

# Abend-AID

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## User/Reference Guide

Release 9.5



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# Summary of Changes

This section summarizes the enhancements to the most recent releases of Abend-AID.

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## Release 9.5 Enhancements

This latest Abend-AID release provides the following enhancements:

**Note:** Abend-AID 9.5 requires Compuware Shared Services Release 8.0 or more current.

- **Enhanced Viewing Facility Navigation:** Access to report sections is faster using main menu point-and-shoot navigation. Menu highlighting shows at a glance which report sections are present. If a user selects a section that is unavailable, a pop-up window provides an explanation of why the section is not included in the report.
- **HOTKEY Command Enhancement:** This release extends the HOTKEY command capability introduced in Abend-AID 9.4. Using the new SECT keyword, the user can now link directly to a specific section of the Abend-AID report from within any ISPF application used to view a failing job's system messages.
- **Additional Point-and-Shoot Navigation:** Newly added point-and-shoot links between report sections enable users to more easily and quickly find the information needed to understand and correct program failures. Pressing the Enter key at the highlighted text displays the associated report section.
- **Source Support for COBOL File Definitions:** File records are now formatted using COBOL source program file definitions. This enhancement speeds solving data-related errors by allowing users to easily compare file data with data in the Working-Storage and Linkage sections.
- **Enterprise PL/I Controlled and External Storage:** Abend-AID Release 9.5 identifies and dumps controlled and static external storage for VisualAge and Enterprise PL/I programs using Compuware source support.
- **Multiple DB2 Releases, Subsystems, and Plan Names Supported by Online Installation:** Installers can now use the Abend-AID Release 9.5 installation dialog to install support for multiple DB2 releases, subsystems, and plan names. The installation dialog keeps track of the parameters that installers use to generate the DB2 installation JCL for all selected DB2 releases, subsystems, and plan names. Installers can change these parameters at any time and re-generate the installation JCL. They can also add the installation parameters for support of additional DB2 releases, subsystems, and plan names and generate the installation JCL any time after initial installation.
- **Improved File Section Format:** Current and previous records have been moved in front of the control blocks in the Abend-AID file display. In addition, users can dynamically switch the scale used to display the record between decimal (starting at one) and hexadecimal (starting at zero).

## Support for Earlier Releases

- Support for Abend-AID Release 9.3 will be discontinued on August 1, 2004.
- Abend-AID Release 9.5 is the last version of the product to support the following IBM software:
  - OS/390 Versions 2.9 through 2.4
  - DB2 Versions 5.1 and 4.1

I – IMS Version 5.1.

# Introduction

This manual describes how to use Compuware's Abend-AID and consists of the following chapters:

**Chapter 1, "Product Overview":** Summarizes Abend-AID's facilities and operation.

**Chapter 2, "Getting Started":** Introduces the Abend-AID report.

**Chapter 3, "Diagnosing a COBOL Data-Related Error":** Shows typical diagnostic steps with an Abend-AID report.

**Chapter 4, "Diagnosing a PL/I Data-Related Error":** Shows typical diagnostic steps with an Abend-AID report.

**Chapter 5, "Diagnosing an Assembler Data-Related Error":** Shows typical diagnostic steps with an Abend-AID report.

**Chapter 6, "Diagnosing VS FORTRAN Errors":** Summarizes diagnostic considerations.

**Chapter 7, "Understanding Database Diagnostics":** Introduces Abend-AID diagnostics for DB2, IMS, and IDMS.

**Chapter 8, "Using SNAP-AID":** Explains how to use the SNAP-AID function.

**Chapter 9, "Using Abend-AID DD Statements":** Lists and summarizes the purposes of Abend-AID's DD statements.

**Chapter 10, "Understanding Language Processors":** Explains how to get the most from a Compuware language processor.

**Chapter 11, "Using Abend-AID in Language Environment":** Answers typical questions about diagnostics and operation in Language Environment.

**Chapter 12, "Report Samples":** Describes the Abend-AID report sections.

**Chapter 13, "Understanding the Compuware/VF Interface":** Explains screen fields.

**Chapter 14, "Printing & Utilities":** Summarizes the management facilities available for both installation and operation.

**Appendix A, "Testing Samples":** Lists sample faulted programs provided with Abend-AID for testing and training.

**Glossary:** Defines Abend-AID facilities, features, and associated terms.

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## Intended Audience

This manual is designed for use by application programmers.

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## Publications

User documentation is now provided in three online formats on CD-ROM with Abend-AID: Adobe Acrobat PDF, HTML, and BookManager.

- Acrobat PDF enables unlimited user printing from a Web site or workstation

- HTML enables unlimited user viewing from a Web site
- BookManager ensures precise, fast search capabilities from a network server or workstation.

The *Abend-AID Installation and Customization Guide* and the *Enterprise Common Components Installation and Customization Guide* are shipped in paper format. Complete documentation sets should be printed as needed from the Acrobat PDF files supplied on the documentation CD.

The following documents comprise the documentation set that is supplied with Abend-AID:

- *Abend-AID Installation and Customization Guide*: Provides instructions for installing Abend-AID and information about setting it up to fit the development and system configurations at your site.
- *Abend-AID Messages and Codes Manual*: Lists the informational and error messages you may encounter while using Abend-AID and their explanations. It also describes any recommended user response.
- *Abend-AID Quick Reference*: A handy summary of Abend-AID report sections, Compuware/VF, SNAP-AID, and Abend-AID DD statements.
- *Abend-AID User/Reference Guide*: Provides guidelines and instructions for using Abend-AID basic language support, Extended Language Support (XLS), SNAP-AID, Abend-AID for DB2, Abend-AID for IMS, Abend-AID for IDMS, and Abend-AID DD statements.
- *Abend-AID SMF Cost Analysis Tool User's Guide*: Describes the SMF Cost Analysis Tool, reports, usage, customization, and installation.
- *Enterprise Common Components Installation and Customization Guide*: Provides instructions for installing, customizing, and maintaining Enterprise Common Components (ECC). ECC is a packaging method for the following Compuware facilities: License Management System (LMS), Compuware Shared Services (CSS), Base Services, and Host Communications Interface (HCI). Base Services and HCI are required only for Abend-AID Distributed Viewing Support.
- *Enterprise Common Components Messages and Codes*: Contains error messages and codes generated during ECC installation or while using its components: LMS, CSS, Base Services, or HCI.
- *Compuware Shared Services User/Reference Guide*: Provides operation and reference information about Compuware Shared Services, which includes Extended Language Support, Compuware Viewing Facility, the Compuware language processors (COBOL, Assembler, PL/I, and C), Compuware's DDIO report and source listing datasets, and the batch file utilities (CWDDSUTL, CWFXSDUT, CWAASDUT, and CWDDLPUT).
- *License Management System User/Reference Guide*: Provides operation and reference information about the Compuware licensing system that lets you establish, maintain, diagnose, and upgrade access to the Compuware products licensed at your site.

## Online Help

You can find information about using Abend-AID components through the Abend-AID Primary Menu and the PF1 (HELP) key.

## FrontLine Support Website

Access online technical support for Compuware products via our FrontLine support website. View or download documentation, frequently asked questions, and product fixes, or directly e-mail Compuware with questions or comments. To access FrontLine, you must first register and obtain a password at <http://frontline.compuware.com>.

## Online Documentation

Documentation for this product is provided on CD-ROM in several electronic formats.

- View PDF files with the free Adobe Acrobat Reader, available at <http://www.adobe.com>.
- View HTML files with any standard Web browser.
- View BookManager softcopy files with any version of IBM BookManager READ or the IBM Softcopy Reader. To learn more about BookManager or to download the free Softcopy Reader, go to <http://www.ibm.com>.

## World Wide Web

Compuware's site on the World Wide Web provides information about Compuware and its products. The address is <http://www.compuware.com>.

## IBM Documentation

You can find more information related to Abend-AID in the following IBM publications:

- *z/OS Language Environment Customization Guide*: Discusses Language Environment for MVS.
- *z/OS Initialization and Tuning Reference*: Describes APF authorization and the use of (E)LPA.
- *z/OS MVS Programming: Authorized Assembler Services Guide*: Describes APF authorization.

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## Technical Support

For information about Abend-AID's operating or performance capabilities, or for assistance in troubleshooting, first refer to the Abend-AID documentation set. Complete online documentation is provided on CD-ROM with each release of Abend-AID, and is also accessible for online reading or downloading from the Compuware FrontLine Support Web site.

If you call Abend-AID Technical Support for troubleshooting assistance, provide the following information applicable to your problem so that we can help you as quickly as possible:

- The client number displayed in the header of the Abend-AID report.
- The Abend-AID release number displayed in the header of the Abend-AID report.
- The operating system and release in use displayed in the header of the Abend-AID report to help determine operating system dependencies.
- All printed output from the job in question including console messages, JCL stream, Abend-AID output, and the standard dump (SYSUDUMP, SYSABEND, or SYSMDUMP).
- Output from jobs that were used to install or customize Abend-AID. This output includes the report produced by the CWVERIFY utility. \$11VERIF is the Abend-AID installation library member used to execute CWVERIFY.

### Abend-AID Technical Support

Compuware Corporation  
One Campus Martius  
Detroit, MI 48226-5099  
1-800-538-7822



# Chapter 1.

## Product Overview

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### Operating System Environment

**Note:** Consult <http://frontline.compuware.com> for updates.

#### *Operating System Support*

- z/OS versions 1.5 through 1.1
- OS/390 version 2

Abend-AID identifies and describes application program failures in the following MVS-based languages and databases:

#### *Programming Language Support*

- Language Environment associated with z/OS versions 1.5 through 1.1 and OS/390 version 2
- COBOL:
  - Enterprise COBOL 3.2, 3.1
  - COBOL for OS/390 & VM 2.2, 2.1\*
  - COBOL for MVS & VM 1.2\*
  - AD/Cycle COBOL/370 1.1, 1.0
  - VS COBOL II 1.4, 1.3.2, 1.3.1
  - OS/VS COBOL 2.4
- PL/I:
  - Enterprise PL/I 3.3, 3.2, 3.1
  - VisualAge PL/I 2.2
  - PL/I for MVS & VM 1.1.1\*
  - AD/Cycle PL/I 1.1
  - PL/I 2.3
- Assembler:
  - High Level Assembler (HLASM) 1.4 through 1.1
  - Assembler H
- C:
  - C/MVS
  - C++/MVS
  - AD/Cycle C/370
  - SAS/C
- VS FORTRAN 2.6, 2.5

#### *Database Support*

- DB2 8.1, 7.1, 6.1, 5.1, 4.1, 3.1
- DB2 RRSF Attachment
- IMS 8.1 through 5.1
- IDMS 15.0, 14.0, 12.01

***Innovative Access Method (IAM) Support from Innovation Data Processing:***

IAM 7.0 and 6.4 through 6.1

\*Compuware supports the OS/390 and MVS portion of this product.

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## Facilities

Abend-AID intercepts and analyzes application program failures to provide comprehensive fault diagnostics reacting specifically to the type of error, the language of the failing program, and the types of files or databases in use. A concise, easy-to-read report, available online or in printed form, presents the most important information first and includes only the data necessary to solve the problem.

Abend-AID provides diagnostics for DB2, IMS, and IDMS databases as well as COBOL, PL/I, Assembler, C, and VS FORTRAN languages. This support includes those versions of COBOL and PL/I that can be run with Language Environment.

For COBOL, PL/I, and Assembler errors, Abend-AID merges actual source code and diagnostic data into a single report. Online, menu-driven access enables quick and accurate problem resolution. The specialized diagnostics for DB2, IMS, and IDMS environments enable programmers to resolve errors independently of the DBA staff.

## Abend-AID Report

The Abend-AID report consists of these sections, which may be accessed individually online by menu selection:

- **Header:** Includes environmental information about the program in error, the operating system release level, the date and time when the error occurred, job name, step name, and JES ID.
- **Error Analysis section:** Includes a comprehensive explanation of the error condition, specific information about the field(s) contained in the statement in error, and suggested courses of action whenever possible.
- **Error Location section:** Provides information for locating the statement in error. When using Extended Language Support, identifies the exact location of the error. The compile date and length of the program in error are also identified.
- **Call Trace Summary section:** Provides the Call Trace Summary and the Application Program Attributes. The Call Trace Summary includes a trace of called/linked programs on the save area chain and indicates the program in error. The Application Program Attributes include the program name, language, compile date, and length for each application program.
- **Supporting Environmental Data section:** Provides supporting environmental data. This information includes the abending Program Status Word (PSW), program PSW, entry point and load point addresses, and the contents of the registers at the time of the error.
- **Program Storage section:** Formats program storage for application programs on the calling chain. Program storage is formatted based on the programming language.
- **Program Listing section:** Available only with COBOL, PL/I, or Assembler extended language support. Provides the procedure divisions for COBOL programs on the calling chain and source listings for PL/I or Assembler programs on the calling chain with the current statement indicated.
- **File section:** Gives a status of each open file along with formatted current and previous records.

