending on the generated VSE message(s). Locate the code that is responsible for moving data to those areas and inspect that code.

   Consider a rerun of the job with the SDAID trace on. Trace events as recommended above.

Correct the faulty code and rerun the job.

Procedure: Program Canceled Because of Illegal SVC

An illegal SVC cancelation of a program is indicated by *message 0S04I,* which displays the faulty SVC code.

1. See *VSE/ESA Messages and Codes* and follow the instructions given under "Programmer Action" for that message. If this does not correct the problem, continue with the next step.
2. Check whether the supervisor includes support for the SVC code displayed in the message.

   If your supervisor does not support the displayed SVC, either reassemble the supervisor to include the required support or change your program to avoid this SVC. Rerun the program.
3. Check whether a correctly coded SVC instruction has been altered during program execution.

   To do this, use the linkage editor map and a source statement listing that shows the expansions of the macros used in the program. (This type of a listing is obtained by a program assembly run with the PRINT GEN assembler instruction included in the source code.) Locate the SVC instruction in the source statement listing.
4. Rerun the program with the SDAID trace on.

   If the code in the source instruction differs from the code displayed in the message, that code has probably been overwritten during program execution. Consider a rerun of the failing program with SDAID trace on. Trace the alteration of the storage locations that contain that SVC instruction.

   The trace information provided by SDAID indicates which instruction of the failing program altered the code. If that instruction is part of an IBM-supplied

routine, call IBM for support. Keep your problem analysis records (and notes), including the assembly listings of the supervisor used at the time of program failure, for further problem analysis. If the instruction is part of your own code, correct your program and rerun it.

Procedure: Program Canceled for Undetermined Reason

1. Inspect the messages printed on SYSLOG and SYSLST prior to program cancelation.

   Ensure that the responses to VSE messages were correct and follow the recommendations given in the *VSE/ESA Messages and Codes* manual.

   The program may have been canceled because of an unusual condition. This condition may have been caused by an incorrect response to a message issued by the system during program execution.
2. Rerun the program with the job control statement // OPTION PARTDUMP inserted in the job stream.

If necessary, contact IBM for support and have the data collected available for problem analysis.

Wait Symptom

Note that a VSE/ESA **unattended node** system has special features for handling wait conditions. For details, refer to "Unattended Node Environment" on page 8.

A CPU is in a wait state if it does not execute any instruction. Whenever bit 14 (W-bit) in the current PSW is on, a CPU is said to be in a wait state. A visible indication is the wait indicator at the system console panel which is turned on.

There are two types of wait states: a **Soft Wait** or a **Hard Wait**.

- In a hard wait state, the I/O and external interrupts are disabled; bits 6 and 7 of the current PSW are both off. This indicates that a hardware or programming error cannot be associated with a single program only. A hard wait requires a re-IPL of the system.
- In a soft wait state, I/O and external interrupts are enabled. Any interrupt causes the system at least temporarily to get out of the wait state. Soft waits are normally caused by non-posted event control blocks (CCBs, IORBs, or ECBs). Usually, no re-IPL of the system is required.

  Soft waits are grouped into:

  – Temporary soft waits.

    The system can escape from the wait without any operator intervention. A temporary soft wait indicates *normal processing* and not a failure, except the wait occurs again and again. This may indicate an I/O instruction loop.

  – Permanent soft waits.

    The system cannot escape from the wait without operator intervention. A permanent soft wait is most likely an indication of an operating or programming error. To exclude an operating error, the operator must ensure that all outstanding replies to messages have been answered and that required attention routine commands have been entered.

When a wait occurs, collect the information about the system status *during the time* the wait exists.

Data You Should Collect

- For a **Soft Wait**:
  - Saved status information.
  - Stand-alone dump or partition dump if problem can be isolated to a partition (DUMP pp,cuu).
  - System console log (printout of the hardcopy file).
  - EREP output covering a reasonable time before the error occurred.
- For a **Hard Wait**:
  - Saved status information.
  - Stand-alone dump.
  - System console log (printout of the hardcopy file).
  - EREP output.

Diagnosing Steps

Procedure: System or Program Entered Wait State

If you contact IBM for support, ensure that all the data about the failure is available: The attention command DEBUG ON should have been used prior to recreating the problem whenever possible.

1. Determine the type of wait: Soft Wait or Hard Wait. For details, refer to "Recovering from a Wait State" on page 155.

   In case of a soft wait, turn to "Procedure: Soft Wait" on page 154.

   In case of a hard wait, proceed with the next step.
2. Compare the contents of bytes 0 through 3 of processor storage with the hard wait codes as listed in *VSE/ESA Messages and Codes*.

   If the code in those bytes is not listed, continue with "Procedure: Hard Wait with No Wait Code" below.

   If the wait code suggests that the hard wait condition has been caused by an IBM program, call IBM for support. Examples of such wait codes are:

   ```
   X'00 00 0F FF' - a program check in the supervisor.
   X'00 00 0F FB' - a page fault in a supervisor routine.
   ```
3. Attempt to isolate the possible cause of the error by using:
   - The dump (or notes) of low address storage for locating the old PSW applicable to the wait code.
   - The stand-alone dump output.
   - The DEBUG trace information pointed to by storage address X'270' may be especially useful in locating the error.
   - If the hard wait code seems to be device related, try to get the appropriate device corrected or use a different device if possible.
   - If the hard wait code points to an IBM program or to a system error, contact IBM for support.

Procedure: Hard Wait with No Wait Code

1. Check whether VSE/POWER was used when the system entered the wait state (establish this from the SYSLOG output).

   If VSE/POWER was used, re-IPL your system and rerun the problem program in a partition whose unit record input and output is not being spooled. Consider also running appropriate SDAID traces with dumps specified. If the error still appears, continue with the next step.

   If the problem program runs successfully, consult the VSE/POWER documentation.

2. Check the available dump for unexpected or unreasonable values in the following areas:
   - Old PSWs in low address storage (machine check, program, I/O, SVC, external). Note the interrupt codes.
   - General purpose registers.
   - Control registers.
   - CSW and CAW.
3. In the dump, examine the contents of relevant control blocks (for example: SYSCOM, LUB, PUB, CHANQ, PIB, ERBLOC).
4. You may want to examine the LTA. The first eight bytes of that area contain the name of the transient phase that was being executed in the LTA at the time the wait state was entered; provided that name was not modified by program action. (You can find the address of the LTA in the SYSCOM).

   If a user-written transient was executed last, obtain the listings of that phase (in source code) and check the use of SVC22. The first occurrence of that SVC seizes the system, the second one releases it.
5. Recreate the hard wait situation while the SDAID trace is running.

   If the above two steps do not provide an indication for the cause of the malfunction, trace the suspected instructions and the alteration of specific storage areas. Request, in the TRACE command, dumps of critical storage areas on occurrence of storage-alter events. This should give you enough information for final error diagnosis.

   If the output of the SDAID trace does not give an indication of the cause of the error, contact IBM for support.

Procedure: Soft Wait

1. Determine which of the active tasks were waiting and why.

   In the dump output, locate the PIB extension (PIB2TAB) table. The four-byte pointer at displacement 8 of the table points to the Partition Control Block (PCB). Locate the task ID string at displacement X'20' of the PCB. All non-zero bytes represent the task IDs of all the tasks that have been started in this partition. The reason of a soft wait can be found by examining the task status flag (TIB+X'20'=TIBRQID) of all tasks that have been started. Any task status other than X'80' and X'83' is indicating a task wait state. Byte 4 through 7 of the TIB, in this case, contain bound state information. This can be the address of a control block (CCB/IORB, ECB, or TECB) if the task is I/O bound (X'82') or it could be the address of a resource for which the task is waiting for.
2. Examine (and take notes of) the return PSW of each affected task.

   Use the instruction address contained in that PSW to locate the instruction that will be executed when the partition (or task) regains control.
3. Analyze the program(s) running when your system entered the wait state.

   Use the program listings and the linkage editor map for each of the programs that were running. Together with the instruction address in the associated return PSW, locate the re-entry instruction in the program listings.

   Check the coding of the applicable routine for correct usage of macros such as ENQ, DEQ, and WAITM (possibly, a task waited for a particular resource). For details about these macros and their formats, refer to the manual *VSE/ESA System Macro Reference*.
4. If the above actions did not help you resolve the problem, consider executing the problem program with the SDAID trace on. Trace the applicable instructions and, possibly, the alteration of involved registers or storage areas. This should provide sufficient information to isolate the cause of the soft wait condition.

If necessary, contact IBM for support and have the data collected available for problem analysis.

Recovering from a Wait State

1. Did you run the SDAID trace?

   ==> If YES, check for the SDAID wait codes in the address part of the wait PSW.

   - If the PSW contains X'00EEEE', an event occurred for which OPTION=HALT was specified.
   - If the PSW contains X'EEEEEE', the SDAID output device requires attention. Display the low storage bytes 0 - 3 for further device information.

   In both cases, refer to "Starting/Terminating Tracing in a System Wait Condition" in the *VSE/ESA Diagnosis Tools* for the restart possibilities (and the meaning of the codes stored in bytes 0 and 1).

   ==> If NO, continue with the next step.

2. If it is a **Hard Wait** (bits 6 and 7 of the current PSW are both off), proceed as follows:

   a. If the address part of the current PSW (bits 40 through 63) is unequal to X'00EEEE' there is no way to recover. Take a stand-alone dump and re-IPL your system as described under step 6.

   b. If the address part of the current PSW (bits 40 through 63) is equal to X'00EEEE', *restart* the system. If this is not possible, take a stand-alone dump and re-IPL your system as described under step 6.

3. If it is a **Soft Wait** (bit 6 or 7 or both of the current PSW are on), proceed as follows:

   a. Display low address storage bytes 0 - 3 (with ALTER/DISPLAY). Bytes 2 through 3 may contain the cuu address of a failing device and the system is unable to report this problem on the system console. In this case, byte 0 contains the message number and byte 1 contains the message type. The operator must perform the manual procedures as described in the *VSE/ESA Messages and Codes* manual for the message number in byte 0.

   b. Enter an appropriate attention or subsystem command to retrieve additional information that helps you in finding the problem area.

   c. Try to find a PUB entry which has an I/O operation enqueued, but which has not yet been started (DEVBSY bit in PUBCSFLG is off). Issue the *ONLINE cuu* command to get that device selected for restart.

4. If the problem affects the whole system, do a STORE STATUS/MACHINE SAVE and take a stand-alone dump for problem analysis. Refer to "Taking a Stand-Alone Dump" on page 115 for details. Re-IPL the system.

   If the problem can be isolated to a single partition, use the command **DUMP pp,cuu** to create a partition dump for problem analysis.

   If necessary, contact IBM for support and have the data collected available for problem analysis.

Loop Symptom

A loop may be caused by one of the following:
- A coding or logic error in the program.
- An error in setting up the job.
- Malfunction of an I/O device.

Data You Should Collect

- System console log (printout of the hardcopy file).
- Stand-alone dump.
- Output of the MAP command.
- Output on SYSLST; if the loop includes user-written code, also output on the line printer owned by the particular partition.
- Trace information (notes if the loop was traced by manual operation, otherwise the output produced by SDAID). Trace information should include a recording of PSW and general-register displays.
- Link map of virtual storage of the running program (ACTION MAP).
- Source listing (or source deck) of the program that was running when the loop occurred.

Diagnosing Steps

1. Can you communicate with the **Attention Routine?**

   ==> If YES, go to the next step.

   ==> If NO,

   - Are there any messages when you attempt to activate the attention routine or to reply to a pending reply ID?

     ==> If NO, the loop is probably a supervisor disabled loop. Sample the current PSW to determine if the loop is tight or long, and at the same time display low address bytes to see if the loop contains any interrupts.

     ==> If YES, the loop is long and is enabled for interrupts. Sample the loop by displaying the current PSW. At the same time display low address bytes and note any interrupt data changes.

   Note: The method for *tracing a loop* depends on whether the loop is tight or long, and whether it is interruptible or not. You determine this by sampling the current PSW to see if the loop is tight, and at the same time display low address bytes to see if the loop contains interrupts. If the loop is tight, do instruction stepping (as indicated in the Operation manual for your processor). If the loop is long sample the loop. In either case, if the loop is interruptible, note the interrupt data in low storage at the same time.

2. Is more than one partition active?

   ==> If NO, trace the loop as described in the Note above and record the contents of low address bytes. Do a STORE STATUS and take a stand-alone dump.

   ==> If YES, (optionally) invoke an SDAID trace.

   For an indication of the range of the loop, trace applicable branch and I/O instructions and possibly program fetch and load. Limit the trace to the partition with the fault.

3. If necessary, do a STORE STATUS and take a stand-alone dump.

Additional Considerations

1. Determine where (in IBM or user code) the loop occurred.

   Use for this purpose (1) the trace of the loop (SDAID output of a branch trace or the notes on a manual trace) and (2), if necessary, the linkage editor map and the stand-alone dump output.

   If the loop is entirely within IBM code, make sure that all your records on the failure are available and contact IBM for support.

   If the loop is not entirely within IBM code, continue with the next step.

   Isolate the loop to a single routine or section of code.

2. Use the listings and the documentation provided for the code to analyze the reason for the loop. This may require a code inspection, instruction by instruction. You might also consider a rerun of the program with the SDAID trace on. Trace specific instructions and the alteration of specific storage areas. If your loop extends beyond phase boundaries, include a trace of phase fetch and load activities.

   You should pay particular attention to the following items when checking the code:
   - Counters that can never reach their limits, that are not updated, or that are not initialized.
   - Counters that are not tested properly each time an intended loop is executed.
   - I/O operations that cannot be completed because of the program's logic flow.
   - Correctness of values passed to a program.

   If necessary, contact IBM for support and have the data collected available for problem analysis.

Appendix A. Problem Log and Change Log

Problem Log

To keep a detailed record of system problems, you should create a Problem Log. Figure 40 shows a problem log example. In the log, record the problem in detail and what was done to correct it.

Note: The documentation for the applications run at your installation should include error recovery procedures.

```
          PROBLEM LOG FOR ........       PAGE 1

Entry for: ........     Date and Time: .............

Problem Reported by: ...........

Problem Severity: ...   (1: System unusable)
                        (2: Operation still possible)

Problem Description: ............................

  ..............................................

  ..............................................

Error Messages (SYSLOG, SYSLIST): ..............

Partitions Running:  ............................

Partition Priorities: ...........................

Jobs Running: ...................................

Devices Involved: ...............................

Listings/Dumps: .................................

Action Taken: ...................................

  ..............................................

REPORTED TO IBM:     YES/NO

  Problem Number: ...............................

  Fix Provided: .................................

  Fix Applied: ..................................

Final Status: ...................................

Date Closed: ....................................
```

Figure 40. Problem Log Example

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Change Log

Maintaining system resources is an important task of the system administrator. For example:

- Define or delete a file.
- Create a user library.
- Extend file space.
- Install an IBM licensed program.

If an erroneous change was implemented, messages like the following may be the result:

```
1A80I  SYSTEM FILE OPEN FAILURE
4181I  NO LABEL INFORMATION ...
4228I  FILE filename OPEN ERROR X'nn'(nnn) ...
4n01I  NO FORMAT 1 LABEL FOUND ...
4n42D  NO MATCHING EXTENT ...
4n98I  OVLAP UNEXPRD SECRD FILE ...
```

Note: To avoid such problems, check the output when performing such tasks carefully. Especially, look for any error messages.

You should **carefully plan** for any system changes required and create a **permanent record** of them. Figure 41 shows an example of a change log form. A Change Log reduces the chances that you may accidentally damage your system. For example, by restoring a back-level version of a library. It also helps you identify problems caused by system changes.

```
CHANGE LOG FOR ........          PAGE 1
                                 Date: ........

Change Description: ..............................
  ..............................................
  ..............................................
Dialog(s) Used: ..................................
Job Stream(s) Used: ..............................
Job Status: ......................................
Tape(s) Used: ....................................
Disk(s) Used: ....................................
Reason for Change: ...............................
  ..............................................
  ..............................................
  ..............................................
```

Figure 41. Change Log Example

Appendix B. Problem Symptom String and APAR Submission

The Problem Symptom String

Any problem that seems to be caused by IBM code should be described to IBM in the form of a symptom string. An example of the problem symptom string that IBM expects is shown in Figure 42. It consists of:

1. Product ID, which identifies the system and its release level.
2. The system change (refresh) level.
3. The affected component.
4. The change level of the affected component.
5. The applicable failure-type keyword.
6. Supplementary information.

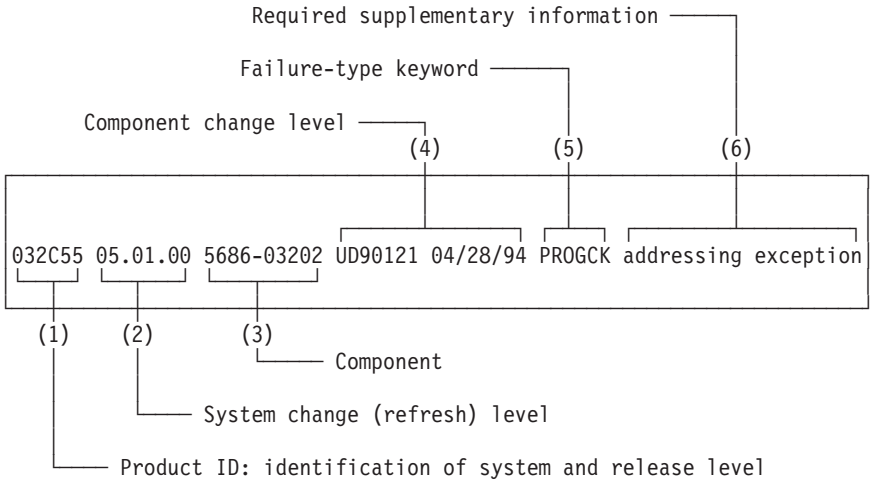

Figure 42. Elements of a Problem Symptom String

You can retrieve items (1), (2), and (4) from your system's history file. Therefore, make it a habit to obtain a printout of your system's history file each time you install an IBM program, a system refresh, a PTF, an APAR, or a local fix.

Keep a copy of this printout on file, in case you need to present a software problem to IBM. Item (3) is the identification of the IBM program (component) causing your problem.

Obtaining a System History Printout

To obtain an up-to-date change level record of your system, access the *Problem Handling* panel and select:

5 (Retrace History File)

To get a history overview retrace as shown in Figure 43 on page 163, use the *Retrace* dialog. To get a component retrace as shown in Figure 44 on page 164, use the *Retrace Components* dialog.

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Problem Symptom String

Enter the RETRACE statement with no keywords to produce an OVERVIEW listing, an example of which is shown in Figure 43 on page 163. For the example in Figure 44 on page 164 enter 0 RETRACE COMPONENT.

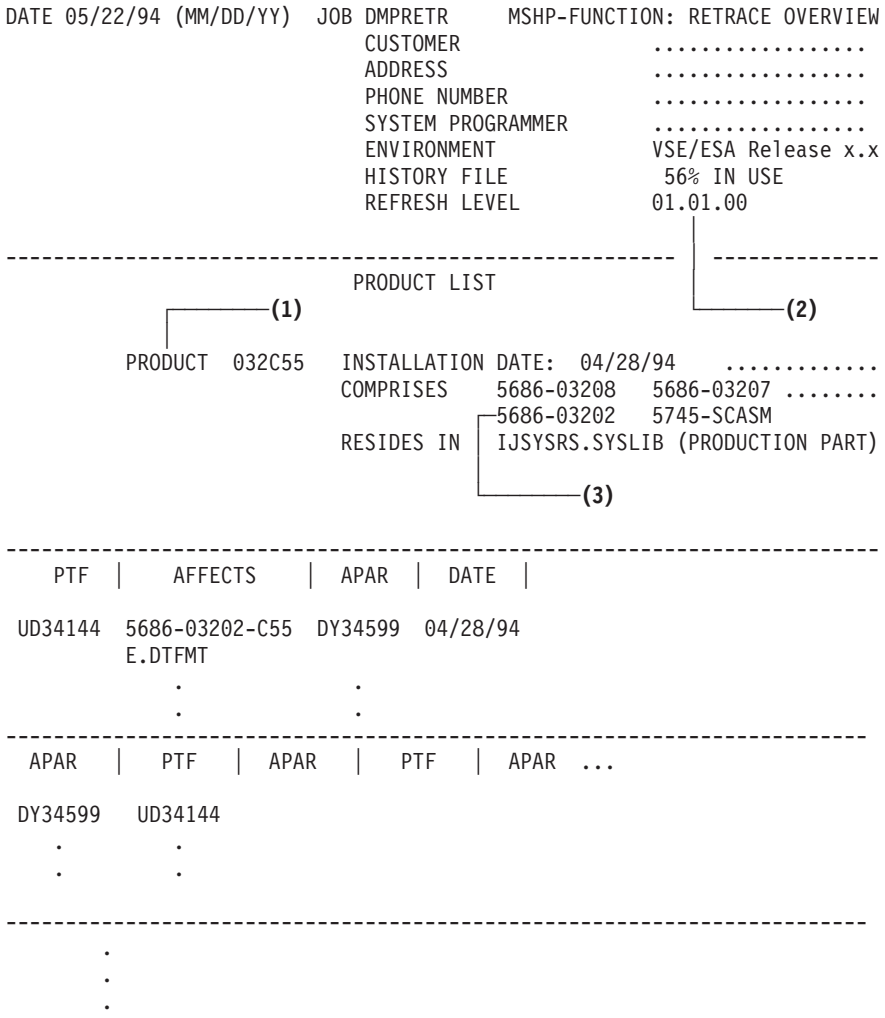
Following is a description of each of the information items shown in Figure 42 on page 161, telling you where to find the required information.