- **Specialized Database Support section:** Provides database-specific support for DB2, IMS, and IDMS if the Abend-AID database support facility for that environment is installed on the system.
- **SORT section:** Includes the current COBOL internal sort information. Available only for COBOL programs with internal sort.
- **COBOL Data Locator section:** Lists occurrences and identifies locations of all or specified data or date strings and formats. Available only during online viewing of COBOL extended language support.
- **Abend-AID for WebSphere MQ section:** Displays MQSeries batch or MQSeries IMS information created by Abend-AID for WebSphere MQ.
- **Language Environment Information section:** Includes information about:
  - *Language Environment run-time options in effect at the time of the error:* Run-time options are obtained from many sources including JCL overrides. These options affect job performance and how a job terminates if an error occurs. Includes how and where the option was set.
  - *User heap storage:* A storage allocation map shows allocated and free storage elements. Overlay errors are identified down to the element in error. Supporting data around the element in error is present to assist in debugging storage overlays.
  - *Significant run-time control blocks (CAA, CIB, EDB, MSIB, PCB, RCB):* In addition to dumping the entire control block, Abend-AID displays important fields in each block, along with the hexadecimal values of those fields.
  - *Run-time library services (RTLS):* Language Environment run-time libraries contain modules that can be accessed via the system LNKST, STEPLIB, and/or a Language Environment service called RTLS. Sites may choose a single method of access to these Language Environment libraries or allow a combination of these access mechanisms. This varied access can cause many run-time issues which may be the root cause of program failures. Using the information provided in the new Language Environment section of the Abend-AID report, the programmer can now determine at a glance what logical library name and RTLS version were used for the application.
- **Epilog section:** Includes report print and IBM dump information, if applicable.

## Extended Language Support

With Extended Language Support (XLS), you get source code in pertinent sections of the Abend-AID report showing where the fault occurs, listing the conditions under which it occurs, and telling why it occurs. XLS is available for COBOL, PL/I, and Assembler (HLASM) programs.

XLS contributes the following information to the report:

- **Error Analysis section:** Shows the source statement that is in error. For data-related errors, also shows the contents of COBOL fields, PL/I variables, or Assembler variables in the statement at the time of the fault.
- **Error Location section:** Shows the source statement being executed.
- **Program Storage section:** Shows the names and contents of all individual COBOL fields, PL/I variables, or Assembler variables in storage.
- **Program Listing section:** Shows the procedure divisions for COBOL programs on the calling chain or the source listings for PL/I or Assembler programs on the calling chain, with the current statement indicated.

### ***Report Viewing***

The Compuware Viewing Facility (Compuware/VF) provides immediate, online access to all report sections. The report can be printed during viewing.

Compuware/VF uses a self-maintaining report dataset that stores Abend-AID output in a compressed format, further reducing DASD space. Reports can be locked to keep them in the report dataset as long as needed.

Compuware/VF keeps track of all Abend-AID activity and provides a comprehensive security system. The report dataset directory summarizes Abend-AID activity in a concise, easy-to-use format. You can sort the directory by job name, report number, error code, date, programmer, or report size.

### ***Source Viewing***

Abend-AID's language processors for COBOL, PL/I, and Assembler enable XLS by capturing the pertinent source code from the compiler listing. The language processors store the source in a special, self-maintaining source listing dataset. For XLS, Compuware/VF inserts applicable information from the source listing dataset into the report sections.

The Abend-AID user can set up a language processor to store the source listing in the source listing dataset either before or after an Abend-AID report is written to the report dataset. One or more source listing datasets are prepared by the installer during installation for this purpose. A source listing dataset can be used by other Compuware products such as XPEDITER/TSO.

The COBOL language processor produces an enhanced compiler listing that gives diagnostic information not available in a standard listing. The enhanced listing enables developers to further review program conditions associated with report diagnostics.

### ***Distributed Viewing***

Distributed viewing enables application developers to merge Abend-AID report and source listing datasets that are on different MVS images that do not share DASD or to access the datasets individually. Users access the datasets through the Compuware/VF, as they normally would.

Working from individual local systems, any number of users can access report and source listing datasets that both reside on other MVS images. The distance between MVS sites has no effect on the speed or reliability of the extended language report presented to a user.

## **Database Support**

Abend-AID provides comprehensive support for DB2, IMS, and IDMS databases. These database support facilities are available as additional cost options.

### **Abend-AID for DB2**

Abend-AID for DB2 solves difficult S04E and S04F abends, as well as application program problems associated with unexpected negative SQL codes. With Abend-AID for DB2, you no longer need to wade through DB2 dumps and message manuals. Abend-AID pinpoints what happened, as well as when, where, and why a DB2 abend or error occurred. Furthermore, Abend-AID for DB2 usually offers a solution to the problem.

Abend-AID can diagnose DB2 problems regardless of the environment in which the program is executing, and it is applicable to TSO, call, or RRSF attach mode, IMS, and DL/I attach mode environments. It alleviates the complexity of DB2 as a result of cross-memory services, multiple address spaces, and the different execution modes.

## Abend-AID for IMS

Abend-AID for IMS features special diagnostic routines for application failures in IMS DB and TM environments. Abend-AID for IMS reduces the complexity surrounding the IMS environment by giving you comprehensive, easy-to-understand diagnostics on IMS user abends in addition to specific database information. Compuware/VF enables immediate, online access to the Abend-AID report that would not normally be available until the region is brought down.

## Abend-AID for IDMS

Abend-AID for IDMS provides diagnostics for failures unique to the CA-IDMS database system. IDMS application failures are thoroughly analyzed by special modules that produce output reports that accurately describe the cause of the error. With Abend-AID for IDMS, you no longer need to rely on manuals or reference cards when debugging IDMS errors.

## SNAP-AID

The SNAP-AID facility produces Abend-AID output without terminating the application program. This facility provides a controlled environment for debugging logic or data errors. For example, SNAP-AID can be very beneficial in the DB2 environment when you want Abend-AID diagnostics for a negative SQL code without terminating the program. SNAP-AID is invoked by a call to the SNAP\_AID module in the application program. The amount of output can be customized by using a parameter list in the SNAP-AID call.

## Japanese Language Facility

Abend-AID's Japanese language capability uses the IBM double-byte character set (DBCS) to present over 90% of the Abend-AID report in Japanese when viewed online through Compuware/VF. Japanese language is available for DB2, IMS, and COBOL diagnostics. Compuware/VF panels, tutorials, and messages can be displayed in Japanese.

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## Abend-AID for WebSphere MQ

Abend-AID for WebSphere MQ provides enhanced debugging capabilities for IBM WebSphere MQ batch and IMS applications. Abend-AID for WebSphere MQ is a separate Fault Management product that you can order through your Compuware sales representative.

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## SMF Cost Analysis Tool

The SMF Cost Analysis Tool analyzes user-provided SMF records spanning any time range to show the volume and type of fault activity on a system. It also estimates the time and system costs saved by using Abend-AID. You can order this tool through your Compuware sales representative.

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## Operation

Abend-AID remains transparent to the user until an application program failure occurs. When a program failure occurs, Abend-AID intercedes and reports the information you need to resolve the problem. Abend-AID operates according to a control structure preset by system defaults. You can tailor Abend-AID's control structure for specialized environments.

## Basic Process

When an application program failure occurs in Language Environment, the system calls registered Abnormal Termination Exits (ATE) to process the condition. For abnormal termination processing, Compuware provides the module LEAID as the entry point to Abend-AID.

If the application program failure is an abend, the operating system calls SVC51 to create a dump. In this case, Abend-AID operates by intercepting IBM SVC51 dump processing. If a //SYSUDUMP or //SYSABEND DD statement, or both the //SYSMDUMP and //ABENDAID DD statements are present in the execution JCL, Abend-AID intercepts the call to SVC51 and takes control.

In all Abend-AID processing, Abend-AID modules are dynamically loaded to process the error. These modules must be available either in a link list library or via a JOBLIB or STEPLIB library. Abend-AID tables let you further control Abend-AID execution. Global default options, global routing, and user exits provide a means of customizing Abend-AID processing.

Abend-AID operates in the normal problem-program state rather than the supervisor state. This operation maintains the integrity of the application system.

Abend-AID's decision-making capabilities selectively invoke the necessary diagnostic and reporting modules. This selection is based on variables such as the specific abend code, programming language, and file access method. Abend-AID reports information based on the status of the program and the system at the time of the program failure.

To keep overhead to a minimum, Abend-AID invokes only the required modules for each error. Exact memory requirements depend on the particular error, the options installed, and the complexity of the program being analyzed.

## Control Structure

Abend-AID can operate with the default parameters supplied by Compuware or can be customized to your needs. Abend-AID reports can be produced for all application program failures because Abend-AID recognizes which information is most helpful for problem resolution. Abend-AID also provides a sophisticated control structure that can be utilized as needed. Compuware recommends that you employ these controls only after you have identified variations to the product defaults that will aid in resolution of specific types of problems.

A seven-level control structure lets you tailor Abend-AID for specialized environments, such as different levels of support for jobs, programs, or abend codes. The structure is a hierarchical sequence with the highest priority first. Use of a particular control level overrides all of the controls that follow. The seven levels of the control structure are:

1. JCL modification
2. User exits
3. Job and program selection tables
4. Abend code tables
5. Global site options table
6. Global routing criteria and options

## 7. System-wide control.

Each level is described below.

### JCL Modification

You can easily override the user exits, tables, and default system parameters. Examples of JCL modifications:

#### **Example 1:**

Causes Abend-AID to print the Help page:

```
//ABNLHELP DD DUMMY
```

#### **Example 2:**

Causes Abend-AID to format and display all program storage and control blocks, regardless of installation options:

```
//ABNLALL DD DUMMY
```

### User Exits

Abend-AID provides optional user exits for tailoring output by particular jobs and/or programs. The exits dynamically perform specialized processing at execution time. They can be particularly useful for program development or for a phased installation of Abend-AID. The exit allows you to:

- Override job and program tables to specify an alternativeabend code table for particular errors.
- Route report output to alternate report datasets based on site-specific information, specify that Abend-AID not process for certain jobs or errors, and request the IBM dump to be either printed or suppressed.
- Display selected storage areas, such as GETMAIN storage, or tables and control blocks from user-written applications.

### Job and Program Selection Tables

Selection tables let you specify the Abend-AID operation for particular programs or jobs. These operations include *dump* (produces an IBM dump), *nodump* (does not produce an IBM dump), *ignore* (does not produce an Abend-AID report), or *proc* (produces an Abend-AID report).

### Abend Code Tables

Tables are supplied with the product that specify — by abend code, PL/I on-code, or LE condition code — the action that Abend-AID will take when a problem is either fully or partially resolved. These actions include options for dump output, control block formatting, and program storage analysis. These tables allow complete flexibility in tailoring the system.

Compuware distributes the abend code tables with the recommended settings. Because these settings are based on Compuware's experience with many installations, modifications to the tables are seldom necessary.

### Global Site Options Module — CWGLOBAL

The global site options module (CWGLOBAL) provides various Abend-AID system default options such as amount of information provided in certain sections of the report and language type for report text. This load module is created during installation.

## Global Routing Options and Criteria Module — CWROUTE

The global routing options and criteria module (CWROUTE) is created during installation and routes Abend-AID reports to specific report datasets. If specified, criteria can be used to route Abend-AID reports to report databases based on information unique to specific jobs. The names of the default shared directories for reports and source listings are stored here.

## System-Wide Control

This level is used to start Abend-AID on your system or to stop Abend-AID from intercepting application program failures.

## IBM Dump Provision

In most cases, the Abend-AID report is all that is needed to resolve the problem. In the rare case when it cannot fully resolve the problem, Abend-AID provides all of the information that can be obtained, and then automatically invokes a full IBM dump.

Abend-AID supplies tables that either request or suppress an IBM dump based on abend code, program name, or job name. Abend-AID DD statements can be used to override any option selected with the installation tables.

## Utilities

Several Abend-AID utility programs provide users with installation and servicing functions.

- **Installation Verification Report:** Checks the installation of tables and modules.
- **Table Listing Program:** Reviews the contents of the abend code tables, global table with site defaults, job/program selection tables, and the CSECT inclusion table.
- **License Management System:** Installs, checks, or modifies license information.

Other utilities provide users with operational and processing functions.

- **Compuware/VF:** Manages report and source listing datasets online.
- **CSS Utilities:** Sets up a language processor or modifies processing online.
- **CSS Batch File Utilities:** Manage report and source listing datasets in batch mode.

## User Manuals

A complete set of user documentation, in several online formats, Adobe Acrobat PDF, HTML, and IBM BookManager is provided on CD-ROM with each release of Abend-AID. Refer to the “Publications” section of the Introduction for complete information.

## Chapter 2. Getting Started

This chapter prepares you to use Abend-AID reports.

---

### Preparing Output

Abend-AID requires that a valid `//SYSUDUMP DD SYSOUT=` statement be added to your execution JCL in order to produce output. If you have a `//SYSUDUMP DD` statement and do not get Abend-AID output, contact an Abend-AID installer.

**Note:** In Language Environment, a `//SYSUDUMP DD` statement is required for abends only. It is not necessary for condition code handling.

### With Compuware/VF

In order to use the Compuware Viewing Facility (Compuware/VF), Abend-AID output must be routed to an Abend-AID report dataset. This report dataset can be a report shared directory, an individual report database attached to a shared directory, or a DDIO report file. Compuware/VF uses the output that is stored in the report dataset.

Normally, your output is routed to the site-specified default report shared directory. The `ABNLTERM DD` can be used in a job's JCL to route the Abend-AID report to a specific report dataset.

```
//STEP03 EXEC PGM=PROGNAME
.
.
.
//SYSUDUMP DD SYSOUT=*
//ABNLTERM DD DSN=YOUR.REPORT.FILE,DISP=SHR
```

---

### Before You Begin

This section will help you prepare a sample Abend-AID report after which you can view it by referring to the section, "Accessing and Browsing a Report" on page 2-5. It will help most in the following situations:

- Your system or site installed Abend-AID for the first time
- Your system or site licensed XLS for the first time
- You are using Abend-AID for the first time.