Displaying the System or Refresh Level of Your System

At the system console, you can display the system or refresh level of your installed system with procedure SYSTEMID:

```
0 EXEC PROC=SYSTEMID
BG 000 * ================================== *
BG 000 *                                    *
BG 000 *       YOU ARE CURRENTLY RUNNING    *
BG 000 *           VSE/ESA x.x.x            *
BG 000 *                                    *
BG 000 * ================================== *
BG 000 EOP SYSTEMID
```

This information is also shown in the header of the retrace overview. See Figure 43 on page 163.



Note: Horizontal lines represent new pages.

Figure 43. Example of a RETRACE Printout (History Overview)

Problem Symptom String

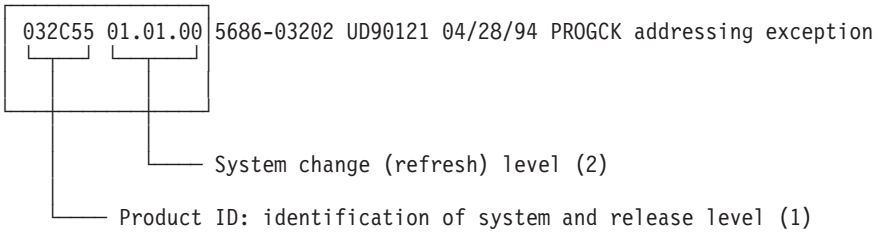
```
DATE 05/22/94 (MM/DD/YY)  JOB DMPRETR     MSHP-FUNCTION:  RETRACE COMPONENT
                              CUSTOMER                ...................
                              ADDRESS                 ...................
                              PHONE NUMBER            ...................
                              SYSTEM PROGRAMMER       ...................
                              ENVIRONMENT             VSE/ESA, Release x.x
                              HISTORY FILE             56% IN USE
                              REFRESH LEVEL           01.01.00

-------------------------------------------------------------------------

                             COMPONENT LIST

         COMPONENT: 5686-03202   LEVEL = C55   CORRECTLY INSTALLED: 04/28/94
         PRODUCTION PART IN: IJSYSRS.SYSLIB

-------------------------------------------------------------------------
  PTF     |STATUS|   COMPONENT  |   APARS   |  AFFECTS |  DATE  |
:p.
UD34144           5686-03202-C55  DY34599    E.DTFMT    04/28/94   PRE = C55
   .                    .           .            .
   .                    .           .            .

UD90121           5686-03202-C55  DY33217    C $$ABEREE 04/28/94   PRE = C55
   |                                                     |
   |_______(4)___________________________________________|


-------------------------------------------------------------------------
 APAR  |    AFFECTS    |   PTF  |  DATE  |           FIX   DESCRIPTION

DY33217  5686-03202-C55 UD90121  04/28/94
DY34599  5686-03202-C55 UD34144  04/28/94

-------------------------------------------------------------------------
           .
           .
```

Note: The last three columns of the PTF listing, REQUIRES, SUPERSEDES, and SUPERSEDED, are not shown.

Figure 44. Example of a RETRACE COMPONENTS Printout

Identification of the Failing System

```
 ┌──────────────────────┐
 │ 032C55 01.01.00 │5686-03202 UD90121 04/28/94 PROGCK addressing exception
 │ └─┬──┘ └──┬───┘ │
 │   │       │     │
 └───┼───────┼─────┘
     │       │
     │       └──── System change (refresh) level (2)
     │
     └──── Product ID: identification of system and release level (1)
```



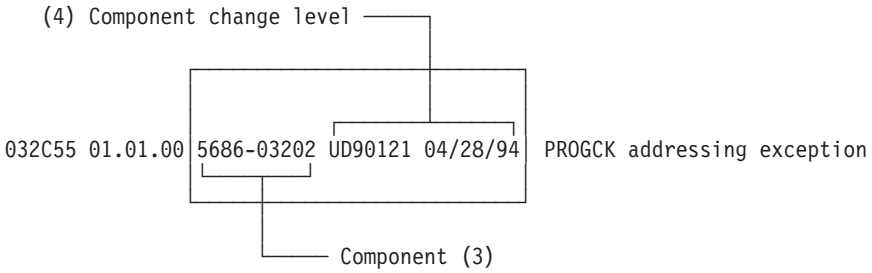
(1) Product ID

In Figure 43 on page 163, (1) points to the *product ID* (032C55 in this example).

(2) System Change (Refresh) Level

The *system change level* of your system is identical with its refresh level as shown in Figure 43 on page 163. In the example used, (2) points to the refresh level 01.01.00.

Identification of the Failing Component



(3) The Component

If you have come to the conclusion that your problem was caused by an IBM program (product), the name of that program gives you an indication of the component that failed. In the example used, (3) points to component 5686-03202 of product 032C55. Ask IBM for details, if necessary.

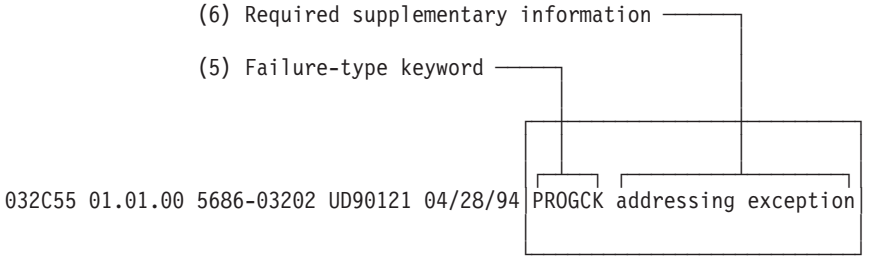
(4) Component Change Level

Under "Component List", Figure 44 on page 164 lists all the components that are part of the installed system. That component's *change level* is given either:

- By the "Correctly Installed" date if no PTF had been applied to that component up to the time the problem occurred, or
- By the number and application date of the PTF most recently (last one) applied. In the example used, (4) points to PTF UD90121 which is the PTF that was applied last.

Description of the Type of Failure

Information (5) and (6) must be supplied by the user and depends on the error that occurred. For failure-type keyword, see description below.



(5) Failure-Type Keyword

For a search of IBM's data base RETAIN, a program failure should be categorized by one or a combination of the failure-type keywords listed below. Report your problem to the IBM Support Center with the applicable failure-type keyword(s). The keywords are:

Problem Symptom String

MSGx...x
An incorrect message occurred, or a message was incomplete or missing.

where

x...x = the message identifier printed by the system, which you use to find the message explanation in the *VSE/ESA Messages and Codes* manual.

PROGCK
A program check occurred.

Any problem that causes the system to terminate (cancel) a program before completion. This includes program abend situations.

INCORROUT
Program output is incorrect.

LOOP An unintended loop occurred.

WAIT A wait state occurred. This includes also error situations described as suspended online activities in this manual.

PERFM
A performance problem occurred.

DOC A publication contains incorrect information or required information is missing.

Each of these failure keywords is discussed in the following section.

An Incorrect Message Occurred (MSGx...x)

Message, in this context, may also be an assembler-originated MNOTE, compiler-originated diagnostic information, or any diagnostic code such as a return or error code in a register (normally register 15) or in a field of a control block.

A problem would fall into this category if, for example, you performed the action recommended by the particular message, but
The problem still persists, or

Your action created another problem.

If your system displayed a message which is not documented in *VSE/ESA Messages and Codes*, (or in another applicable "Messages" manual), report this as a documentation (DOC) problem.

An incorrect message problem would be submitted to IBM with a failure-type keyword such as the following example:

```
MSG4122I   (indicates a problem with message 4122I)
```

A Program Check Occurred (PROGCK)

When a program check condition occurs, the system indicates the type of program exception in message 0S03I. For a successful search of RETAIN in case of a program-check problem, IBM needs to know what type of a program exception (such as addressing exception or operation exception) was displayed by the system. A program abend or cancel situation falls into this category too.

Program Output is Incorrect (INCORROUT)

If you have come to the conclusion that IBM code is at fault, submit the problem with a failure-type keyword as follows:

```
INCORROUT D/Tnnnn function
```

where

```
D/Tnnnn  = IBM device type; for example: D/T3211.
```

function = the failing function; for example:

```
SKIP    for skipping a line
PRINT   for printing a line
SELECT  for selecting a stacker
WRITE   for an erroneous WRITE operation
```

or

```
   the name of the IBM program that produced
   the incorrect output.
```

For a successful search of RETAIN with INCORROUT as failure-type, IBM requires, as a component name, either the name of the IBM language translator that was used to compile or assemble the failing program or the name of the access method used.

A Loop Occurred (LOOP)

If your problem is an unintended program loop and you have good reason to believe that IBM code is at fault, use LOOP as the failure-type keyword. If possible, provide, as supplementary information, the name of the program in which the loop occurs.

A Wait Occurred (WAIT)

If you have isolated the cause for the wait condition to IBM-supplied code, submit the problem to IBM with WAIT as the failure-type keyword. If the system displayed a wait code, provide that code as supplementary information. For a list of wait codes that may be displayed by the system, see the *VSE/ESA Messages and Codes* manual.

A Performance Problem Occurred (PERFM)

A problem of this kind is indicated if the performance of your system has decreased notably.

Provide copies of run-time records available at your installation and ensure that sufficient configuration and job-mix information is available to reproduce the environments for both the satisfactory and the unsatisfactory performance.

Information in a Manual is Incorrect or Missing (DOC)

A problem should be reported with this keyword if the problem is caused by incorrect, missing, or ambiguous information in a manual.

Submitting an APAR

When the problem found is not yet known to IBM, and if probably IBM code is at fault, you may have to submit an APAR. APAR stands for Authorized Program Analysis Report. An APAR includes a detailed problem description, along with any related data collected.

If an APAR is required, follow the instructions of your IBM Support Representative who will process the APAR through RETAIN.

The data required for an APAR submission for any given component may be more than listed in this manual. If so, your IBM Support Representative will tell you which additional data is required.

Appendix C. List of IPL, JCL, and Label Procedures

This appendix lists the names of the IPL, JCL, and label procedures shipped with VSE/ESA.

IPL Procedures:	JCL Procedures:	Label Procedures:
$IPLE45	$0JCL745	STDLAB45
$IPLE80	$0JCL780	STDLAB80
$IPLE90	$0JCL790	STDLAB90
$IPLEGF	$0JCL7GF	STDLABGF
	$1JCL745	
	$1JCL780	
	$1JCL790	
	$1JCL7GF	
	$2JCL745	
	$2JCL780	
	$2JCL790	
	$2JCL7GF	
	$3JCL745	
	$3JCL780	
	...	
	$4JCL745	
	$4JCL780	
	...	
	$5JCL745	
	$5JCL780	
	...	

Figure 45. IPL, JCL, and Label Procedures for Initial Installation

Note: VSE/ESA uses these procedures only once for initial installation.

The name of a procedure is determined by the disk device type used for DOSRES and SYSWK1. The following naming conventions apply for the procedures:

- The last two characters identify the type of disk device on which DOSRES and SYSWK1 reside. The manual *VSE/ESA Installation* shows the layout of DOSRES and SYSWK1 for each disk device type supported for initial installation under "VSE/ESA Disk Layouts". Procedures are provided for initial installation for the following disk device types:

  ```
  45 = IBM 9345
  80 = IBM 3380
  90 = IBM 3390
  GF = IBM FBA
  ```

  The characters GF indicate that this is the generalized layout for FBA disk devices such as the IBM 9336.
- In a running system, after installation, the procedures have been renamed as follows:
  - IPL procedure: $IPLESA

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- JCL procedures: $0JCL, $1JCL, $2JCL, and so on.
- Label procedure: STDLABEL

  Procedure STDLABEL calls procedures STDLABUP and STDLABUS.

It might be useful to have printouts available of those procedures which are relevant for your system. Such a printout can help you identify the original contents of a procedure in case of a system startup problem because of user modifications. This should be done right after initial installation.

You can use the VSE/ICCF **LIBRP** command to copy a procedure from the system library IJSYSRS.SYSLIB to your VSE/ICCF library. From it, print the procedure using the *Program Development Library* dialog.

Example of an IPL Procedure for Initial Installation

Figure 46 shows the statements of an IPL procedure for initial installation (stored in system library IJSYSRS.SYSLIB) **as shipped** by IBM. As an example, the figure shows procedure $IPLE90, required for initial installation of a VSE/ESA system residing on an IBM 3390 disk device.

```
MEMBER=$IPLE90.PROC      SUBLIBRARY=IJSYSRS.SYSLIB   DATE:1999-02-19
                                                     TIME: 10:14
--------------------------------------------------------------------------------
01F $$A$SUPX,VSIZE=100M,VPOOL=64K,VIO=512K
ADD FDF,FBAV VIRTUAL DISK FOR LABEL AREA
ADD FEC,3505
ADD FFC,3505 ICCF DUMMY DEVICE DON'T DELETE
ADD FFA,3505 ICCF DUMMY DEVICE DON'T DELETE
ADD FED,2520B2
ADD FFD,2520B2 ICCF DUMMY DEVICE DON'T DELETE
ADD FEE,PRT1
ADD FEF,PRT1
ADD FFE,PRT1 ICCF DUMMY DEVICE DON'T DELETE
ADD FFF,CONS DEDICATED CONSOLE DON'T DELETE
DEF SYSCAT=DOSRES,SYSREC=SYSWK1
SYS DASDFP=YES
SYS JA=YES
SYS SPSIZE=0K
SYS NPARTS=24
SYS PASIZE=30M
DLA VOLID=DOSRES,CYL=60,NCYL=3,DSF=N,NAME=AREA1
DPD VOLID=DOSRES,CYL=398,NCYL=36,DSF=N
DPD VOLID=DOSRES,CYL=434,DSF=NO
SVA PSIZE=(320K,3000K),SDL=300,GETVIS=(768K,6M)
```

Figure 46. IPL Procedure for Initial Installation

$$A$SUPX is the name of the supervisor shipped with VSE/ESA 2.1.

Appendix D. Handling Dumps

This appendix contains information that should belong to pages 15 and 16 of the *VSE/ESA Diagnosis Tools* Version 2 Release 1 manual. However, since the *VSE/ESA Diagnosis Tools* manual is not being published for Version 2 Release 4, the information has been included here instead.

Options to Activate Dump Writing

The system writes the output of an automatically invoked ABEND dump into the dump sublibrary for the partition if you submit either of the following statements:

```
// STDOPT SYSDUMP=YES
 // OPTION SYSDUMP
```

With the // STDOPT SYSDUMP statement you request the system to write dumps of the next and all subsequent jobs or job-steps into the dump sublibrary for the particular partition until the SYSDUMP option is deactivated. The STDOPT statement must be given in the BG partition and is active for all partitions.You can display the current settings for the *permanent options* using the QUERY STDOPT command.The // OPTION statement is active only for the duration of the particular job (this is the *temporary option).* After EOJ, the permanent option given in a previous STDOPT statement will be active again.

Options to Deactivate Dump Writing

The SYSDUMP option is deactivated by:

```
// STDOPT SYSDUMP=NO
// OPTION NOSYSDUMP
UNBATCH (to deactivate the partition)
LIBDROP DUMP,PERM
```

Identifying the Stored Dumps

Once the dump library and dump sublibraries have been defined, dumps from various sources can be stored there. The dumps stored by the ABEND dump routines have an identifier of the following format:

```
SYSDUMP.partition_id.nnnnnnnn
```

SYSDUMP
Dump library name.

partition_id
Sublibrary name, normally the partition identifier, like BG or F3 or, for dynamic partitions, DYN.

nnnnnnnn
Dump identifier of the form:

Dppnnnnn
for address space dumps, or

Sppnnnnn
for data space dumps.

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pp = partition identifier of the static or dynamic partition.

n = integers between 0 and 9 which are maintained by the system automatically with every new store dump operation.

For example:

```
SYSDUMP.F4.DF400002
```

is the name of a dump residing in the dump sublibrary for the F4 partition of the library SYSDUMP, with the identifier DF400002.

Note: When you onload a dump into the dump library via Info/Analysis, you select a dump name by your choice. The rules for creating a dump name are explained in "Recommendations (Restrictions) for the Generation of Dump Names" on page 171 of the IBM manual *VSE/ESA Diagnosis Tools*

Handling a Dump Library Full Condition

Information is written to the dump sublibraries when:

1. A dump is taken automatically by the system;
2. A dump is stored in a sublibrary via the onload process of Info/Analysis dump management;
3. Dumps are examined with an Info/Analysis analysis routine function.

In all three cases, space is needed in the dump sublibrary for page maps and analysis information, in addition to the dumps themselves. How the system reacts to a library-full condition depends on which routine caused the condition, and what kind of information was being written at the time.

If the library becomes full while:

- The system is writing an ABEND dump into it, the whole dump is printed on SYSLST and a dump-library-full information message is issued on SYSLOG:
  - If you want to *ignore* the dump (rather than printing it on SYSLST) you must specify the *SYSDUMPC* option in addition to specifying SYSDUMP.
  - Refer to the IBM manual *VSE/ESA System Control Statements* for details of how to specify the SYSDUMPC option.
- The Info/Analysis dump management function is writing a dump, the dump is flagged "to be onloaded". In spite of this flag, the dump may have been stored in the sublibrary. This can happen when the library-full condition arises while additional information is being stored after the dump itself has been written.
- An Info/Analysis dump viewing function is being used, the function fails.

In all three cases, the amount of free space in the sublibrary is kept as it was before the dump write operation was started. You can clear sublibrary space to make room for new dumps by deleting dumps that are no longer required. How to delete a dump is described in "DELETE - Delete Current Dump" on page 173 of the IBM manual *VSE/ESA Diagnosis Tools*.

Note: Do not delete a dump with a delete function other than the Info/Analysis delete function.

Appendix E. Info/Analysis

This appendix contains information that should belong to pages 161 to 167 of the *VSE/ESA Diagnosis Tools* Version 2 Release 1 manual. However, since the *VSE/ESA Diagnosis Tools* manual is not being published for Version 2 Release 4, the information has been included here instead.

The External Routines File

The external routines file contains the names of dump analysis exit routines. These routines are used to analyze dumps stored in one of the dump sublibraries. The external routines file contains the name and, optionally a description of each routine available for use with Info/Analysis.

Presently the external routines file contains four name lines. DFHPD410 analyses a dump of the CICS Transaction Server partition. IJBXDBUG is the common analysis routine for stand alone dumps. IJBXSDA formats the SDAID buffer in a stand-alone dump. IJBXCSMG formats the console buffer in a stand-alone dump.

The name of the external routines file is BLNXTRN. The job INITDUMP.Z creates the external routines during the system build process. If the external routines file is damaged you may recreate it via a DITTO job (see Figure 47 on page 174), or if the DITTO program is not available in your system, via an OBJMAINT job (see Figure 48 on page 174).

Loading the Info/Analysis External Routines File

The sample jobs shown in Figure 47 on page 174 and Figure 48 on page 174 record the names of the analysis routines DFHPD410, IJBXCSMG, IJBXDBUG and IJBXSDA in the Info/Analysis external routines file.

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Sample Jobs of External Routines File

```
// JOB LOAD1
// DLBL BLNXTRN,'INFO.ANALYSIS.EXT.RTNS.FILE',1999/365,SD
// EXTENT SYS017,SYSWK1,1,0,9045,15
// EXEC DITTO
$$DITTO CSQ BLKFACTOR=1,FILEOUT=BLNXTRN
ANEXIT DFHPD410  CICS DUMP ANALYZER
ANEXIT IJBXCSMG  ANALYSE CONSOLE BUFFER
ANEXIT IJBXDBUG  ANALYSE STANDALONE DUMP ROUTINE
ANEXIT IJBXSDA   SDAID BUFFER FORMATTING ROUTINE
/*
$$DITTO EOJ
/*
/&
```

Note:
The example shows the DITTO statements for an external routines file on CKD disk.
If the external routines file is on an FBA disk the DITTO command line reads like
$$DITTO CSQ BLKFACTOR=1,FILEOUT=BLNXTRN,CISIZE=512

Figure 47. Sample Job: Loading the External Routines File via DITTO

```
// JOB LOAD2
// ASSGN SYS004,00C
// ASSGN SYS005,SYSWK1
// DLBL UOUT,'INFO.ANALYSIS.EXT.RTNS.FILE',1999/365,SD
// EXTENT SYS005,SYSWK1,1,0,9045,15
// EXEC OBJMAINT
./ CARD DLM=$$
./ Copy
ANEXIT DFHPD410  CICS DUMP ANALYZER
ANEXIT IJBXCSMG  ANALYSE CONSOLE BUFFER
ANEXIT IJBXDBUG  ANALYSE STANDALONE DUMP ROUTINE
ANEXIT IJBXSDA   SDAID BUFFER FORMATTING ROUTINE
$$
/*
/&
```

Figure 48. Sample Job: Loading the External Routines File via OBJMAINT

Invoking Info/Analysis

You invoke Info/Analysis by submitting the necessary JCL followed by control statements that request functions. You may submit the job either in line mode by entering statements on the console, or in reader mode by submitting a job to the system input device.

Info/Analysis requires a program area of at least 300K bytes and a 24-bit partition GETVIS area of at least 600K bytes. Thus, the partition used for the execution of Info/Analysis should have a minimum of 900K bytes.

If user-written exits are to be used when running Info/Analysis, this size has to be adjusted accordingly. Especially the CICS Transaction Server uses such exits; therefore, a partition size of at least 4M bytes is necessary to analyze a CICS dump.