### Extended Language Support

#### Collect Report Information

The information requested below will be helpful if Abend-AID is new to your site or system or if you are new to XLS. If XLS is new, you may have to refer to an Abend-AID installer.

1. Reports will be automatically routed to a report dataset by the CWROUTE load module. Provide the name of the Abend-AID report dataset that you will use:
2. If report routing is by job name, identify the name required:
3. Identify the Compuware source listing dataset that you will use:
4. Identify how you will access Abend-AID from ISPF — with a menu option, CLIST, or other method:
5. Identify the menu, PROC, or JCL member you will use to compile source code with the Compuware language processor:
6. Identify any changes or special parameters that are required when you use the activating menu, PROC, or JCL member:

## Create a Sample Report

Create a sample abend and report for the orientation procedure that follows. You can identify an applicable program containing a sample abend in **Appendix A, “Testing Samples”**. These samples are in the Abend-AID installation library (TPAASAMP). If Abend-AID has been in use on your system or at your site for more than several weeks, you probably have reports available. Otherwise, make a change to a program or alter data to cause the program to abend.

1. Obtain a sample abended program, or create your own, containing a S0C7, on-code 0320, or S0CB.
2. Using the information you recorded in items 5 and 6 above, compile the program incorporating the Compuware language processor.
3. Check the JOBLLOG to make sure the Compuware language processor completed with a return code of 0 or 4.
4. Run the program, making sure that it abends.

If routing is by job name, make sure you run the job with an appropriate job name. Refer to item 2 in the preceding section.

## Basic Language Support

### Collect Report Information

The information requested below will be helpful if Abend-AID is new to your site or system. If Abend-AID is new, you may have to refer to an Abend-AID installer.

1. Verify that Abend-AID reports are being automatically routed to a report dataset by the CWROUTE load module created during shared directory installation. Provide the name of the Abend-AID report dataset that you will use:

2. If report routing is by job name, identify the name required:
3. Identify how you will access Abend-AID from ISPF — with a menu option, CLIST, or other method:
4. Identify the menu, PROC, or JCL member you will use to compile source code with the Compuware language processor:
5. Identify any changes or special parameters that are required when you use the activating menu, PROC, or JCL member:

## Create a Sample Report

Create a sample abend and report for the orientation procedure that follows. You can identify an applicable program containing a sample abend in **Appendix A, “Testing Samples”**. These samples are in the Abend-AID installation library (TPAASAMP). If Abend-AID has been in use on your system or at your site for more than several weeks, you have probably have reports available. Otherwise, make a change to a program or alter data to cause the program to abend.

1. Obtain a sample abended program, or create your own, containing a S0C7, on-code 0320, or SOCB.
2. Run the program, making sure that it abends.

If routing is by job name, make sure you run the job with an appropriate job name. Refer to step 2 in the preceding section.

---

## Accessing Abend-AID

You can view Abend-AID reports using the Compuware/VF (Viewing Facility) either directly under ISPF/PDF or from SDSF in JES2 through a CLIST or REXX EXEC.

## Accessing While Viewing JES Output Display

Beginning with Abend-AID Release 9.4 with Compuware Shared Services (CSS) 7.9, a new function allows you to *hot key* from your job log to the report in the Abend-AID report database. You are positioned at the Output Selection Menu (Figure 2-7 on page 2-7). This function uses the same REXX EXEC or CLIST as Compuware/VF that your site's installer set up during the CSS installation. Refer to the *Compuware Shared Services User/Reference Guide* for more information. The function is context-independent and works from any ISPF screen display. The function merely depends on a new message, AB400A, written at dump capture to the job log.

While viewing the AB400A message, you can do one of the following to access the report:

- Enter the TSO command `TSO EXEC 'CX.SLCXCNTL(CWVFREXE)' 'HOTKEY'` on the Command Input line (Figure 2-1 on page 2-4). You can define the TSO HOTKEY command as an ISPF system command, invoking Compuware/VF by either CWVFREXE, the REXX EXEC, or CWVFCLSE, the CLIST. The Compuware library dataset name (CX.SLCXCNTL) may be different, but the low-level qualifier is typically SLCXCNTL.

- Equate the TSO HOTKEY command to a PF key and thus provide hot-key access to the report (Figure 2-2 on page 2-4). Display the ISPF panel (Figure 2-2 on page 2-4) by entering the ISPF KEYS command on the command line. This panel enables you to equate a PF key to the command used to link to Compuware/VF. You now have one-key access to the Abend-AID report from SDSF or a SYSOUT archival package.

When you enter the TSO HOTKEY command, the OUTPUT SELECTION MENU (Figure 2-7 on page 2-7) is displayed by Compuware/VF. When you exit Compuware/VF, the original screen (Figure 2-1) is redisplayed.

**Figure 2-1.** Executing the TSO HOTKEY Command

```

SDSF OUTPUT DISPLAY AA950C01 J0249094 DSID      2 LINE 10      COLUMNS 02- 81
COMMAND INPUT ==> TSO EXEC 'CX.SLCXCNTL(CWVFREXE)' 'HOTKEY'  SCROLL ==> HALF
2.34.01 J0975344 ---- MONDAY,    15 SEP 2003 ----
2.34.01 J0975344 IRR010I  USERID TSUSER  IS ASSIGNED TO THIS JOB.
2.34.03 J0975344 ICH70001I EFHDMW0  LAST ACCESS AT 12:02:58 ON MONDAY, SEPTEMB
2.34.03 J0975344 $HASP373 AA95DMWC  STARTED - INIT 2    - CLASS A - SYS CW09
2.34.03 J0975344 IEF403I  AA95DMWC  - STARTED - TIME=12.34.03
2.34.15 J0975344 +AB400A      ===== ABEND-AID ===== 050
050          REPORT WRITTEN TO: AA.DEV.R95.SHDRRPT
050          REPORT NUMBER: 000494
050          JOB-AA95DMWC STEP-GO
050          LE COND CODE=CEE3209S
2.34.23 J0975344 +LEAID110 LE-AID IS ISSUING U4039-8 ABEND
2.34.27 J0975344 $HASP375 AA95DMWC ESTIMATED LINES EXCEEDED
2.34.29 J0975344 $HASP375 AA95DMWC ESTIMATE EXCEEDED BY           10,000 L
2.34.31 J0975344 $HASP375 AA95DMWC ESTIMATE EXCEEDED BY           20,000 L
2.34.33 J0975344 $HASP375 AA95DMWC ESTIMATE EXCEEDED BY           30,000 L
2.34.35 J0975344 $HASP375 AA95DMWC ESTIMATE EXCEEDED BY           40,000 L
2.34.36 J0975344 $HASP375 AA95DMWC ESTIMATE EXCEEDED BY           50,000 L

```

**Figure 2-2.** Assign Command to PF Key

```

Command ==>

Number of PF Keys . . . 24                      Terminal type . . . 3278      More:      +
Enter "/" to select . . . (Enable EURO sign)

PF1 . . . TSO EXEC 'CX.SLCXCNTL(CWVFREXE)' 'HOTKEY'
PF2 . . . SPLIT
PF3 . . . END
PF4 . . . RETURN
PF5 . . . IFIND
PF6 . . . RFIND
PF7 . . . UP
PF8 . . . DOWN
PF9 . . . SWAP
PF10 . . LEFT
PF11 . . RIGHT
PF12 . . RETRIEVE

```

## SECT and TRACE Keywords

You can use the SECT and TRACE keywords with the TSO HOTKEY command to access a specific Abend-AID report section with trace mode activated. For diagnostic purposes, the TRACE keyword displays the Trace section, which provides a trace of program flow and program attributes. For example, valid syntax for the TSO HOTKEY command to access the Next Sequential Instruction (NSI) section of the Abend-AID report with trace mode activated is:

```
TSO EXEC 'dataset-name(CWVFREXE or CWVFCLSE)' 'HOTKEY SECT(NSI) TRACE'
```

## Accessing Abend-AID Under an ISPF/PDF Menu

Compuware/VF users can also access Abend-AID through an ISPF/PDF menu, like the one shown in Figure 2-3 on page 2-5. Your menu selection presents the Compuware/VF Entry Panel. If you cannot access the entry panel from your menu, notify an Abend-AID installer.

Figure 2-3. Sample ISPF/PDF Menu

```

----- ISPF/PDF PRIMARY OPTION MENU -----
- OPTION  ==> A
0 ISPF PARMS - Specify terminal and user parameters
1 BROWSE     - Display source data or output listings
2 EDIT      - Create or change source data
3 UTILITIES - Perform utility functions
4 FOREGROUND - Invoke language processors in foreground
5 BATCH     - Submit job for language processing
6 COMMAND   - Enter TSO Command, CLIST, or REXX exec
7 DIALOG TEST - Perform dialog testing
A ABEND-AID - Abend-AID
C CSS       - Compuware CSS Utilities
S SDSF     - System Display and Search Facility
T TUTORIAL - Display information about ISPF/PDF
XT XPEDITER/TSO - Compuware interactive test/debugging product
X EXIT     - Terminate ISPF using log and list defaults

USERID - USER01
TIME   - 15:56
TERMINAL - 3278
PF KEYS - 24

Enter END command to terminate ISPF.

```

## Accessing and Browsing a Report

The following procedure describes accessing and browsing an Abend-AID report through Compuware/VF.

**Note:** You can find complete information about the screens referred to in this procedure, including commands and field summaries, in **Chapter 13, “Understanding the Compuware/VF Interface”**.

1. Access the Compuware/VF Entry Panel as described in “Accessing Abend-AID” on page 2-3.
2. At the Compuware/VF Entry Panel (Figure 2-4 on page 2-6), specify report and source listing datasets. You can also identify the remote MVS images that they are located on, if applicable. Complete the steps below as applicable, then press **Enter**.

*For Extended Language Support (XLS):*

- a. Type **0** in the Dataset choice field to select the report dataset. To look only at a compiled source listing instead of a report, specify a source dataset (1 - 8).
- b. If necessary, name the report dataset on the **0** line and one or more source listing datasets on the lines 1 - 8.
- c. If a dataset is located on a different MVS system, in the Remote Server field identify the Abend-AID server on that system. At the Local Server SSID field, identify the Abend-AID server on the local MVS system. For distributed viewing, Server IDs are assigned when the servers are configured.

*For base language support:*

- a. Type **0** in the Dataset choice field to select the report dataset.
- b. If necessary, name the report dataset on the **0** line.

- c. If a dataset is located on a different MVS system, in the Remote Server field identify the Abend-AID server on that system. At the Local Server SSID field, identify the Abend-AID server on the local MVS system. For distributed viewing, Server IDs are assigned when the servers are configured.

**Figure 2-4.** Compuware/VF Entry Menu

```

COMPUWARE/VF ENTRY PANEL ----- COPYRIGHT COMPUWARE CORPORATION 1976, 2003.
Command ==>
Dataset choice . 0          (Select 0 - 8, from below, or C for Contact Data)
Member . . . . . _____ (MVS:jobname, SOURCE:program, or member*)
                          (Use the LNAME command to enter a Long Program Name)

                          Remote
Abend-AID Shared Directory or Report Dataset:          Volume Server
0 'AA.REPORTS'
Source Directory or Listing Datasets:
1 'AA.LISTING'
2
3
4
5
6
7
8

Processing options:                                     Source browsing options:
Confirm delete . . YES      (Yes or no)                Unit . . . . . VIO
Show print setup . YES      (Yes or no)                Blocking . . . 10
Show source warning YES      (Yes or no, used only for Abend-AID)
Language . . . . . ENGLISH
Local Server SSID .          (Required for Viewing Remote DDIO files)
    
```

- 3. If you are accessing a dataset on a different MVS system, Compuware/VF presents its Alternate Logon screen. Enter your user ID and password for the Abend-AID server on that system in the applicable fields.

**Figure 2-5.** Compuware/VF Alternate Logon

```

----- COMPUWARE/VF ALTERNATE LOGON -----
Command ==>

Logon attempt to AASRV01 requires a USERID/PASSWORD. Please
supply an alternate userid/password to complete access requirement
for DDIO file: AA.R950.CXR800.RPTFILE

Alternate USERID: PFHAJF0    <== USERID on remote system
PASSWORD:
    
```

- 4. At the resulting Abend-AID Dataset Directory (Figure 2-6), select your abended program in the JOBNAME column by entering the line command S (Select) to the left of its name. You can apply any of the other commands shown above the directory in the same way.