With JCL, you must specify any nonstandard system device assignments and pre-allocate and assign any files that you require other than the system libraries. A sample of the JCL for invocation is:

```
// JOB    JCL
// ASSGN  SYSLST,00E
// ASSGN  SYS020,252      Dump library
// ASSGN  SYS016,252      Dump management file
// ASSGN  SYS017,252      External routines file

// DLBL SYSDUMP,'VSE.DUMP.LIBRARY',1999/365,SD
// EXTENT ,SYSWK1,1,0,3150,600
// DLBL BLNDMF,'INFO.ANALYSIS.DUMP.MGNT.FILE',0
// EXTENT SYS016,SYSWK1,1,0,9030,15
// DLBL BLNXTRN,'INFO.ANALYSIS.EXT.RTNS.FILE',1999/365,SD
// EXTENT SYS017,SYSWK1,1,0,9045,15

// EXEC   INFOANA,SIZE=300K

 ....          |
 ....          | Info/Analysis
 ....          | control statements
 ....          |

/*
/&
```

Figure 49. Sample Job: Invoke Info/Analysis

Standard Info/Analysis Job Stream

Figure 49 shows a sample job to invoke the Info/Analysis program (// EXEC INFOANA). Assume that the dump sublibraries in the library SYSDUMP have already been defined and the label information for the SYSDUMP library resides in the standard label area.

Once the JCL has been processed, you are at the selection level in Info/Analysis. The program reads for your control statements. An end of input (/*) statement marks the end of these statements. To end your job, enter an end of job (/&) statement.

Glossary

This glossary includes terms and definitions related primarily to IBM VSE/ESA. If you do not find the term you are looking for, refer to the index of this book or to the *IBM Dictionary of Computing* New York: McGraw Hill, 1994.

The glossary includes definitions with:

- Symbol * where there is a one-to-one copy from the IBM Dictionary of Computing.
- Symbol (A) from the *American National Dictionary for Information Processing Systems* , copyright 1982 by the Computer and Business Equipment Manufacturers Association (CBEMA). Copies may be purchased from the American National Standards Institute, 1430 Broadway, New York, New York 10018. Definitions are identified by the symbol (A) after the definition.
- Symbols (I) or (T) from the *ISO Vocabulary - Information Processing* and the *ISO Vocabulary - Office Machines,* developed by the International Organization for Standardization, Technical Committee 97, Subcommittee 1. Definitions of published segments of the vocabularies are identified by the symbol (I) after the definition; definitions from draft international standards, draft proposals, and working papers in development by the ISO/TC97/SC1 vocabulary subcommittee are identified by the symbol (T) after the definition, indicating final agreement has not yet been reached among participating members.

The following cross-references are used:

- Contrast with. This refers to a term that has an opposed or substantively different meaning.
- Synonym for. This indicates that the term has the same meaning as a preferred term, which is defined in its proper place in the dictionary.
- Synonymous with. This is a backward reference from a defined term to all other terms that have the same meaning.
- See. This refers the reader to multiple-word terms that have the same last word.
- See also. This refers the reader to related terms that have a related, but not synonymous, meaning.

*** abend.** 1. Abnormal end of task.

2. Synonym for *abnormal termination*.

access control. A function of VSE that ensures that the system and the data and programs stored in it can be accessed only by authorized users in authorized ways.

access method. A program, that is, a set of commands (macros), to define files or addresses and to move data to and from them; for example VSE/VSAM or VTAM.

address space. A range of up to two gigabytes of contiguous virtual storage addresses that the system creates for a user. Unlike a data space, an address space contains user data **and** programs, as well as system data and programs, some of which are common to all address spaces. Instructions execute in an address space (not a data space). Contrast with *data space*.

Advanced Function Printing (AFP). A group of IBM licensed programs that support APA printers.

AFP. Advanced Function Printing.

alternate block. On an FBA disk, a block designated to contain data in place of a defective block.

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Glossary

alternate index. In systems with VSE/VSAM, the index entries of a given base cluster organized by an alternate key, that is, a key other than the prime key of the base cluster. For example, a personnel file primarily ordered by names can be indexed also by department number.

*** alternate tape.** A tape drive to which the operating system switches automatically for tape read or write operations if the end of the volume has been reached on the originally used tape drive.

alternate track. On a CKD disk, a track designated to contain data in place of a defective track.

*** American National Standard Code for Information Interchange (ASCII).** 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 communication systems, and associated equipment. The ASCII set consists of control characters and graphic characters. (A)

APA. All points addressable.

APAR. Authorized Program Analysis Report.

appendage routine. A piece of code physically located in a program or subsystem, but logically an extension of a supervisor routine.

*** application profile.** A control block in which the system stores the characteristics of one or more application programs.

application program. A program written for or by a user that applies directly to the user's work. See also *batch program* and *online application program*.

*** ASCII.** American National Standard Code for Information Interchange.

ASI (automated system initialization) procedure. A set of control statements which specifies values for an automatic system initialization.

assemble. To translate a program from assembler language into object code.

assembler. A computer program used to assemble. Synonymous with *assembly program*.

assembler language. A programming language whose instructions are usually in one-to-one correspondence with machine instructions and allows to write macros.

attention routine. A routine of the system that receives control when the operator presses the Attention key. The routine sets up the console for the input of a command, reads the command, and initiates the system service requested by the command.

authorized program analysis report (APAR). A report of a problem caused by a suspected defect in a current release of a program.

*** automated system initialization (ASI).** A function that allows control information for system startup to be cataloged for automatic retrieval during system startup.

auxiliary storage. Addressable storage that is not part of the processor, for example storage on a disk unit. Synonymous with *external storage*.

*** background partition.** An area of virtual storage in which programs are executed under control of the system. By default, the partition has a processing priority lower than any of the existing foreground partitions.

*** backup copy.** A copy, usually of a file or a library member, that is kept in case the original file or library member is unintentionally changed or destroyed.

batch processing. 1. Serial processing of computer programs. 2. Pertaining to the technique of processing a set of computer programs in such a way that each is completed before the next program of the set is started. (A)

batch program. A program that is processed in series with other programs and therefore normally processes data without user interaction.

binary synchronous communication (BSC). Method of telecommunication using binary synchronous line discipline. Contrast with *SDLC*.

block. Usually, a block consists of several records of a file that are transmitted as a unit. But if records are very large, a block can also be part of a record only. See also *control block*.

blocking. The process of combining (or cutting) records into blocks.

*** bps.** Bits per second.

*** bringup.** The process of starting a computer system or a subsystem that is to operate under control of the system.

BSC. Binary synchronous communication.

*** BTAM-ES (Basic Telecommunication Access Method Extended Storage).** An IBM supplied telecommunication access method. It permits read and write communication with remote devices.

B-transient. A phase with a name beginning with $$B and running in the Logical Transient Area (LTA). Such a phase is activated by special supervisor calls.

*** cache.** A high-speed buffer storage that contains frequently accessed instructions and data; it is used to reduce access time.

cache storage. A random access electronic storage in selected storage controls used to retain frequently used data for faster access by the channel. For example, the IBM 3990 Model 3 contains cache.

catalog. 1. A directory of files and libraries, with reference to their locations. A catalog may contain other information such as the types of devices in which the files are stored, passwords, blocking factors. (I) (A)

2. To store a library member such as a phase, module, or book in a sublibrary.

See also *VSAM master catalog*, *VSAM user catalog*.

*** cataloged procedure.** A set of control statements placed in a library and retrievable by name.

CCB. Command control block.

CCW. Channel command word.

central processing unit (CPU). The hardware component that interprets and executes instructions. Synonym for *processor*.

chained sublibraries. A facility that allows sublibraries to be chained by specifying the sequence in which they must be searched for a certain library member.

chaining. A logical connection of sublibraries to be searched by the system for members of the same type (phases or object modules, for example).

channel-attached. Pertaining to the attachment of devices directly by data channels (I/O channels) to a computer. Contrast with *link-attached*. Synonymous with *locally attached*.

channel command word (CCW). One or more CCWs make up the channel program that directs data channel operations.

channel program. One or more channel command words that control a sequence of data channel operations. Execution of this sequence is initiated by a single start I/O (SIO) instruction.

*** channel scheduler.** The part of the supervisor that controls all input/output operations.

channel-to-channel attachment (CTCA). A function that allows data to be exchanged (1) under the control of VSE/POWER between two virtual VSE machines running under VM or (2) under the control of VTAM between two processors.

checkpoint. 1. A point at which information about the status of a job and the system can be recorded so that the job step can be restarted later. 2. To record such information.

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CICS (Customer Information Control System). An IBM program that controls on-line communication between terminal users and a data base. Transactions entered at remote terminals are processed concurrently by user-written application programs. The program includes facilities for building, using, and servicing data bases.

CICS system definition (CSD) file. See CSD.

CICS/VSE. Customer Information Control System/VSE.

CKD device. Count-key-data device.

class. In VSE/POWER, a group of jobs that either come from the same input device or go to the same output device.

CMS. Conversational monitor system.

COBOL. Common business-oriented language.

command control block (CCB). The name of a system control block to hold information about a specific instance of a command.

common business-oriented language (COBOL). A high-level programming language based on English used primarily for business application programs.

common library. A library that can be interactively accessed by any user of the (sub)system that owns the library.

*** communication adapter.** A circuit card with associated software that enables a processor, controller, or other device to be connected to a network.

*** communication controller.** 1. A device that directs transmission of data over the links of a network; its operation is controlled by a program executed in a processor to which the controller is connected or it may be controlled by a program executed within the device. (T)2. A type of communication control unit whose operations are controlled by one or more programs stored and executed in the unit. It manages the details of line control and the routing of data through a network.

communication line. See *telecommunication line*.

*** communication region.** An area of the supervisor that is set aside for transfer of information within and between programs.

*** compile.** To translate a source program into an executable program (object program). See also *assembler*.

compiler. A program used to compile.

component. 1. Hardware or software that is part of a computer system. 2. A functional part of an operating system, for example: job control program, VSE/POWER.

conditional job control. The capability of the job control program to process or to skip one or more statements based on a condition that is tested by the program.

configuration. The devices and programs that make up a system, subsystem, or network.

control block. An area within a program or a routine defined for the purpose of storing and maintaining control information.

control program. A program to schedule and supervise the running of programs in a system.

control unit. See *communication controller*. Synonymous with *controller*.

*** conversational monitor system (CMS).** A virtual machine operating system that provides general interactive time sharing, problem solving, and program development capabilities and operates under the control of VM/SP.

*** corrective service.** The installation of a PTF or an APAR fix that corrects a specific problem.

count-key-data (CKD) device. A disk device that stores data in the record format: count field, key field, data field. The count field contains, among others, the address of the record in the format: cylinder, head (track), record number

and the length of the data field. The key field, if present, contains the record's key or search argument. CKD disk space is allocated by tracks and cylinders. Contrast with *FBA disk device*. See also *extended count-key-data device*.

CPU. Central processing unit.

CTCA. Channel-to-channel attachment.

Customer Information Control System/VSE (CICS/VSE). An IBM program that controls online communication between terminal users and a database. Transactions entered at remote terminals are processed concurrently by user-written application programs. The product includes facilities for building, using, and servicing databases.

DASD. Direct access storage device.

DASD sharing. An option that lets independent computer systems use common data on shared disk devices.

database. A set of data available online that is organized by a common system and used for a common purpose.

DATABASE 2 (DB2). An IBM relational database management system.

*** data entry panel.** A panel in which the user communicates with the system by filling in one or more fields. See also *panel* and *selection panel*.

data file. See *file*.

*** Data Interfile Transfer, Testing and Operations (DITTO/ESA for VSE) utility.** An IBM program that provides file-to-file services for card I/O, tape, and disk devices.

The current version is called DITTO/ESA for VSE.

Data Language/I (DL/I). A database access language used with CICS/VSE.

data link. In SNA, the combination of the link connection and the link stations joining network nodes, for example, a System/370 channel and its associated protocols. A link is both logical and physical.

In SNA, synonym for *link*.

*** data management.** A major function of the operating system. It involves organizing, storing, locating, and retrieving data.

data security. See *access control*.

data set. See *file*.

data space. A range of up to two gigabytes of contiguous virtual storage addresses that a program can directly manipulate through ESA/370 instructions. Unlike an address space, a data space can hold only user data; it does not contain shared areas, system data or programs. Instructions do not execute in a data space, although a program can reside in a data space as non-executable code. Contrast with *address space*.

deblocking. The process of making each record of a block available for processing. Contrast with *blocking*.

default value. A value assumed by the program when no value has been specified by the user.

*** device address.** 1. The identification of an input/output device by its channel and unit number.

2. In data communication, the identification of any device to which data can be sent or from which data can be received.

*** device class.** The generic name for a group of device types, for example, all display stations belong to the same device class. Contrast with *device type*.

*** Device Support Facilities.** An IBM program for performing operations on disk volumes so that they can be accessed by IBM and user programs. Examples of these operations are initializing a disk volume and assigning an alternate track.

*** device type code.** The four- or five-digit code to be used for defining an I/O device to a computer system.

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*** dialog.** 1. In an interactive system, a series of related inquiries and responses similar to a conversation between two people. 2. For VSE/SP, a set of panels that can be used to complete a specific task, for example, defining a file.

direct access. Accessing data on a storage device using their address and not their sequence. This is the typical access on disk devices as opposed to magnetic tapes. Contrast with *sequential access*.

Direct access storage device. A device in which access time is effectively independent of the location of the data.

directory. 1. A table of identifiers and references to the corresponding items of data. (I) (A) 2. In VSE, specifically, the index for the program libraries. See also *library directory* and *sublibrary directory*.

disk sharing. An option that lets independent computer systems use common data on shared disk devices.

display station. A display screen with attached keyboard for communication with the system or a network. See also *terminal*.

*** distribution tape.** A magnetic tape that contains, for example, a preconfigured operating system like VSE/ESA. This tape is shipped to the customer for program installation.

DITTO utility. Data Interfile Transfer, Testing and Operations utility.

The current version is called DITTO/ESA for VSE.

DOSRES. Disk operating system residence volume.

dummy device. A device address with no real I/O device behind it. Input and output for that device address are spooled on disk.

dump. 1. Data that has been dumped. (I) (A) 2. To write at a particular moment some contents of storage to another data medium for the purpose of safeguarding or debugging the data. (T)

*** duplex.** Pertaining to communication in which data can be sent and received at the same time.

dynamic partition. A partition created and activated on an 'as needed' basis that does not use fixed static allocations. After processing, the occupied space is released. Dynamic partitions are grouped by class, and jobs are scheduled by class. Contrast with *static partition*.

*** dynamic partition balancing.** A VSE facility that allows the user to specify that two or more or all partitions of the system should receive about the same amount of time on the processor.

EBCDIC. Extended binary-coded decimal interchange code.

ECKD device. Extended count-key-data device.

end user. 1. A person who makes use of an application program. 2. In SNA, the ultimate source or destination of user data flowing through an SNA network. May be an application program or a terminal operator.

Enterprise Systems Architecture/370. See *ESA/370* and *ESA/390*.

environmental record editing and printing (EREP) program. The IBM program that makes the data contained in the system recorder file available for further analysis.

EREP program. Environmental record editing and printing program.

error recovery procedures (ERP). Procedures to help isolate and, where possible, to recover from errors in equipment.

ESA mode. An operation mode of the supervisor (generated with MODE=ESA) of the VSE system. Such a supervisor will run on Enterprise Systems Architecture processors (ESA/370 and ESA/390) and provides support for multiple virtual address spaces, the channel subsystem, and more than 16MB of real storage.

ESA/370. IBM Enterprise Systems Architecture/370. The extension to the IBM System/370 architecture which includes the advanced addressability feature that provides access registers.

ESA/390. IBM Enterprise Systems Architecture/390. The latest extension to the IBM System/370 architecture which includes the advanced addressability feature and advanced channel architecture.

*** escape.** To return to the original level of a user interface.

exit. A routine, normally user-supplied, that receives control from the system when a certain event occurs (abnormal-end exit, for example).

extended count-key-data (ECKD) device. A disk storage device that has a data transfer rate faster than some processors can utilize. A specialized channel program is needed to convert ordinary CKD channel programs for use with an ECKD device.

extent. Continuous space on a disk or diskette occupied by or reserved for a particular file or VSAM data space.

extended binary-coded decimal interchange code (EBCDIC). A coded character set consisting of 8-bit coded characters.

external storage. Storage that is not part of the processor.

fast service upgrade (FSU). A service function of VSE/ESA for the installation of a refresh release without regenerating control information such as library control tables.

FBA disk device. Fixed-block architecture disk device.

*** FCB.** Forms control buffer.

fetch. 1. To locate and load a quantity of data from storage. (A) 2. To bring a program phase into virtual storage from a sublibrary and pass control to this phase. 3. The name of the macro instruction (FETCH) used to accomplish 2. See also *loader*.

file. A named set of records stored or processed as a unit. (T) Synonymous with *data set*.

fixed-block architecture (FBA) disk device. A disk device that stores data in blocks of fixed size. These blocks are addressed by block number relative to the beginning of the file. Contrast with *CKD device*.

*** foreground partition.** A space of virtual storage in which programs are executed under control of the system. By default, a foreground partition has a higher processing priority than the background partition.

*** forms control buffer (FCB).** In the 3800 Printing Subsystem, a buffer for controlling the vertical format of printed output.

*** fragmentation (of storage).** Inability to allocate unused sections (fragments) of storage in the real or virtual address range of virtual storage.

FSU. Fast service upgrade.

GB. Gigabyte.

generation. See *macro generation*.

*** GETVIS space.** Storage space within a partition or the shared virtual area, available for dynamic allocation to programs.

gigabyte (GB). 1024MB of storage (see MB). One gigabyte equals 1 073 741 824 bytes, which is 2 to the thirtieth power.

guest system. A data processing system that runs under control of another (host) system.

*** half-duplex.** In data communication, pertaining to transmission of data in only one direction at a time. Contrast with *duplex*.

hardcopy file. A system file on disk, used to log all lines of communication between the system and the operator at the system console, to be printed on request.

hard wait. The condition of a processor when all operations are suspended. System recovery from a hard wait is impossible without performing a new system startup.

Glossary

hardware. Physical equipment used in data processing, as opposed to programs, procedures, rules, and associated documentation. (I) (A) Contrast with *software*.

help panel. A display of information provided by the system in response to a user's help request.

*** host system.** The controlling or highest level system in a data communication configuration.

ICA. Integrated communication adapter.

ICCF. See *VSE/ICCF*.

index. In data management, a table used to locate the records of a file.

*** initial program load (IPL).** The process of loading system programs and preparing the system to run jobs.

input/output control system (IOCS). A group of IBM supplied routines that handle the transfer of data between main storage and auxiliary storage devices.

integrated communication adapter (ICA). The part of a processor where multiple lines can be connected.

integrated console. In VSE/ESA, the service processor console available on ES/9000 processors that operates as the VSE/ESA system console. The integrated console is typically used during IPL and for recovery purposes when no other console is available.

interactive. A characteristic of a program or system that alternately accepts input and then responds. An interactive system is conversational, that is, a continuous dialog exists between user and system. Contrast with *batch*.

Interactive Computing and Control Facility (VSE/ICCF). An IBM program that serves as interface, on a time-slice basis, to authorized users of terminals linked to the system's processor.

interactive interface. A system facility which controls how different users see and work with the system by means of user profiles. When signing on, the interactive interface makes available those parts of the system authorized by the profile. The interactive interface has sets of selection- and data-entry panels through which users communicate with the system.

interactive partition. An area of virtual storage for the purpose of processing a job that was submitted interactively via VSE/ICCF.

interface. A shared boundary between two hardware or software units defined by common functional or physical characteristics. It might be a hardware component or a portion of storage or registers accessed by several computer programs.

*** intermediate storage.** Any storage device used to hold data temporarily before it is processed. See also *buffer storage*.

I/O (input/output). See *input* and *output*.

IOCS. Input/output control system.

IPL. Initial program load.

*** irrecoverable error.** An error for which recovery is impossible without the use of recovery techniques external to the computer program or run. (T)

JCL. Job control language.

JECL. Job entry control language.

job accounting. A system function that lists how much every job step uses of the different system resources.

job control language (JCL). A language that serves to prepare a job or each job step of a job to be run. Some of its functions are: to identify the job, to determine the I/O devices to be used, set switches for program use, log (or print) its own statements, and fetch the first phase of each job step.

job control statement. A particular statement of JCL.

job entry control language (JECL). A control language that allows the programmer to specify how VSE/POWER should handle a job.

job step. One of a group of related programs complete with the JCL statements necessary for a particular run. Every job step is identified in the job stream by an EXEC statement under one JOB statement for the whole job.

job stream. The sequence of jobs as submitted to an operating system.

KB. Kilobyte (KB equals 1024 bytes).

key. In VSE/VSAM, one or several characters taken from a certain field (key field) in data records for identification and sequence of index entries or of the records themselves.

key sequence. The collating sequence either of records themselves or of their keys in the index or both. The key sequence is alphanumeric.

*** kilobyte (KB).** 1024 bytes of storage. One kilobyte equals 1024 bytes, which is 2 to the twelfth power.

label. 1. An identification record for a tape, disk, or diskette volume or for a file on such a volume. 2. In assembler programming, a named instruction generally used for branching.

label information area. An area on a disk to store label information read from job control statements or commands. Synonymous with *label area*.

language translator. A general term for any assembler, compiler, or other routine that accepts statements in one language and produces equivalent statements in another language.

*** librarian.** The set of programs that maintains, services, and organizes the system and private libraries.

library. See *VSE library* and *VSE/ICCF library*.

*** library block.** A block of data stored in a sublibrary.

*** library directory.** The index that enables the system to locate a certain sublibrary of the accessed library.

*** library member.** The smallest unit of data to be stored in and retrieved from a sublibrary.

*** licensed program.** A separately priced program and its associated materials that bear an IBM copyright and are offered to customers under the terms and conditions of either the Agreement for IBM Licensed Programs (ALP) or the IBM Program License Agreement (PLA).

line. Short for telecommunication line. Any physical medium such as a wire or microwave beam, that is used to transmit data. Synonymous with *transmission line*.

line printer. A device that prints a line of characters as a unit. (I) (A) Contrast with *character printer* or *page printer*.

link. To connect items of data or portions of programs, for example linking of object programs by the linkage editor or linking of data items by pointers.

linkage editor. A program to build a phase (executable code) from one or several independently translated object modules or existing phases or both. In creating the phase, the program resolves cross references among the modules and phases available as input. The program can catalog the newly built phases.