Figure 2-6. Abend-AID Dataset Directory

```

COMPUWARE/VF ---- 'ABENDAID.REPORT.FILE'----- ROW 1 OF 52
COMMAND INPUT ==>                                SCROLL ==> PAGE

                                ABEND-AID DATASET DIRECTORY

S - View C - Contact Info D - Delete P - Print L - Lock U - Unlock

JOBNAME   REPT NUMBER JESID   CODE    DATE      TIME     DESC      SIZE(K)
S TSS070CS 71 J08263 SOC7 05 MAR 2000 17.50.22 CLAYTON D 31
TSS070CS (L) 70 J07553 U1035 05 MAR 2000 16.45.18 DONNA C 15
TSM050TS 68 J09691 U0240 02 MAR 2000 9.11.49 WOODS 15
TSM050TS (L) 67 J09465 SOC2 02 MAR 2000 8.51.20 T WOODS 15
TSM030SN 66 J05446 SNAP 01 MAR 2000 16.33.07 T SMITH 15
TSM020TX 65 J00942 SOC1 01 MAR 2000 9.31.15 GARY K 15
TSM050TS 64 J00406 U1020 01 MAR 2000 8.42.12 WOODS TINA 15
TSM050TS 63 J07030 SOC7 10 FEB 2000 16.54.14 KAYLOR G 31
TSM050TS (L) 62 J06927 SOCB 10 FEB 2000 16.46.36 WOODS T 31
TSM030LP 61 J05611 SOC7 10 FEB 2000 15.07.38 SMITH 15
TSM030PL 59 J09984 S213 10 FEB 2000 14.50.09 T SMITH 15
TSM050X1 (M) 58 J08064 SD37 08 FEB 2000 11.29.39 TINA WOODS 15
TSS070CS 57 J08885 SOC7 05 FEB 2000 16.53.20 DONNA C 31
TSA060RI 55 J00512 U2222 03 FEB 2000 13.54.07 RANDY S 31
TSA060RO 52 J08065 SOC7 02 FEB 2000 17.36.52 SMITH R 31
TSM020ST 51 J03476 SOCF 02 FEB 2000 10.19.17 KAYLOR G 15
TSA060RA 50 J09305 U2222 01 FEB 2000 15.41.46 RANDY S 31
TSA080PR 46 J05500 SOC7 01 FEB 2000 9.19.48 HEIDI M 15
TST020LB 45 J06929 SD37 31 JAN 2000 12.52.31 FRANKEN S 15

```

- At the resulting Output Selection Menu (Figure 2-7), press Enter to go directly to the Error Analysis section. You can directly obtain any report section by entering its identification number or name in the SELECT SECTION field. Alternatively, you can use the cursor point-and-shoot method by pressing the Tab key to position the cursor on any highlighted section identification name, and then pressing the Enter key.

If a suitable source listing cannot be found (*XLS only*), you will receive a notification screen. The screens are explained in “Source Warnings” on page 2-14.

Figure 2-7. Output Selection Menu

```

COMPUWARE/VF ----- OUTPUT SELECTION MENU -----
SELECT SECTION ==>

'AA.SHDRRPT' REPT.122 AA950P92 J788317

0 HEADER   System and job information
1 DIAGS    Analysis
2 NSI      Location (next sequential instruction)
3 TRACE    Program flow and program attributes
5 REGS     Register contents and PSWs
6 PROG     Program Storage
7 PLIST    Program Listing
8 FILES    Open files information
9 IMS      IMS information and PCBs
10 IDMS    CA-IDMS information
11 DB2     DB2 information
12 SORT    COBOL sort information
13 DATALOC COBOL Data Locator
14 MQ      Websphere MQ information
15 LE      LE information
20 EPILOG  Abend-AID termination information

Key section number or name and press ENTER.
Or press ENTER to view the diagnostic summary of sections 1 through 5.

```

- The Error Analysis section shows the text of the abended statement (*XLS only*) and information about all fields in the statement. Scroll up to see the header section.

**Figure 2-8.** Error Analysis Section

```

COMPUWARE/VF -----
COMMAND INPUT ==>                                     SCROLL ==> CSR

'ABENDAID.REPORT.FILE'  REPT.71  AA940XLS  J08263

  A data exception, SOC7, occurred during execution of program PAYROLLX.

*****
*           Analysis of Error           *
*****

  A Data Exception occurred in the following statement:

000115          SUBTRACT TCR-TOTAL-TAXES FROM TCR-GROSS-PAY
000116          GIVING WS-NET-PAY

          Current values of fields on abending statement
          Level/Field Name          Picture/Type Offs          Value
          -----
000009  02  TCR-TOTAL-TAXES          9(4)V99          013222
000010  02  TCR-GROSS-PAY          # 9(2)V99          X'7C7CF3F3F1F1F0'
000012  77  WS-NET-PAY          # 9(2)V99 COMP-3  X'CC33110F'
000015  02  RPT-GROSS-PAY          $ZZ,ZZ.99          $ 1,203.33
          -----
  
```

**Note:** You can activate these functions at the COMMAND INPUT field within the report:

- Obtain any report section by entering its menu number or name.
- Search for specific data with the F (Find) command.
- Suppress source information by entering Source On and Source Off (*XLS only*).

For complete information about functions available within the report, refer to “Output Selection Menu” on page 13-9 or “Report Commands” on page 2-13.

7. Sections after the Registers section can be selected individually at the COMMAND INPUT field. Enter 6 on the command input line to see the Program Storage (PROG) section.

Figure 2-9. Trace Section

```

COMPUWARE/VF -----
COMMAND INPUT ==>                                     SCROLL ==> CSR

'ABENDAID.REPORT.FILE' REPT.71 AA940XLS J08263

*****
*           Call Trace Summary           *
*****

*****Calling*****      ****Return****      *****Called*****
Load-Mod Program      Type      Value      Program      Load-Mod

*SYSTEM                                     Links to PAYROLLX PAYLOAD *
PAYLOAD PAYROLLX      DISP 000007A2 Calls IGZCSPA IGZCPAC
                                           Program Causing Error *

-----
Load-Mod      Amode      Rmode      Resides in
PAYLOAD      ANY        24        CW.AA.TEMPL0A7
IGZCPAC      24         24        SYS2.COBRUN
-----

*****
*           Application Program Attributes           *
*****

Load-Mod      Program      Compile Date      Length      Language
PAYLOAD      PAYROLLX      08 FEB 2002      00000FB8      VS COBOL II V1R3M2

```

8. If more than one program was on the calling chain at the time of the abend, you will see a Program Storage Selection List (Figure 2-10). Select a program by entering **S** to the left of the program name.

Figure 2-10. Program Storage Selection List

```

COMPUWARE/VF PROGRAM STORAGE SELECTION LIST ----- ROW 1 TO 2 OF 2
COMMAND INPUT ==>                                     SCROLL ==> PAGE

PROGRAM / PROCEDURE NAME      LOAD      LANGUAGE      COMPILE DATE      -TIME
S PAYROLLX                     PAYLOAD VS COBOL II  15 FEB 2000  11:23:36
  UPDATE                       PAYLOAD VS COBOL II  15 FEB 2000  11:24:10
*****
***** BOTTOM OF DATA *****

```

9. You will see the Working-Storage and Linkage sections of the program (Figure 2-11 on page 2-10). You may have to press the Down key once or twice to bypass the compiler options information. Enter **7** on the command line to see the Program Listing (PLIST) Section.

**Figure 2-11. Program Storage Section (Working Storage)**

```

COMPUWARE/VF-----ROW 39 TO 57 OF 163
COMMAND INPUT ==> 7                                SCROLL ==> PAGE

'ABENDAID.REPORT.FILE' REPT.71 AA903XLS J08263

      Working-Storage Section

Working storage referenced by BLW cell      0 (X'0')

Level/Field Name                                Picture/Type Offs      Value
-----+-----1-----+-----2
77 WS-RECORD-CTR                                S999      COMP-3      +4
77 WS-TOTAL-NET-PAY                             S9(7)V99  COMP-3      +339117
77 WS-NET-PAY                                   S9(5)V99  COMP-3      X'CC33110F'
77 WS-EMP-NO                                    9(8)                                     04060293
01 WS-TIMECARD-REC
  02 TCR-EMP-NO                                  9(8)                                     04060293
  02 TCR-MONTH-CODE                             99                                             02
  02 TCR-EMP-NAME                               X(32)                                       EDWARDS, ALEXANDER
  02 TCR-GROSS-PAY                             9(5)V99                                       X'7C7CF3F3F1F0'
  02 TCR-TOTAL-TAXES                           9(4)V99                                       013222
    
```

10. If more than one program is available, you will see a Program Listing Selection List similar to the Program Storage Selection List in Figure 2-10 on page 2-9. Select a program by entering **S** to the left of the program name.
11. You will see the paragraph containing the current statement (Figure 2-12). The command **PLIST ALL** shows the complete division or listing. To return to the Output Selection Menu, press the End key. You may have to press it more than once.

**Figure 2-12. Program Listing Section**

```

COMPUWARE/VF-----ROW 1 TO 24 OF 24
COMMAND INPUT ==>                                SCROLL ==> PAGE

'ABENDAID.REPORT.FILE' REPT.71 AA903XLS J08263

*****
*                               Program Listing Section - PAYROLLX                               *
*****

000100      READ-A-RECORD.
000101      READ TIMECARD INTO WS-TIMECARD-REC
000102      AT END GO TO END-OF-JOB.
000103      MOVE WS-TIMECARD-REC TO MASTER-RECORD.
000104      ADD 1 TO WS-RECORD-CTR.
000105      IF TCR-EMP-NO > WS-EMP-NO
000106      MOVE TCR-EMP-NO TO WS-EMP-NO
000107      ELSE
000108      DISPLAY 'EMPLOYEE# SEQ ERROR ',
000109      TCR-EMP-NO,
000110      SPACE,
000111      WS-EMP-NO UPON SYSOUT,
000112      GO TO READ-A-RECORD.
000113      MOVE TCR-EMP-NO TO RPT-EMP-NO.
000114      MOVE TCR-EMP-NAME TO RPT-EMP-NAME.
    
```

12. If your program has open files, you may want to view the File section by entering **8**.

Figure 2-13. Output Selection Menu

```

COMPUWARE/VF ----- OUTPUT SELECTION MENU -----
SELECT SECTION ==>

'AA.SHDRRPT'  REPT.122  AA950P92  J788317

0 HEADER    System and job information
1 DIAGS     Analysis
2 NSI       Location (next sequential instruction)
3 TRACE     Program flow and program attributes
5 REGS      Register contents and PSWs
6 PROG      Program Storage
7 PLIST     Program Listing
8 FILES     Open files information
9 IMS       IMS information and PCBs
10 IDMS     CA-IDMS information
11 DB2      DB2 information
12 SORT     COBOL sort information
13 DATALOC  COBOL Data Locator
14 MQ       Websphere MQ information
15 LE       LE information
20 EPILOG   Abend-AID termination information

                Key section number or name and press ENTER.
                Or press ENTER to view the diagnostic summary of sections 1 through 5.

```

13. If more than one file is open at the time of abend, you will see a list of all open files on the File Summary Selection List (Figure 2-14). Select the file you want to view by entering **S** to the left of the file name. To open a file through File-AID's edit or browse modes, enter **E** or **B**.

Figure 2-14. File Summary Selection List

```

COMPUWARE/VF  FILE SUMMARY SELECTION LIST -----  ROW 1 TO 8 OF 8
COMMAND INPUT ==>                                     SCROLL ==> PAGE

S - view file control blocks  E - File-AID Edit  B - File-AID Browse
                             (except JES spooled datasets)

DDNAME  DEVICE UNIT VOLSER DISP AMTYPE  EXCPS  -----  DCB INFORMATION  ---
OUTLIST JES2 spooled                QSAM   81      (DSORG=PS,RECFM=FBA,
MASTER  3380  3AB  CWX018 NEW  QSAM   0      LRECL=133,BLKSIZE=13300)
                             (DSORG=PS,RECFM=FBA,
                             LRECL=80,BLKSIZE=3200)
S TIMECARD
SYSUT1  3380  2C9  SMS801 SHR  VSAM   4
SYSUT1  3380  2C9  SMS801 SHR  BDAM   4      (DOSORG=DA,RECFM=F,
                             LRECL=121,BLKSIZE=12100)
***** BOTTOM OF DATA *****

```

14. Press the Down key to view the complete file information (Figure 2-15 on page 2-12). Press the End key to return to the File Selection Menu. Press End again to return to the Output Selection Menu.

**Figure 2-15. File Section**

```

COMPUWARE/VF ----- ROW 1 TO 24 OF 36
COMMAND INPUT ==>          SCROLL ==> PAGE

                                Use the EDIT or BROWSE command for File-AID

'ABENDAID.REPORT.FILE' REPT.71 AA903XLS J08263

    Data Management Control Blocks for DDNAME - TIMECARD
    DSNAME=CWV.TS0000.AA.TIMECARD
                                ACC METH=VSAM

File EXCP Count=1

File Summary:

Access type.....BASE CLUSTER
Dataset type.....ESDS
Processing type...ADR,AMODE31,NFX,DDN,NDF,SEQ,NCI,IN,NIS,NRM,NRS,NSR,
                                NUB

File errors.....None

Current record:

00044F70 CHAR 4058829912D0E, WILLIAM T.          00|@#200
    
```

15. Exit Compuware/VF by entering **End** at the SELECT SECTION field.

**Figure 2-16. Output Selection Menu**

```

COMPUWARE/VF ----- OUTPUT SELECTION MENU -----
SELECT SECTION ==>

'AA.SHDRRPT' REPT.122 AA950P92 J788317

0 HEADER  System and job information
1 DIAGS   Analysis
2 NSI     Location (next sequential instruction)
3 TRACE   Program flow and program attributes
5 REGS    Register contents and PSWs
6 PROG    Program Storage
7 PLIST   Program Listing
8 FILES   Open files information
9 IMS     IMS information and PCBs
10 IDMS   CA-IDMS information
11 DB2    DB2 information
12 SORT   COBOL sort information
13 DATALOC COBOL Data Locator
14 MQ     Websphere MQ information
15 LE     LE information
20 EPILOG Abend-AID termination information

                                Key section number or name and press ENTER.
                                Or press ENTER to view the diagnostic summary of sections 1 through 5.
    
```

---

## Report Commands

You can scroll through the first five report sections, while other sections must be accessed individually. Enter the section number or name in the COMMAND INPUT field. Inside the report, use standard scrolling commands.

The commands summarized below are also available.

### SOURCE Command

You can suppress the presence of source information in the report or look at a directory listing of the members in your source datasets.

Enter SOURCE in the COMMAND INPUT field of any report section containing source information or in the SELECT SECTION field of the Output Selection menu.

#### SOURCE On

Default. Display source. Applicable only to the open report.

#### SOURCE Off

Suppress source.

#### SOURCE MISMATCH

When you are working with COBOL or PL/I XLS, this command presents a source warning screen at which you can access a directory listing of the source datasets specified on the Entry Panel. For Assembler XLS, it directly presents the directory listing.

### F (FIND) Command

When viewing a report section, use the F (FIND) command to search for specific characters or character strings within the section:

**Note:** The word *find* cannot substitute for any of the following syntax.

#### F xxx

Finds the characters specified by xxx in the current report section. Ignores letter case.

#### F 'xxx yyy'

Finds the character string specified by 'xxx yyy' with embedded blanks. Ignores letter case.

#### F

Finds the character string specified in the previous FIND command. Ignores letter case. Use this command instead of the REPEAT FIND PF key.

#### FS xxx

Finds the characters specified by xxx in the current report section. Case-sensitive.

#### FS 'xxx yyy'

Finds the character string specified by 'xxx yyy' with embedded blanks. Case-sensitive.

#### FS

Finds the character string specified in the previous FIND command. Case-sensitive. Use this command instead of the REPEAT FIND PF key.



## PL/I Mismatched Structure

When the compile time of a PL/I program is not in the load module, Abend-AID cannot report it. A mismatch results. When a PL/I date or time mismatch occurs, Abend-AID automatically checks the most recent source listing for matching program structure. If the structures do not match, you receive the Mismatched Structure Warning. You also obtain this screen with the SOURCE MISMATCH command.

**Figure 2-18.** PL/I Mismatched Source Listing Warning

```

COMPUWARE/VF -----
COMMAND INPUT ===>

'TSOUSER3.CSS80.QA.REPTFILE' REPT.1 EFHRIPOC J20788

* * * * * W A R N I N G * * * * *
*
*      An appropriate source listing could not be found.
*      Either:
*      1. a source listing for program PLIA5 does not
*         exist, or
*      2. a source listing exists, but it does not match
*         the compiler language and release of the program
*         in the Abend-AID report.
*
* * * * *

Type an S next to the desired option and press ENTER.
_ Retrieve a source listing by submitting background JCL.
_ Provide BASIC support without a source listing.

```

From this screen, you can choose one of the following:

- Submit a background job to retrieve a source listing.
- Continue without source support.
- Exit the selected section.

## Assembler Unmatched Source Listing

Due to the characteristics of Assembler, Abend-AID may not be able to reliably identify a matching source listing dataset for Assembler diagnostics. In this case you will receive a directory similar to the one shown in Figure 2-19 on page 2-16. Select the member you need.

The directory is immediately presented when Abend-AID cannot identify a matching source listing for Assembler diagnostics. In a diagnostic report for Assembler, you can also obtain this directory with the SOURCE MISMATCH command.

Figure 2-19. Assembler Mismatched Warning

```

COMPUWARE/VF ----- ROW 1 TO 28 OF 31
COMMAND INPUT ==>          SCROLL ==> CSR

      CSECT Name: EUR001
      Wildcard Mask: *****
      Assembled: 16 AUG 2003          Load module: EUR001

      The CSECT name and date do not uniquely match a source listing.

      _ Retrieve a source listing by submitting background JCL.
      _ Provide BASIC support without a source listing.

      Type an S next to the correct source listing below and press the ENTER key.
      ASSEMBLER SOURCE LISTING DATASET DIRECTORY
      PROGRAM      LIST NUMBER  ASMB DATE    TIME    RC   LANGUAGE  SIZE(K)
      ----- 'EFHAXSO.TEST.DDIO' -----
      X80102B (L)      3537      09 NOV 2002  12.20   00   HLASM R4   399
      TEMPNAME (L)     3344      10 SEP 2002  13.33   00   HLASM R4   160
      TEST1 (L)       3179      22 JUN 2002  11.35   00   HLASM R4   160
      VIBAIITF (L)    3046      28 MAR 2002  13.07   00   HLASM R4   559
      CWDEMASM (L)    2612      14 JUN 2001  20.08   04   HLASM R3   240
      ASM03T (L)     2651      08 JUN 2001  15.47   00   HLASM R3    80
      ASMPRG1 (L)    2330      13 MAR 2001  12.14   00   HLASM R3    80
      AIBHLP00 (L)   1023      T PAGO N    10.51   00   HLASM R2   719
      BXPLDBRT (L)   1884      03 AUG 2000  13.39   04   ASMH      399
      L87C006 (L)   1598      08 JUL 2000  16.37   00   HLASM R2   399
    
```

## Available Source Listings

If you choose Display Available Source Listings in response to mismatch warnings for COBOL and PL/I diagnostics, you will receive a Dataset Directory similar to the one shown in Figure 2-20.

You can use these commands in the directory:

- B:** Browse.
- D:** Delete.
- L:** Lock.
- P:** Print.
- S:** Select.
- U:** Unlock.

Figure 2-20. Source Listing Dataset Directory

```

COMPUWARE/VF ----- ROW 1 TO 13 OF 13
COMMAND INPUT ==>          SCROLL ==> PAGE

      SOURCE LISTING DATASET DIRECTORY
      PROGRAM      LIST NUMBER  COMP DATE    TIME    RC   LANGUAGE  SIZE
      ----- 'CWX0236.TECH.FIL1169.SLS2' -----
      WTP#1074 (L)      16      05 MAY 2000  16:16:18 00   PL/I V2   48 KB
      WTP#1074 (L)      8       29 MAR 2000  09:16:26 00   PL/I V2   32 KB
      ----- 'CWX0236.TECH.FIL1169.SLS1' -----
      WTP#1074 (L)     17       04 MAY 2000  10:49:45 00   PL/I V2   82 KB
      WTP#1074 (L)     16       03 MAR 2000  09:16:26 00   PL/I V2   82 KB
      ----- 'CWX0236.BD60.SLSP' -----
      WTP#1074 (L)     19       05 MAY 2000  16:16:18 00   PL/I V2   44 KB
      WTP#1074 (L)     12       04 FEB 2000  10:49:45 00   PL/I V2   40 KB
      WTP#1074 (L)     10       02 FEB 2000  09:16:26 00   PL/I V2   32 KB

      ***** BOTTOM OF DATA *****
    
```

## Source-Not-Found

You receive the warning shown in Figure 2-21 when the program name and language identified in the report cannot be found in a specified source listing dataset.

**Figure 2-21.** Source Not Found Warning

```

COMPUWARE/VF -----
COMMAND INPUT ==>

'EFHRIP0.RPTFILE' REPT.92 EFHRIP0C J20788

* * * * * W A R N I N G * * * * *
*
*      An appropriate source listing could not be found.
*      Either:
*      1. a source listing for program COMP5 does not
*         exist, or
*      2. a source listing exists, but it does not match
*         the compiler language and release of the program
*         in the Abend-AID report.
*
* * * * *

Type an S next to the desired option and press ENTER.
_ Retrieve a source listing by submitting background JCL
_ Provide BASIC support without a source listing

Enter END command to exit.

```

From this screen, you can choose one of the following:

- Submit a background job to retrieve a source listing.
- Continue without source support.
- Exit the selected section.

---

## Rapid Response

Abend-AID is one of the *find-and-fix* tools in Compuware's Rapid Response survival kit. In addition to diagnostic reporting at the time of abend, several Abend-AID facilities enable applications programmers to quickly respond to program faults that may be associated with Euro-currency program changes. These facilities provide advantages in development and testing stages as well as during production.

Abend-AID's Rapid Response advantages, summarized below, require Compuware Shared Services Release 7.8 or more current. For complete information, refer to the *Compuware Shared Services User/Reference Guide* or the Compuware/VF online help. You can also find additional information about the report Data Locator section in "COBOL Data Locator" on page 3-5.

## File-AID Access

Abend-AID users can keystroke directly into a Compuware File-AID product from an Abend-AID report:

- From the File section you can access File-AID/MVS.
- From the DB2 section you can access File-AID for DB2.
- From the IMS section you can access File-AID for IMS.

Edit and Browse commands in the report take you into File-AID edit and browse modes within a dataset or database. A current version of the applicable File-AID product must be available on the operating system.

## Data Locator

An online report section for COBOL diagnostics presents all data-related source and fields, including Millennium Language Extensions modifications if MLE is active. Selecting COBOL Data Locator on the output menu shows you all formats used and flags data or formats that may be invalid.

Access the Data Locator section as you would any report section. Data locator specifications may be customized for any data strings or fields.

## Source Comparison

A Compuware Shared Services (CSS) batch utility command enables you to compare any two source listings in a source listing dataset. The Flag command identifies any lines in a more recent listing that differ from a previous listing. You can also compare listings in different source listing datasets.

## Contact Information

You can attach a contact name and additional information to an abended job for future reference. Access the Contact Information summary from the Abend-AID Primary Menu, the Entry Panel, or the Abend-AID Dataset Directory.

## CSS Utilities

With CSS Utilities, you can modify compile JCL to preprocess or postprocess source code for XLS, or create and format report and source listing shared directories and associated files, all by entering specifications on ISPF panels. These operations previously involved JCL preparation and were typically done by a systems programmer. Access the utilities through the Abend-AID Primary Menu.

## Chapter 3.

# Diagnosing a COBOL Data-Related Error

This chapter describes how to use Abend-AID to diagnose a common COBOL error. Abend-AID provides two levels of COBOL support: Extended Language Support (XLS) and basic language support.

---

## Resolving a S0C7 with Extended Language Support

When you select a report section online through the Compuware Viewing Facility (Compuware/VF), with the applicable Compuware language processor in use, program source code can be automatically merged into the report. This comprises Abend-AID Extended Language Support (XLS).

COBOL XLS provides:

- The source code of the statement in error, shown in the Error Analysis section. For data-related errors, all COBOL fields in the statement in error are shown with their attributes and current values.
- The source code of the statement being executed, shown in the Error Location section.
- The names and contents of all individual COBOL fields in working storage, shown in the Program Storage section.
- The procedure divisions for COBOL programs on the calling chain, shown in the Program Listing section with the current statement indicated.

The following procedure shows how to read an extended language report on a common error, a S0C7 abend.

### 1. Review the Error Analysis section to determine the cause of the error.

First review the Error Analysis section (Figure 3-1 on page 3-2) to find the cause of the error. Usually, all of the information you need is in this section. The source code of the statement in error is shown, and all fields are shown with their current values. The Error Analysis section also gives a definition of a data exception. In this example, fields WS-NET-PAY and TCR-GROSS-PAY both contain invalid data, indicated with the # (pound sign) character.



The Error Analysis and Error Location sections usually provide enough information to resolve the problem. The other sections of the Abend-AID report provide supporting information that can be used to trace the cause of the error.

**3. Find the contents of other fields in your program.**

To find the contents of other data fields, review the Program Storage section in the Abend-AID report. Program storage is formatted by individual field name within working storage and linkage storage. At time of error, level name, field name, picture definition, and contents are given (Figure 3-3).

To find the contents of an indexed field, refer to "Determining Index and Indexed Field Values" on page 3-4.

**Figure 3-3. Program Storage Section**

Working-Storage Section				
Level/Field Name	Picture/Type	Offs	Value	
77 WS-LINE-CTR	S999	COMP-3	+4	
77 WS-PAGE-CTR	S999	COMP-3	+1	
77 WS-RECORD-CTR	S999	COMP-3	+4	
77 WS-TOTAL-NET-PAY	S9(7)V99	COMP-3	+339117	
77 WS-NET-PAY	# S9(5)V99	COMP-3	X'CC33110F'	
77 WS-EMP-NO	9(8)		04060293	
01 WS-TIMECARD-REC				
02 TCR-EMP-NO	9(8)		04060293	
02 TCR-MONTH-CODE	99		02	
02 TCR-EMP-NAME	X(32)		EDWARDS, ALEXANDER	
02 TCR-GROSS-PAY	# 9(5)V99		X'7C7CF3F3F1F0'	
02 TCR-TOTAL-TAXES	9(4)V99		013222	
Linkage Section				
Level/Field Name	Picture/Type	Offs	Value	
01 PARMDATA				
02 PARM-LEN	9(3)	COMP	7	
02 PARM-STRING	X(7)		SPACES	
Supporting data				
Contents of BLW cells				
BLW	0 (X'0')	-	00007220	
Contents of BLL cells				
BLL	0 (X'0')	-	00000000	BLL 1 (X'1') - 00013808
Contents of BLF cells				
BLF	0 (X'0')	-	09BF8270	BLF 1 (X'1') - 00007161
BLF	2 (X'2')	-	09BF5030	
Task Global Table (TGT)				
DSPL	Address	Data		
00000	00006B28	00108001	00015E98	00000000 80006A52 .....:q.....].
00010	00006B38	89BD52D8	8004C3DC	00DD01E0 00000001 i..Q..C....\....
00020	00006B48	00006F60	000177EC	00006D00 00006FC0 ..?-....._..?{
00030	00006B58	80006860	09BF8270	09BF4FE0 00007161 ...-..b...[\.../
00040	00006B68	0000680C	000064BC	F3E3C7E3 00026018 .....3TGT...-

**4. Review other supporting information.**

Whenever COBOL source listings are available in the source listing dataset, XLS provides the procedure divisions for all active COBOL programs with the current statement indicated. This information is shown in the Program Listing section. Figure 3-4 on page 3-4 shows the program listing for PAYROLLX.