*** link-attached.** Pertaining to devices connected to a control unit by a data link. Synonymous with *remote*. Contrast with *channel- attached*.

link-edit. To create a loadable computer program by having the linkage editor process compiled (assembled) source programs.

loader. A routine, commonly a computer program, that reads data or a program into processor storage. See also *relocating loader*.

*** lock file.** In a shared disk environment under VSE, a system file on disk used by the sharing systems to control their access to shared data.

* **logging.** The recording of data about specific events.

logical record. A user record, normally pertaining to a single subject and processed by data management as a unit. Contrast with *physical record* which may be larger or smaller.

logical unit name. In programming, a name used to represent the address of an input/ output unit.

logo. A trademark or other art work that is associated with a firm or product. A logo often appears as the first screen of an interactive program.

LSR. Local shared resources.

LU. Logical unit.

macro (instruction). 1. In assembler programming, a user-invented assembler statement that causes the assembler to process a set of statements defined previously in the macro definition. 2. A sequence of VSE/ICCF commands defined to cause a sequence of certain actions to be performed in response to one request.

macro definition. A set of statements and instructions that defines the name of, format of, and conditions for generating a sequence of assembler statements and machine instructions from a single source statement.

macro expansion. See *macro generation*.

macro generation. An assembler operation by which a macro instruction gets replaced in the program by the statements of its definition. It takes place before assembly. Synonymous with *macro expansion*.

* **main task.** The main program within a partition in a multiprogramming environment.

* **Maintain system history program (MSHP).** A program used for automating and controlling various installation, tailoring, and service activities for a VSE system.

master console. In VSE/ESA, one or more consoles that receive all system messages, except for those that are directed to one particular console. Contrast with *user console* which receives only those messages that are specifically directed to it, for example messages issued from a job that was submitted with the request to echo its messages to that console. The operator of a master console can reply to all outstanding messages and enter all system commands.

* **MB.** Megabyte (MB equals 1 048 576 bytes).

* **megabyte (MB).** 1024KB of storage (see KB). One megabyte equals 1 048 576 bytes, which is 2 to the twentieth power.

* **member.** The smallest unit of data that can be stored in and retrieved from a sublibrary.

message. 1. In VSE, a communication sent from a program to the operator or user. It can appear on a console, a display terminal or on a printout. 2. In telecommunication, a logical set of data being transmitted from one node to another.

* **microcode.** 1. A code written using the instructions of a specific instruction set and implemented in a part of storage that is not program-addressable. 2. To design write, and test one or more micro instructions.

* **migrate.** To move to a changed operating environment, usually to a new release or version of a system.

* **module.** A program unit that is discrete and identifiable with respect to compiling, combining with other units, and loading; for example, the input to, or output from, an assembler, a compiler, linkage editor, or executive routine. (A)

* **MSHP.** Maintain system history program.

* **multiprogramming.** 1. A mode of operation that provides for interleaved execution of several programs by a single processor. (I) (A) 2. Pertaining to concurrent execution of several programs by a computer. (A)

multitasking. Concurrent running of one main task and one or several subtasks in the same partition.

MVS. Multiple Virtual Storage. Implies MVS/390, MVS/XA, MVS/ESA, and the MVS element of the OS/390 operating system.

*** nest.** To incorporate a structure or structures of some kind into a structure of the same kind. For example, to nest one loop (the nested loop) within another loop or to nest one subroutine (the nested subroutine) within another subroutine. (T)

network. 1. An arrangement of nodes (data stations) and connecting branches. 2. The assembly of equipment through which connections are made between data stations.

networking. Making use of the services of a network program.

*** object code.** Output from a compiler or assembler which is itself executable machine code or is suitable for processing to produce executable machine code. (A)

object module (program). A program unit that is the output of an assembler or compiler and is input to a linkage editor.

OCCF. See VSE/OCCF.

online processing. Processing by which the input data enters the computer directly from a display station and the output data is transmitted directly to the display station.

*** operating system.** Software that controls the running of programs; an operating system may provide services such as resource allocation, scheduling, input/output control, and data management. (I) (A)

*** operator command.** A statement to a control program, issued via a console or terminal. It causes the control program to provide requested information, alter normal operations, initiate new operations, or end existing operations.

optional program. An IBM optional program that a user can install on VSE by way of available installation-assist support.

*** OS/390.** An IBM licensed program that not only includes and integrates functions previously provided by many IBM software products (including the MVS operating system) but also (a) is an open, secure operating system for the IBM S/390 family of enterprise servers, (b) complies with industry standards, (c) is Year 2000 ready and enabled for network computing and e-business, and (d) supports technology advances in networking server capability, parallel processing, and object-oriented programming.

page. 1. In a virtual storage system, the unit of code or data or both which is transferred between processor storage and the PDS as needed for processing. 2. To transfer pages between processor storage and the page data set.

page data set (PDS). One or more extents of disk storage in which pages are stored when they are not needed in processor storage.

page fault. A program interruption that occurs when a program page marked ″not in processor storage″ is referred to by an active page.

*** page fixing.** Marking a page so that it is held in processor storage until explicitly released. Until then, it cannot be paged out.

page frame. An area of processor storage that can contain a page.

page-in. The process of transferring a page from the PDS to processor storage.

page I/O. Page-in and page-out operations.

page-out. The process of transferring a page from processor storage to the PDS.

*** page pool.** The set of page frames available for paging virtual-mode programs.

panel. The complete set of information shown in a single display on a terminal screen. Scrolling back and forth through panels is like turning manual pages. See also *selection panel* and *data entry panel*.

partition. A division of the virtual address area available for running programs. See also *dynamic partition, static partition*.

* **partition balancing, dynamic.** A VSE facility that allows the user to specify that two or more or all partitions of the system should receive about the same amount of time on the processor.

PDS. Page data set.

* **phase.** The smallest unit of executable code that can be loaded into virtual storage.

* **physical record.** The amount of data transferred to or from auxiliary storage. Synonymous with *block*.

* **physical unit (PU).** In SNA, the component that manages and monitors the resources of a node, such as attached links and adjacent link stations, as requested by an SSCP via an SSCP-SSCP session.

PL/I. A programming language designed for use in a wide range of commercial and scientific computer applications.

PNET. Programming support available with VSE/POWER; it provides for the transmission of selected jobs, operator commands, messages, and program output between the nodes of a network.

POWER. See *VSE/POWER*.

* **preventive service.** The installation of one or more PTFs on a VSE system to avoid the occurrence of anticipated problems.

* **primary library.** A VSE library owned and directly accessible by a certain terminal user.

Print Services Facility/VSE. An access method that provides support for the advanced function printers.

priority. A rank assigned to a partition or a task that determines its precedence in receiving system resources.

* **private library.** A user-owned library that is separate and distinct from the system library.

* **private partition.** Any of the system's partitions that are not defined as shared. See also *shared partition*.

procedure. See *cataloged procedure*.

* **processing.** The performance of logical operations and calculations on data, including the temporary retention of data in processor storage while this data is being operated upon.

processor. The hardware component that interprets and executes instructions. (I) (A)

processor storage. The storage contained in one or more processors and available for running machine instructions. Synonymous with *real storage*.

* **production library.** 1. In a pre-generated operating system (or product), the program library that contains the object code for this system (or product). 2. A library that contains data needed for normal processing. Contrast with *test library*.

profile. A description of the characteristics of a user or a computer resource.

* **programmer logical unit.** A logical unit available primarily for user-written programs. See also *logical unit name*.

program product. See *licensed program*.

program service. The customer- or program-related IBM service of correcting design or implementation errors via APARs and PTFs.

program temporary fix (PTF). A solution or by-pass of one or more problems documented in APARs. PTFs are distributed to IBM customers for preventive service to a current release of a program.

prompt. To issue messages to a terminal or console user, requesting information necessary to continue processing.

PSF/VSE. Print Services Facility/VSE.

PTF. Program temporary fix.

PU. Physical unit.

punch. 1. To make holes in some data medium according to a signal code and thus save data on that medium. 2. A machine (output device) to punch 80-column punch cards.

* **punch card.** A card into which hole patterns can be punched; normally, it is characterized by 80 columns and 12 rows of punch positions.

* **queue.** 1. A line or list formed by items in a system waiting for service; for example, tasks to be performed or messages to be transmitted in a network. 2. To arrange in, or form, a queue.

queue file. A disk file maintained by VSE/POWER that holds control information for the spooling of job input and job output.

queue record. A record in the queue file containing descriptive information about a job or job output.

* **random processing.** The treatment of data without respect to its location on disk storage, and in an arbitrary sequence governed by the input against which it is to be processed.

real address. The address of a location in processor storage.

* **real address area.** In VSE, the area of virtual storage where virtual addresses are equal to real addresses.

* **real address space.** The address space whose addresses map one to one to the addresses in processor storage.

real mode. In VSE, a processing mode in which a program may not be paged. Contrast with *virtual mode*.

real storage. See *processor storage*.

* **record.** A collection of related data or words, treated as a unit. See *logical record*, *physical record*.

recovery management support (RMS). System routines that gather information about hardware failures and that initiate a retry of an operation that failed because of processor, I/O device, or channel errors.

* **reentrant.** The attribute of a program or routine that allows the same copy of the program or routine to be used concurrently by several tasks.

refresh release. An upgraded VSE system with the latest level of maintenance for a release.

relocatable module. In VSE, a library member of type object. It consists of one or or more control sections cataloged as one member.

relocating loader. A function that modifies addresses of a phase, if necessary, and loads the phase for running into the partition selected by the user.

* **remote job entry (RJE).** Submission of jobs through an input unit that has access to a computer through a data link.

* **restore.** To write back on disk data that was previously written from disk to an intermediate storage medium such as tape.

RJE. Remote job entry.

RJE workstation. Any workstation that is used for remote job submission and for the remote retrieval of output.

RMS. Recovery management support.

* **routine.** Part of a program, or a sequence of instructions called by a program, that may have some general or frequent use. (I) (A)

* **routing.** The assignment of the path by which a message will reach its destination.

RPG II. A commercially oriented programming language suitable for writing application programs that meet common business data processing requirements.

* **run.** 1. A performance of one or more jobs. (I) (A)

2. A performance of one or more programs. (I) (A)

3. To cause a program or job to be performed.

SAM. Sequential access method.

SAM ESDS file. A SAM file managed in VSE/VSAM space, so it can be accessed by both SAM and VSE/VSAM macros.

schedule. To select a program or task for getting control over the processor.

SDL. System directory list.

*** search chain.** The order in which chained sublibraries are searched for the retrieval of a certain library member of a specified type.

second-level directory. A table in the SVA containing the highest phase names found on the directory tracks of the system sublibrary.

security. See *access control*.