Figure 3-4. Program Listing Section

```

*****
*           Program Listing Section - PAYROLLX           *
*****

000100      READ-A-RECORD.
000101          READ TIMECARD INTO WS-TIMECARD-REC
000102              AT END GO TO END-OF-JOB.
000103          MOVE WS-TIMECARD-REC TO MASTER-RECORD.
000104          ADD 1 TO WS-RECORD-CTR.
000105          IF TCR-EMP-NO > WS-EMP-NO
000106              MOVE TCR-EMP-NO TO WS-EMP-NO
000107          ELSE
000108              DISPLAY 'EMPLOYEE# SEQ ERROR  ',
000109                  TCR-EMP-NO,
000110                  SPACE,
000111                  WS-EMP-NO UPON SYSOUT,
000112                  GO TO READ-A-RECORD.
000113          MOVE TCR-EMP-NO TO RPT-EMP-NO.
000114          MOVE TCR-EMP-NAME TO RPT-EMP-NAME.
000115  CURR STMT ==>  SUBTRACT TCR-TOTAL-TAXES FROM TCR-GROSS-PAY
000116                  GIVING WS-NET-PAY
000117          MOVE TCR-GROSS-PAY TO RPT-GROSS-PAY.
000118          MOVE TCR-TOTAL-TAXES TO RPT-TOT-TAXES.
000119          MOVE WS-NET-PAY TO RPT-NET-PAY.
000120          ADD WS-NET-PAY TO WS-TOTAL-NET-PAY.

```

### 5. Review record information.

The File section shows information about all files that are open at the time of the error. This information includes identification of the current record and previous records, when available. DCB and other control block information is also given. Abend-AID displays records using decimal locations making fields easier to find when using record layouts. File information is provided for all file types, including VSAM and IAM.

You can directly access these files through File-AID from the online File Summary Selection List, which lists multiple open files. Inside a file you have full File-AID edit and browse capabilities.

## Searching Program Listing

The commands shown below enable you to immediately access the source statements that you need if you are working with XLS. Enter them as shown in an open Program Listing section with the PLIST command.

### blank

Displays source statements as determined by Active Program Listing Display Amount global option.

### nn

Displays *nn* lines before and after the current statement.

### ALL

Displays the complete COBOL procedure division.

### PARA

Displays the COBOL paragraph containing the current statement.

## Determining Index and Indexed Field Values

The following procedure tells how to determine an indexed occurrence within a table using an extended language report.

1. If the index is named in the statement in error, review the Error Analysis section. Otherwise, review the Program Storage section for your program.
2. Find the index name below the corresponding table name. Make note of the index value.
3. To convert the index value to the actual occurrence value, do the following:
  - a. Divide the index value by the length of one occurrence within the table. For example, if the index value is 27 and the length of one occurrence is 9:  
 $27 / 9 = 3$ .
  - b. Add one to this value:  $3 + 1 = 4$ .

The result is the occurrence within the table that the index was pointing to when the Abend-AID report was created.

## COBOL Data Locator

With default settings, the selection COBOL Data Locator on the output menu provides a summary of all data-related source and data formats in use, identifying data or formats that may be invalid. The summary includes Millennium Language Extensions (MLE) modifications if MLE is active at time of abend. The locator's search and display specifications may be customized for any types of data, including dates and currency.

The summary is available only online for COBOL programs. It may be printed during viewing with the LPRINT command but does not print with the complete Abend-AID report.

The data locator summary is shown as a Working Storage report section. When it is open, you can access locator search specifications by entering FINDDATA on the command line. When you exit after changing specifications, the summary will be immediately refreshed with the specified data.

For detailed information, refer to the Compuware Viewing Facility online help or the Compuware Viewing Facility chapter of the *Compuware Shared Services User/Reference Guide*.

Figure 3-5. COBOL Data Locator Summary

```

COMPUWARE/VF -----
COMMAND INPUT ==> _                               SCROLL ==> CSR
                                                Formatting has completed
'PFHWFBO.DUMP.DDIO'   REPT.71  PFHWFV2  J06619
Program: MLECOB       Compile Date: 07 JAN 2000  YEARWINDOW(1971)

'@' in column   36 denotes field with Data Locator PICTURE match.
'!' in column   36 denotes field with Data Locator DATE  match.
'#' in column   36 denotes field contains data not matching PICTURE clause.

Language Processor Interface Release      = 08.00.00
Language Processor Post Processor Release = 08.00.00

Working-Storage Section

Level/Field Name          Picture/Type Offs          Value
-----
77 CURRENT-YEAR           # 99                      SPACES
77 DAT-DATA-MATCH         ! 9(5)                    99366
77 DUE-YEAR               99                      05
77 END-YEAR               DATE FORMAT  YY          YEAR(2005)
77 EXP-CUST-DATE          DATE FORMAT  YYYY        YEAR(2005)
01 BASE-DATE              DATE FORMAT  @ 9(8)        19580430
02 BASE-YEAR              DATE FORMAT  YYYYXXXX  YEAR(1958)
02 BASE-MONTH             DATE FORMAT  YXXXXX    YEAR(2058)
02 BASE-DAY               9(2)
02 BASE-MONTH             9(2)
02 BASE-DAY               9(2)
    
```

---

## Compiling for Basic Language Support

To apply Abend-AID's basic language report, match the displacement addresses and offsets that it provides to the compiler listing. Set the following options to put the necessary information into the compiler listing.

### VS COBOL II

- OFFSET: Table matching statement numbers to program displacements.
- (or LIST): Expansion of COBOL code to its Assembler equivalent (contains a displacement for each Assembler instruction along with the related statement number).
- MAP: Table matching field names to offsets from BLW, BLL, etc., cells.

### OS VS COBOL

- CLIST: Table matching statement numbers to program displacements.
- (or PMAP): Expansion of COBOL code to its Assembler equivalent (contains a displacement for each Assembler instruction along with the related statement number).
- DMAP: Table matching field names to offsets from BL, BLL cells.

---

## Resolving a SOC7 with Basic Language Support

When you access a report section through the Compuware Viewing Facility, your site's System Display and Search Facility (SDSF) or printed output (without the applicable Compuware language processor in use) does not provide source-level support for the report. This comprises Abend-AID support.

The following procedure shows how to read a basic language report on the same error and program used in "Resolving a SOC7 with Extended Language Support" on page 3-1.

#### 1. Review the Error Analysis section to identify the error.

First review the Error Analysis section (Figure 3-6) for the analysis of the problem. Usually, all of the information you need is in this section. Find the name of the program in error.

**Figure 3-6.** Error Analysis Section

```

A data exception, SOC7, occurred during execution of program PAYROLLX.

*****
*           Analysis of Error           *
*****

A Data Exception was caused by data referenced at displacement 020 from
the start of BLW cell 00 (X'0'). The field contains X'CC33110F'. Refer
to the data division map in the program listing to locate the field
name.

The field causing the exception is located in Working-Storage of program
PAYROLLX.

Because the program is re-entrant, Working-Storage is located outside of
the program.

-----

A Data Exception is caused when a computational-3 field has
an invalid digit (not 0-9), or its last byte contains an invalid
sign (not A, B, C, D, E, or F).
```

**2. Find the name of the program in error.**

Review the Error Location section in your Abend-AID report. The Error Location section (Figure 3-7) identifies the program name and the displacement of the next sequential instruction to be executed.

The Error Location section also provides the following information:

- Program's compile date and length
- Program's link date and load module length
- Load module name and the load library name
- Location of the last I/O operation or subroutine call, if applicable.

**Figure 3-7. Error Location Section**

```

*****
*           Error Location           *
*****

The next sequential instruction to be executed in program PAYROLLX was
at displacement 0000065A.

The program was compiled on 08 FEB 2002 and is 00000FB8 bytes long.

It is part of load module PAYLOAD.

The module was loaded from STEPLIB library CW.AA.TEMPL0A7.

The module was link edited on 08 FEB 2002 and is 00001400 bytes long.

The last known I/O request or call in the program above was issued with
a return address at displacement 000005AC.
    
```

**3. Obtain a copy of the correct compiler listing.**

Make sure that the date of your compiler listing exactly matches the date provided by Abend-AID. Look at the compile date provided in the Error Location section (Figure 3-7). Compare it to the date in the compiler listing (Figure 3-8). If you had multiple compiles on that date, look at the compiled program length that is also provided in the Error Location section.

**Figure 3-8. Compiler Listing – Date**

```

1PP 5668-958 IBM VS COBOL II Release 3.2 09/05/1990          PAYROLLX Date 02/15/2000 Time 15:12:45 Page 2
LineID  PL SL  ----*A-1-B-+----2-+----3-+----4-+----5-+----6-+----7-Z-+----8  Map and Cross Reference
0 000001          IDENTIFICATION DIVISION.
000002          PROGRAM-ID. 'PAYROLLX' .
000003          AUTHOR. J. PROGRAMMER.
000004          *REMARKS.
000005          * THIS PROGRAM PROCESSES PAYROLL TIME-CARD RECORDS AND
000006          * WRITES AN EMPLOYEE MASTER RECORD FOR EACH EMPLOYEE
000007          * TIME-CARD. IT ALSO PRINTS A PAYROLL REPORT FOR ALL
000008          * EMPLOYEES.
000009          *-----
000010          ENVIRONMENT DIVISION.
000011          CONFIGURATION SECTION.
    
```

**4. Find the source code of the statement in error.**

Review the Assembler listing section of the compiler listing (Figure 3-9). Find the statement number for the instruction at the displacement shown in the Error Location section. This statement is the cause of the error. The displacement given in the Error Location section is 65A. Match that displacement to the Assembler listing. In this example, the error is in statement 115. Look at the program compiler listing in Figure 3-10, and match the statement number.

Figure 3-9. Assembler Listing

000114	MOVE						
00063A	D21F 9199 903A	MVC	409(32,9),58(9)	RPT-EMP-NAME		TCR-EMP-NAME	
000115	SUBTRACT						
000640	F236 9020 905A	PACK	32(4,9),90(7,9)	WS-NET-PAY		TCR-GROSS-PAY	
000646	960F 9023	OI	35(9),X'0F'	WS-NET-PAY+3			
00064A	F235 D160 9061	PACK	352(4,13),97(6,9)	TS2=0		TCR-TOTAL-TAXES	
000650	960F D163	OI	355(13),X'0F'	TS2=3			
000654	F833 9020 D160	SP	32(4,9),352(4,13)	WS-NET-PAY		TS2=0	
00065A	F833 9020 9020	ZAP	32(4,9),32(4,9)	WS-NET-PAY		WS-NET-PAY	
000117	MOVE						
000660	D20A D160 A0CF	MVC	352(11,13),207(10)	TS2=0		PGMLIT AT +203	
000666	F236 D170 905A	PACK	368(4,13),90(7,9)	TS2=16		TCR-GROSS-PAY	

Figure 3-10. Compiler Listing – Statement in Error

000105		IF TCR-EMP-NO > WS-EMP-NO	52	50
000106	1	MOVE TCR-EMP-NO TO WS-EMP-NO	52	50
000107		ELSE		
000108	1	DISPLAY 'EMPLOYEE# SEQ ERROR ',		
000109	1	TCR-EMP-NO,	52	
000110	1	SPACE,		IMP
000111	1	WS-EMP-NO UPON SYSOUT,	50	
000112	1	GO TO READ-A-RECORD.	100	
000113		MOVE TCR-EMP-NO TO RPT-EMP-NO.	52	77
000114		MOVE TCR-EMP-NAME TO RPT-EMP-NAME.	54	75
000115		SUBTRACT TCR-TOTAL-TAXES FROM TCR-GROSS-PAY	56	55
000116		GIVING WS-NET-PAY	49	
000117		MOVE TCR-GROSS-PAY TO RPT-GROSS-PAY.	55	81
000118		MOVE TCR-TOTAL-TAXES TO RPT-TOT-TAXES.	56	83
000119		MOVE WS-NET-PAY TO RPT-NET-PAY.	49	85
000120		ADD WS-NET-PAY TO WS-TOTAL-NET-PAY.	49	48

5. Determine the field in error.

The statement in error contains three fields (Figure 3-10). Refer again to the Error Analysis section (Figure 3-6 on page 3-6). Abend-AID identifies the cause of the error and the field causing the data exception. The field is located at hexadecimal displacement 020 from the beginning of BLW cell 00. This field contains X'CC33110F'.

To find the field name, review the MAP/DMAP for your program (Figure 3-11). The name of the field located at BLW cell 00, displacement 020, is WS-NET-PAY.

This program indicates that data is being moved into WS-NET-PAY. The invalid data is from either TCR-TOTAL-TAXES or TCR-GROSS-PAY. The MAP/DMAP shows you that TCR-TOTAL-TAXES is at displacement 61 from BLW cell 00, and TCR-GROSS-PAY is at displacement 5A. Review the Working-Storage section for your program in the Abend-AID report (Figure 3-12). The contents of working storage are grouped by BLW cell. Abend-AID working storage indicates that TCR-TOTAL-TAXES contains 013222, and TCR-GROSS-PAY contains @@33110, which is invalid data.

Figure 3-11. MAP/DMAP

Source LineID	Hierarchy and Data Name	Base Locator	Hex-Displacement Blk	Structure	Asmblr Data Definition	Data Type	Data Def Attributes
2	PROGRAM-ID PAYROLLX						-----*
23	FD MASTER					QSAM	FB
29	01 MASTER-RECORD	BLF=0000	000		DS 80C	Display	
30	FD OUTLIST					QSAM	FB
36	01 DATA-LINE	BLF=0001	000		DS 133C	Display	
37	FD TIMECARD					QSAM	FB
43	01 TIMECARD-RECORD	BLF=0002	000		DS 80C	Display	
45	77 WS-LINE-CTR	BLW=0000	000		DS 2P	Packed-Dec	
46	77 WS-PAGE-CTR	BLW=0000	008		DS 2P	Packed-Dec	
47	77 WS-RECORD-CTR	BLW=0000	010		DS2P	Packed-Dec	
48	77 WS-TOTAL-NET-PAY	BLW=0000	018		DS 5P	Packed-Dec	
49	77 WS-NET-PAY	BLW=0000	020		DS 4P	Packed-Dec	
50	77 WS-EMP-NO	BLW=0000	028		DS 8C	Disp-Num	
51	01 WS-TIMECARD-REC	BLW=0000	030		DS 0CL80	Group	
52	02 TCR-EMP-NO	BLW=0000	030	0 000 000	DS 8C	Disp-Num	
53	02 TCR-MONTH-CODE	BLW=0000	038	0 000 008	DS 2C	Disp-Num	
54	02 TCR-EMP-NAME	BLW=0000	03A	0 000 00A	DS 32C	Display	
55	02 TCR-GROSS-PAY	BLW=0000	05A	0 000 02A	DS 7C	Disp-Num	
56	02 TCR-TOTAL-TAXES	BLW=0000	061	0 000 031	DS 6C	Disp-Num	
57	02 TCR-FILLER	BLW=0000	067	0 000 037	DS 25C	Display	

Figure 3-12. Working-Storage Section

```

Working-Storage Section
Working storage referenced by BLW cell      0 (X'0')

  DSPL Address ----- Data -----
00000 06902650 004C0000 00000000 001C0000 00000000 .<.....
00010 06902660 004C0000 00000000 00134042 3C000000 .<.....
00020 06902670 CC33110F 00000000 F0F4F0F6 F0F2F9F3 .....04060293
00030 06902680 F0F4F0F6 F0F2F9F3 F0F2C5C4 E6C1D9C4 0406029302EDWARD
00040 06902690 E26B40C1 D3C5E7C1 D5C4C5D9 40404040 S, ALEXANDER
00050 069026A0 40404040 40404040 40407C7C F3F3F1F1 @3311
00060 069026B0 F0F0F1F3 F2F2F2F4 F3F2F3F4 F3F2F440 001322243234324

Linkage Section
Linkage storage referenced by BLL cell      1 (X'1')
(Length: EXEC PARM)

  DSPL Address ----- Data -----
00000 00005FEE 00074040 40404040 40 ..

Supporting data

Contents of BLW cells
BLW      0 (X'0') - 06902650

Contents of BLL cells
BLL      0 (X'0') - 00000000  BLL      1 (X'1') - 00005FEE

Task Global Table (TGT)
  DSPL Address ----- Data -----
00000 06902028 00108001 00005F98 000487B0 869013A2 .....~q..g.f..s
00010 06902038 80019178 86901E0E 00049FE0 000052D4 ..j.f.....\...M
00020 06902048 06902200 06902318 869011AC 0004D220 .....f....K.
00030 06902058 00049FE0 069025B0 06902650 06900CAC ...\......&...

```

6. Find the contents of other data fields in your program.

Use Abend-AID to investigate the contents of other data fields in your program. In this example, find the contents of WS-RECORD-CTR. Refer again to the Working-Storage section (Figure 3-12). Use the following procedure to find the contents of WS-RECORD-CTR.

- a. Find the BLW cell and displacement for WS-RECORD-CTR in the program's MAP/DMAP.
- b. Look at the Working Storage portion for BLW cell 00 and "match" the displacement of 010 using the DSPL column.

In this example, the match indicates that WS-RECORD-CTR was set at 4 (X'004C').

To find the contents of an indexed field, refer to “Determining Index and Indexed Field Values” on page 3-10.

Review record information. The File section shows information about all files that are open at the time of the error. This information includes identification of the current record and previous records, when available. DCB and other control block information is also given. Abend-AID displays records using decimal locations, making fields easier to find when using record layouts. File information is provided for all file types, including VSAM and IAM.

You can directly access these files through File-AID from the online File Summary Selection List, which lists multiple open files. Inside a file you have full File-AID edit and browse capabilities.

## Searching Program Storage

The commands shown below give you immediate access to the specific part of program storage that you need, if you are working with basic language support. Enter the commands within the Program Storage section of the Abend-AID report.

### **PROG(progname) BL x**

Locates the cell specified by *x* in the program specified by *progname*. Specify *x'x'* for hexadecimal cell numbers.

### **BL x, BLL x, BLW x, BLX x**

Locates the base locator cell specified by *x* in the current program storage.

### **PROG(progname) TGT**

Locates the TGT in the program specified by *progname*.

### **TGT**

Locates the TGT in the current program.

### **EXT**

Displays the COBOL External Data Section.

## Determining Index and Indexed Field Values

The following procedures tell how to determine an indexed occurrence within a table using a basic language report.

### **VS COBOL II, COBOL/370, and COBOL for MVS and VM**

1. Find the Program Storage section for your program in the Abend-AID report. At the end of the section, find “Contents of index cells” under “Supporting data” (Figure 3-13). Note that the index cells are listed in the same order as they appear in the Working-Storage section in your program. Locate the index cell that corresponds to the desired index.

**Figure 3-13.** Supporting Data Section

Supporting data					
Contents of BLW cells					
BLW	0 (X'0')	-	00013CA0		
Contents of BLL cells					
BLL	0 (X'0')	-	00000000	BLL	1 (X'1') - 00000000
BLL	2 (X'2')	-	00000000		
No BLF cells used in this program					
Contents of index cells					
IDX	0 (X'0')	-	0000001B	IDX	1 (X'1') - 00000024

2. To calculate the index value or occurrence, do the following:
  - a. Convert the value of these four bytes from hexadecimal to decimal. For example, if the four bytes contain X'0000001B', convert hexadecimal 1B to decimal 27.
  - b. Divide this decimal value by the decimal length of one occurrence within the table. For example, if the length of one occurrence is 9 bytes and the index value in decimal is 27:  $27 / 9 = 3$ .
  - c. Add one to this value:  $3 + 1 = 4$ .

The result is the occurrence within the table that the index was pointing to when the Abend-AID report was created.

**Note:** The index cells are based from the TGT in COBOL II or COBOL/370, and from the TGT or DSA in COBOL for MVS and VM. Supporting data will identify the TGT or DSA index cells.

## OS/VS COBOL

1. In the Memory Map at the end of your program's compiler listing, find the entry for "INDEX CELLS" (Figure 3-14). Make note of the displacement.

**Figure 3-14.** Memory Map

MEMORY MAP	
TGT	00118
SAVE AREA	00118
SWITCH	00160
TALLY	00164
.	
.	
BLL CELLS	00310
VLC CELLS	00344
SBL CELLS	00344
INDEX CELLS	00344
SUBADR CELLS	00348

2. Find the Program Storage section for your program in the Abend-AID report. In the task global table (TGT), locate the displacement specified for "INDEX CELLS" in the Memory Map (Figure 3-15).

Figure 3-15. Task Global Table (TGT)

Task Global Table (TGT)						
DSPL	Address	Data				
00118	00008348	00300000	000073C8	00000000	00000000	.....H.....
00128	00008358	00000000	00000000	00000000	00000000	.....
.						
.						
002C8	000084F8	00008230	00000000	00007BE0	E2E8E2D6	..b.....#\SYS0
002D8	00008508	E4E34040	E380000C	000082B8	00000000	UT T.....b.....
002E8	00008518	00000000	00000000	00000000	00000000	.....
002F8	00008528	00008590	00000000	00000000	00000000	..e.....
00308	00008538	00000000	00000000	00000000	00000000	.....
00318	00008548	000082D0	00000000	00000000	0000012F	..b}.....
00328	00008558	00000000	0000000C	00000000	00000000	.....
00338	00008568	00006D78	80006F0D	00000000	0000001B	.._...?.....

3. At the located TGT displacement, note that the index contents are listed in the same order as they appear in the Working-Storage section in your program. Locate the index contents that correspond to the desired index. The contents of each index cell are four bytes in length.
4. To calculate the index value, do the following:
  - a. Convert the value of these four bytes from hexadecimal into decimal. For example, if the four bytes contain X'0000001B', convert hexadecimal 1B to decimal 27.
  - b. Divide this decimal value by the decimal length of one occurrence within the table. For example, if the length of one occurrence is 9 bytes and the index value in decimal is 27:  $27 / 9 = 3$ .
  - c. Add one to this value:  $3 + 1 = 4$ .

The result is the occurrence within the table that the index was pointing to when the Abend-AID report was created.

## Chapter 4.

# Diagnosing a PL/I Data-Related Error

This chapter describes how to use Abend-AID to diagnose a common PL/I error. Abend-AID provides two levels of PL/I support: Extended Language Support (XLS) and basic language support.

Some conditions or characteristics found in PL/I programs restrict the usage of PL/I XLS. The usage restrictions are listed in Chapter 8 of the *Compuware Shared Services User/Reference Guide*.

---

## Resolving an On-Code 0320 with Extended Language Support

When you select a report section online through the Compuware Viewing Facility (Compuware/VF), with the applicable Compuware language processor in use, program source code can be automatically merged into the report. This comprises Abend-AID Extended Language Support (XLS).

PL/I XLS provides:

- The source code of the statement in error displayed in the Error Analysis section. For data-related errors, all PL/I variables in the statement in error are shown with their current values.
- The source code of the statement being executed in the Error Location section.
- The names and contents of all individual PL/I variables in storage displayed in the Program Storage section.
- The source listings for PL/I programs on the calling chain displayed in the Program Listing section with the current statement indicated.

The following procedure shows how to read an extended language report on a common error, an on-code 0320 abend.

1. **Review the Error Analysis section to determine the cause of the error.**

First review the Error Analysis section (Figure 4-1) to find the cause of the error. Usually, all of the information you need is in this section. The source code of the statement in error is displayed, and all variables are shown with the current values. The Error Analysis section also gives a description of an on-code 0320. This example is a decimal divide exception, which is caused when the divisor is zero. The divisor in the statement in error is MONTH\_CODE.

**Figure 4-1. Error Analysis Section**

```

The user abend code of U3001 was issued by PL/I after normal return from
an error or finish on-unit for error on-code 0320. That on-code
corresponds to the OS completion code of SOCB.

*****
*           Analysis of Error           *
*****

A Decimal Divide Exception occurred in the following statement:
000065          AVG_HOURS = TOTAL_HOURS / MONTH_CODE;

          Current values of fields on abending statement
--- Variable/Attributes ----- Value---1-----2-----3-----4
CALC_PAYROLL:AVG_HOURS
  AUTO   FIXED DEC(5,1)          +43.0
CALC_HOURS:TOTAL_HOURS
  STATIC FIXED DEC(5)           +101
PAYROLL:TIME_RECORD.MONTH_CODE
  AUTO   PIC'99'                 00
-----
          "#" - Indicates field contains invalid data

A decimal divide exception is caused when the divisor is zero.

          Specific Information
          ADDR   CSECT   DISPL/  Module  DISPL/  DISPL/
          Name   CSECT   Name     EPA     Load   Len Instruction
06900F2E PAYROLL1 000009DE PAYEXEC 00000A5E 00000A5E 6 FD91 D098 D0C8
                                          DP - divide decimal

                                          A-operand - dividend
00011F18                                  10 0000001010000000000000C
                                          B-operand - divisor
00011F48                                  2 000C
                                          The above field is in error
    
```

**2. Review the Error Location section to find the location of the error.**

The Error Location section (Figure 4-2) indicates that the statement being executed is contained in procedure CALC\_HOURS.

The Error Location section also provides the following information:

- Program's compile date and length
- Program's link date and load module length
- Load module name and the load library name
- Location of the last I/O operation or subroutine call, if applicable.

**Figure 4-2.** Error Location Section

```

*****
*           Error Location           *
*****

The statement being executed was:

000065          AVG_HOURS = TOTAL_HOURS / MONTH_CODE;

This statement is contained in
procedure PAYROLL:CALC_PAYROLL:CALC_HOURS.

The program was compiled on 08 FEB 2002 and is 00000A28 bytes long.

It is part of load module PAYEXEC.

The module was loaded from STEPLIB library CW.AA.TEMPL0A7.

The module was link edited on 08 FEB 2002 and is 00003B30 bytes long.

The last known I/O request or call in the program above was:

000063          OVERTIME_TOTAL.ACCRUED_HOURS = OVERTIME_TOTAL.ACCRUED_HOURS +
                OVERTIME_HOURS_WEEKLY;

This statement is contained in
procedure PAYROLL:CALC_PAYROLL:CALC_HOURS.

```

The Error Analysis and Error Location sections usually provide enough information to resolve the problem. The other sections of the Abend-AID report provide supporting information that can be used to trace the cause of the error.