*** selection panel.** A displayed list of items from which a user can make a selection. Synonymous with *menu*.

sense. Determine, on request or automatically, the status or the characteristics of a certain I/O or communication device.

sequential access. The serial retrieval of records in their entry sequence or serial storage of records with or without a premeditated order. Contrast with *direct access*.

sequential access method (SAM). A data access method that writes to and reads from an I/O device record after record (or block after block). On request, the support performs device control operations such as line spacing or page ejects on a printer or skip a certain number of tape marks on a tape drive.

sequential file. A file in which records are processed in the order in which they are entered and stored.

*** shared spooling.** A function that permits the VSE/POWER account file, data file, and queue file to be shared among several computer systems with VSE/POWER.

*** shared virtual area (SVA).** In VSE, a high address area that contains a list system directory list (SDL) of frequently used phases, resident programs shared between partitions, and an area for system support.

SIT (System Initialization Table). A table in CICS that contains data used by the system initialization process. In particular, the SIT can identify (by suffix characters) the version of CICS system control programs and CICS tables that you have specified and that are to be loaded.

skeleton. A set of control statements and/or instructions that requires user-specific information to be inserted before it can be submitted for processing.

SNA. System Networks Architecture.

SNA network. The part of a user-application network that conforms to the formats and protocols of SNA.

*** software.** Programs, procedures, rules, and any associated documentation pertaining to the operation of a computer system.

source member. A library member containing source statements in any of the programming languages supported by VSE.

*** source program.** A computer program expressed in a source language. (I) (A) Contrast with *object module*.

source statement. A statement written in symbols of a programming language.

spanned record. A record that extends over several blocks.

stand-alone program. A program that runs independently of (not controlled by) the VSE system.

*** standard label.** A fixed-format record that identifies a volume of data such as a tape reel or a file that is part of a volume of data.

startup. The process of performing IPL of the operating system and of getting all subsystems and application programs ready for operation.

static partition. A partition, defined at IPL time and occupying a defined amount of virtual storage that remains constant. Contrast with *dynamic partition*.

storage dump. See *dump*.

storage fragmentation. Inability to allocate unused sections (fragments) of storage in the real or virtual address range of virtual storage.

sublibrary. In VSE, a subdivision of a library. Members can only be accessed in a sublibrary.

sublibrary directory. An index for the system to locate a member in the accessed sublibrary.

submit. A VSE/POWER function that passes a job to the system for processing.

* **subsystem.** A secondary or subordinate system or program, usually capable of operating independently of, or asynchronously with, the operating system.

subtask. A task that is initiated by the main task or by another subtask.

* **supervisor.** The part of a control program that coordinates the use of resources and maintains the flow of processor operations.

SVA. Shared virtual area.

switched line. A telecommunication line in which the connection is established by dialing.

SYSRES. System residence volume.

* **system console.** A console, usually equipped with a keyboard and display screen for control and communication with the system.

system directory list (SDL). A list containing directory entries of frequently-used phases and of all phases resident in the SVA. The list resides in the SVA.

* **system file.** In VSE, a file used by the operating system, for example, the hardcopy file, the recorder file, the page data set.

System Initialization Table (SIT). A table in CICS that contains data used by the system initialization process. In particular, the SIT can identify (by suffix characters) the version of CICS system control programs and CICS tables that you have specified and that are to be loaded.

system logical unit. A logical unit available primarily for operating system use. See also *logical unit name*.

Systems Network Architecture (SNA). The description of the logical structure, formats, protocols, and operational sequences for transmitting information units through and controlling the configuration and operation of networks.

system recorder file. The file that is used to record hardware reliability data. Synonymous with *recorder file*.

system refresh release. See *refresh release*.

system residence volume (SYSRES). The disk volume on which the system sublibrary is stored and from which the hardware retrieves the initial program load routine for system startup.

system sublibrary. The sublibrary that contains the operating system. It is stored on the system residence volume (SYSRES).

* **tailor.** A process that defines or modifies the characteristics of the system.

* **task.** The basic unit of synchronous program execution. A task competes with other tasks for system resources such as processing time and I/O channels.

task management. The functions of a control program that control the use, by tasks, of the processor and other resources (except for input/output devices).

TCP/IP. See Transmission Control Protocol/Internet Protocol.

TCT. Terminal Control Table.

telecommunication. Transmission of data between computer systems and between such a system and remote devices.

telecommunication line. Any physical medium such as a wire or microwave beam, that is used to transmit data. Synonymous with *transmission line*.

terminal. A point in a system or network at which data can either enter or leave. Usually a display screen with a keyboard.

terminal access facility (TAF). In the NetView program, a facility that allows a network operator to control a number of subsystems. In a full-screen or operator control session, operators can control any combination of such subsystems simultaneously.

terminal control table (TCT). A control block in which the system stores information about the characteristics and modes of operation of the terminals defined to the system.

time event scheduling support. In VSE/POWER, the time event scheduling support offers the possibility to schedule jobs for processing in a partition at a predefined time once or repetitively. The time event scheduling operands of the * $$ JOB statement are used to specify the desired scheduling time.

token. A piece of information used as a unit.

*** telecommunication.** Transmission of data between computer systems and between such a system and remote devices.

telecommunication line. Any physical medium such as a wire or microwave beam, that is used to transmit data. Contrast with *data link*.

terminal. A point in a system or network at which data can either enter or leave. (A) Usually a display screen with a keyboard.

*** throughput.** 1. A measure of the amount of work performed by a computer system over a given period of time, for example, jobs per day. (I) (A) 2. In data communication, the total traffic between stations per unit of time.

trace. 1. To record a series of events as they occur.

2. A record of specified events during the run of a program.

3. A program to produce such a record.

*** track.** A circular path on the surface of a disk or diskette. Smallest unit of physical disk space.

track hold. A function that protects a track while it is being updated by one program from being accessed by another program.

*** transient area.** An area within the control program used to provide high-priority system services on demand.

transaction. (1) In a batch or remote batch entry, a job or job step. (2) In CICS, an application program (or programs) that can be used by a display station operator. A given transaction can be used concurrently from one or more display stations. The execution of a transaction for a certain operator is also referred to as a task. A given task can relate only to one operator.

*** Transmission Control Protocol (TCP).** A communications protocol used in the Internet and in any network that follows the U.S. Department of Defense standards for internetwork protocol. TCP provides a reliable host-to-host protocol between hosts in packet-switched communications networks and in interconnected systems of such networks. It uses the Internet Protocol (IP) as the underlying protocol.

*** Transmission Control Protocol/Internet Protocol (TCP/IP).** A set of communications protocols that support peer-to-peer connectivity functions for both local and wide area networks.

transmission line. Synonym for *telecommunication line*.

* **transmit.** To send data from one place for reception elsewhere. (A)

UCB. Universal character set buffer.

* **UCS.** Universal character set.

* **unattended mode.** A mode in which no operator is present or in which no operator station is included at system generation.

unattended node support. In VSE, a set of functions allowing one or more systems to run without an operator being present. The systems are connected to a single central host.

universal character set buffer (UCB). A buffer to hold UCS information.

user console. In VSE/ESA, a console that receives only those system messages that are specifically directed to it. These are, for example, messages that are issued from a job that was submitted with the request to echo its messages to that console. Contrast with *master console*

* **utility program.** 1. A program in general support of computer processes, for example, a diagnostic program, a trace program, or a sort program. (T) Synonymous with *service program*. 2. A program that performs an everyday task such as copying data from one storage device to another. (A)

VAE. Virtual addressability extension.

virtual address. An address that refers to a location in virtual storage. It is translated by the system to a processor storage address when the information stored at the virtual address is to be used.

virtual addressability extension (VAE). A storage management support that gives the user of VSE multiple address spaces of virtual storage.

virtual address area. The virtual range of available program addresses.

virtual address space. In VSE, a subdivision of the virtual address area available to the user for the allocation of private (non-shared) partitions.

* **virtual I/O area (VIO).** An extension of the page data set; used by the system as intermediate storage, primarily for control data.

* **virtual machine.** A functional simulation of a computer system and its associated devices.

* **virtual mode.** The operating mode of a program which may be paged.

virtual storage. Addressable space image for the user from which instructions and data are mapped into processor storage locations.

volume. A data carrier that is mounted and demounted as a unit, for example, a reel of tape or a disk pack. (I) Some disk units have no demountable packs. In that case, a volume is the portion available to one read/write mechanism.

volume ID. The volume serial number, which is a number in a volume label assigned when a volume is prepared for use by the system.

volume table of contents (VTOC). A table on a disk volume that describes every file on it.

VSAM. See *VSE/VSAM*.

VSE (Virtual Storage Extended). A system that consists of a basic operating system and any IBM-supplied and user-written programs required to meet the data processing needs of a user. VSE and the hardware it controls form a complete computing system. Its current version is called VSE/ESA.

VSE/Advanced Functions. Part of VSE Central Functions, a base program of VSE.

VSE/DITTO for VSE (VSE/Data Interfile Transfer, Testing, and Operations Utility). An IBM program that provides file-to-file services for disk, tape, and card devices.

Glossary

VSE/ESA (VSE/Enterprise Systems Architecture). The most advanced VSE system currently available.

* **VSE/Fast Copy.** A utility program for fast copy data operations from disk to disk and dump/restore operations via an intermediate dump file on magnetic tape or disk.

* **VSE/ICCF (VSE/Interactive Computing and Control Facility).** An IBM program that serves as interface, on a time-slice basis authorized users of terminals linked to the system's processor.

VSE/ICCF library. A file composed of smaller files (libraries) including system and user data which can be accessed under the control of VSE/ICCF.

VSE library. A collection of programs in various forms and storage dumps stored on disk. The form of a program is indicated by its member type such as source code, object module, phase, or procedure. A VSE library consists of at least one sublibrary which can contain any type of member.

VSE/OCCF (Operator Communication Control Facility). A VSE/ESA optional program that helps reduce operator interaction in the operation of a VSE-controlled installation and helps centralize data processing skills.

* **VSE/OLTEP (VSE/Online Test Executive Program).** An IBM program for managing the online tests that are available for preventive service for I/O devices. Normally, only IBM service representatives use this program.

* **VSE/POWER.** An IBM program primarily used to spool input and output. The program's networking functions enable a VSE system to exchange files with or run jobs on another remote processor.

VSE/SP Unique Code. Part of VSE Central Functions, a base program of VSE/ESA.

VSE/VSAM (VSE/Virtual Storage Access Method). An IBM access method for direct or sequential processing of fixed and variable length records on disk devices.

* **VSE/VSAM managed space.** A user-defined space on disk placed under the control of VSE/VSAM.

VTAM (Virtual Telecommunications Access Method). An IBM program that controls communication and the flow of data in an SNA network. It provides single-domain, multiple-domain, and interconnected network capability; it supports application programs and subsystems (VSE/POWER, for example).

VTOC. Volume table of contents.

wait state. The condition of a processor when all operations are suspended. System recovery from a hard wait is impossible without performing a new system startup. Synonym for *hard wait*.

Workstation File Transfer Support. Enables the exchange of data between IBM Personal Computers linked to a VSE host system where the data is kept in intermediate storage. PC users can retrieve that data and work with it independently of VSE.

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