### 3. Find the contents of other variables in your program.

To find the contents of other variables, review the Program Storage section in the Abend-AID report. Program storage is formatted by individual variable name in the same order as declared in the program. Variable name, storage type, definition, and current value for each PL/I variable located in storage at the time of the error, are given (Figure 4-3 on page 4-4 through Figure 4-5 on page 4-5).

**Figure 4-3. Program Storage Section – Procedure PAYROLL**

Variable Storage - Procedure PAYROLL		
Variable/Attributes	Value	1-----2-----3-----4
1 TIME_RECORD		
AUTO		
2 EMPLOYEE_NUMBER_REMOTE_LOCATION		
CHAR(8)	30900200	
2 MONTH_CODE		
PIC'99'	00	
2 EMP_NAME		
CHAR(30)	SMITH, ROBERT M.	
2 GROSS_PAY		
CHAR(7)	0232469	
2 TOTAL_TAXES		
CHAR(5)	01230	
2 SALARY_PER_HOUR		
CHAR(4)	3200	
2 REGULAR_HOURS_WEEKLY		
CHAR(3)	018	
2 OVERTIME_HOURS_WEEKLY		
CHAR(3)	040	
2 COMMENT		
CHAR(18)	03PNC 0320 SAMPLE	
.		
.		
1 REGULAR_TOTAL		
AUTO		
2 EMP_NUMBER		
CHAR(8)	0	
2 ACCRUED_HOURS		
FIXED DEC(3,1)	+53.0	
SORT_EMPL		
AUTO		
CHAR(17)	DECEMBER 40140039	
NET_PAY		
AUTO		
FIXED DEC(7,2)	+67999.00	
MONTHS		
EXT ENTRY		
ADDR		
BUILTIN		

**Figure 4-4. Program Storage Section – Procedure CALC\_HOURS**

Variable Storage - Procedure CALC_HOURS		
Variable/Attributes	Value	1-----2-----3-----4
TOTAL_HOURS		
STATIC		
FIXED DEC(5)	+101	

Figure 4-5. Program Storage Section – Procedure CALC\_PAYROLL

Variable Storage - Procedure CALC_PAYROLL		Value
Variable/Attributes		1-----2-----3-----4
AVG_HOURS	AUTO FIXED DEC(5,1)	+43.0
1 CNTL_STRUCT	CTL (0)	
2 TABLE_NAME	CHAR(30)	JOHNSTONE, REGINALD B.
2 TABLE_DATA (1:2)	(1) FLT DEC(5)	+2.000000E+0
	(2) FLT DEC(5)	+2.000000E+0
2 TABLE_ACTIVITY	CHAR(18)	02RECORD 2
1 CNTL_STRUCT	CTL (-1)	
2 TABLE_NAME	CHAR(30)	JONES, KERI, M.
2 TABLE_DATA (1:2)	(1) FLT DEC(5)	+1.000000E+0
	(2) FLT DEC(5)	+1.000000E+0
2 TABLE_ACTIVITY	CHAR(18)	01RECORD 1
1 INVENTORY_RANGE (1:3)	AUTO	
2 (1) WAREHOUSE		
3 MAX_STOCK	(1) FIXED DEC(4,1)	+99.0
3 MIN_STOCK	(1) FIXED DEC(3,1)	+88.0
2 (1) ROW_BIN		
3 MAX_STOCK	(1)	+99.0
3 MIN_STOCK	(1)	+88.0
2 (3) WAREHOUSE		
3 MAX_STOCK	(3) FIXED DEC(4,1)	+0.0
3 MIN_STOCK	(3) FIXED DEC(3,1)	+0.0
2 (3) ROW_BIN		
3 MAX_STOCK	(3)	+0.0
--- Variable/Attributes	-----	Value----1-----2-----3-----4
3 MIN_STOCK	(3)	+0.0
WAREHOUSE_DESCRIPTION	AUTO CHAR(120)	DESCRIPTION DESCRIPTION DESCRIPTION DESC RIPTION DESCRIPTION DESCRIPTION DESCRIPT ION DESCRIPTION DESCRIPTION DESCRIPTION
WAGES (-2:1,1:2)	AUTO	+40 +80
	(-2,1) FIXED DEC(3)	+2
	(-2,2) FIXED DEC(3)	+2
	(-1,1) FIXED DEC(3)	+0
	(-1,2) FIXED DEC(3)	+0
	(0,1) FIXED DEC(3)	+0
	(0,2) FIXED DEC(3)	+0
	(1,1) FIXED DEC(3)	+0
	(1,2) FIXED DEC(3)	+0
1 SECTION_FLAGS	STATIC	
2 SECTION1_FLG	BIT(2)	B'10'
2 SECTION2_FLG	BIT(2,2)	B'00'
2 SECTION3_FLG	BIT(2,4)	B'10'
2 SECTION4_FLG	BIT(2,6)	B'00'

#### 4. Review other supporting information.

Whenever PL/I source listings are available in the source listing dataset, XLS provides the source listings for all active PL/I programs with the current statement indicated. This information is shown in the Program Listing section. Figure 4-6 shows the program listing for PAYROLL.

Figure 4-6. Program Listing Section

```

*****
*           Program Listing Section - PAYROLL           *
*****
000059      CALC_HOURS: PROC;
000060      DCL      TOTAL_HOURS STATIC  FIXED DEC(5);
000061      REGULAR_TOTAL.EMP_NUMBER = OVERTIME_TOTAL.EMP_NUMBER =
              EMPLOYEE_NUMBER_REMOTE_LOCATION;
000062      REGULAR_TOTAL.ACCRUED_HOURS = REGULAR_TOTAL.ACCRUED_HOURS +
              REGULAR_HOURS_WEEKLY;
000063      OVERTIME_TOTAL.ACCRUED_HOURS = OVERTIME_TOTAL.ACCRUED_HOURS +
              OVERTIME_HOURS_WEEKLY;
000064      TOTAL_HOURS = OVERTIME_TOTAL.ACCRUED_HOURS +
              REGULAR_TOTAL.ACCRUED_HOURS;
          CURR STMT ==>  AVG_HOURS = TOTAL_HOURS / MONTH_CODE;
000066      SORT_EMPL = MONTH ZZ EMPLOYEE_NUMBER_REMOTE_LOCATION;
000067      END CALC_HOURS;

```

#### 5. Review record information.

The File section shows information about all files that are open at the time of the error. This information includes identification of the current record and previous records, when available. DCB and other control block information is also given. Abend-AID displays records using decimal locations, making fields easier to find when using record layouts. File information is provided for all file types, including VSAM and IAM.

You can directly access these files through File-AID from the online File Summary Selection List, which lists multiple open files. Inside a file you have full File-AID edit and browse capabilities.

## Searching Program Listing

The commands shown below enable you to immediately access the source statements that you need if you are working with XLS. Enter them as shown in an open Program Listing section with the PLIST command.

#### blank

Displays source statements as determined by the SLSLIST or SLSMLIST option in the CWGLOBAL table.

#### nn

Displays *nn* lines before and after the current statement.

#### ALL

Displays the complete PL/I source listing.

#### LABEL

Displays the label portion of the PL/I program containing the current statement.

---

## Types of Basic Language Support

Abend-AID provides non-abending and abending support for PL/I. The type of support your site installs depends on how your PL/I application programs presently terminate following an error.

- **Non-abending support:** Diagnoses the error and returns control to PL/I. This allows the program to terminate with the appropriate PL/I return code.
- **Abending Support:** Issues a U3001 abend. Abend-AID is then invoked through normal SVC51 processing to diagnose the error. Abending support lets your site avoid coding an IBMBEER or IBMBXITA exit in order to abend in an IMS environment.

**Note:** The Abend-AID SVC51 interface must be started when using either non-abending or abending PL/I support.

When PL/I is used with Language Environment (LE), Abend-AID receives control via LE condition-handling rather than PL/I condition-handling. Therefore, if you are using PL/I exclusively with LE, Compuware recommends that your site install Abend-AID Language Environment support instead of Abend-AID PL/I support.

---

## Resolving an On-Code 0320 with Basic Language Support

When you access a report section through the Compuware Viewing Facility, your site's System Display and Search Facility (SDSF) or printed output (without the applicable Compuware language processor in use) does not provide source-level support for the report. This comprises Abend-AID support.

PL/I basic support provides:

- Diagnostics for all PL/I errors including full ON-UNIT support.
- The procedure name and the displacement of the statement in error. The statement number is given when the GOSTMT compiler option is used.
- The line number when the GONUMBER compiler option is used.
- A call trace showing procedure names and displacements. Statement numbers are shown when the GOSTMT compiler option is used.
- Automatic, static, and other PL/I storage areas. In the automatic storage area, Abend-AID indicates the offset to the main entry point at the time of the PROC block, ON-UNIT, or library procedure transferred control with a CALL or BEGIN statement. Abend-AID shows both the absolute addresses, and their corresponding relative addresses, which match the offsets of the static variables on the variable storage map. Thus, you can directly reference each static variable. The names of the PROC, CSECT, and load module are provided.

The following procedure shows how to read a basic language report on the same error and program that was used in "Resolving an On-Code 0320 with Extended Language Support" on page 4-1.

### 1. Review the Error Analysis section to identify the error.

First review the Error Analysis section (Figure 4-7) for the analysis of the problem. Usually, all of the information you need is in this section. The Error Analysis section also gives a definition of an on-code 0320. This example is a decimal divide exception that is caused when the divisor is zero.

**Figure 4-7. Error Analysis Section**

```

The user abend code of U3001 was issued by PL/I after normal return from
an error or finish on-unit for error on-code 0320. That on-code
corresponds to the OS completion code of SOCB.

*****
*           Analysis of Error           *
*****

A decimal divide exception is caused when the divisor is zero.

                Specific Information
      CSECT   DISPL/   Module   DISPL/   DISPL/
ADDR  Name   CSECT   Name     EPA     Load   Len Instruction
06900F2E PAYROLL1 000009DE PAYEXEC 00000A5E 00000A5E 6 FD91 D098 D0C8
                                           DP - divide decimal
                                           A-operand - dividend

00011F18                                           10 000000101000000000000C
                                           B-operand - divisor

00011F48                                           2 000C
                                           The above field is in error

Note: The CSECT and module displacements are not applicable
      because the operands are located in storage outside
      of the program.

```

**2. Find the name of the procedure in error.**

Review the Error Location section in your Abend-AID report. The Error Location section (Figure 4-8), identifies the procedure name and the offset of the next sequential instruction to be executed. The GOSTMT compiler option was used to get the statement number.

The Error Location section also provides the following information:

- Program’s compile date and length
  - Program’s link date and load module length
  - Load module name and the load library name
  - Location of the last I/O operation or subroutine call, if applicable.

**Figure 4-8. Error Location Section**

```

*****
*           Error Location           *
*****

The next sequential instruction to be executed was in statement 65 at
offset 00000016C in procedure CALC_HOURS.

The program was compiled on 08 FEB 2002 and is 00000A28 bytes long.

It is part of load module PAYEXEC.

The module was loaded from STEPLIB library CW.AA.TEMPL0A7.

The module was link edited on 08 FEB 2002 and is 00003B30 bytes long.

The last known I/O request or call in the program above was issued with
a return address at displacement 0000097C.

```

**3. Obtain a copy of the correct compiler listing.**

Make sure that your compiler listing matches the date provided by Abend-AID exactly. Look at the compile date provided in the Error Location section (Figure 4-8).

Compare it to the date in the compiler listing (Figure 4-9). If you had multiple compiles on that date, then look at the compiled program length that is also provided in the Error Location section.

**Figure 4-9.** Compiler Listing – Date

```

15668-
910 IBM OS PL/I OPTIMIZING COMPILER VER 2 REL 3 MOD 0      05 MAR 2000 12:30:39 PAGE 1
-OPTIONS SPECIFIED
OAG,LIST,MAP,OFFSET,STORAGE,A(F),XREF(F),OPT,GOSTMT;
.
.
.
15668-
910 IBM OS PL/I OPTIMIZING COMPILER PAYROLL: PROC OPTIONS (MAIN);      PAGE 2
- SOURCE LISTING
- STMT
0
1 PAYROLL: PROC OPTIONS (MAIN);
  /*****
  /* THIS PROGRAM PROCESSES PAYROLL TIME-CARD RECORDS AND */

```

**4. Look at the source code of the statement in error.**

The Error Location section (Figure 4-8 on page 4-8) provides the number for the statement in error. Look at the program compiler listing in Figure 4-10, and match the statement number.

**Figure 4-10.** Compiler Listing – Statement in Error

```

63 OVERTIME_TOTAL.ACCRUED_HOURS = OVERTIME_TOTAL.ACCRUED_HOURS +
   OVERTIME_HOURS_WEEKLY;
64 TOTAL_HOURS = OVERTIME_TOTAL.ACCRUED_HOURS +
   REGULAR_TOTAL.ACCRUED_HOURS;

65 AVG_HOURS = TOTAL_HOURS / MONTH_CODE;

66 SORT_EMPL = MONTH ȳȳ EMPLOYEE_NUMBER_REMOTE_LOCATION;
67 END CALC_HOURS;
68 END CALC_PAYROLL;
69 WRITE_TOTAL:
   TOTAL_NET_PAY = TOTAL_CTR;
70 WRITE FILE (OUTLIST) FROM (FINAL_LINE);

```

**5. Determine the variable in error.**

The statement in error contains three variables (Figure 4-10). Refer again to the Error Analysis section (Figure 4-8 on page 4-8). Abend-AID identifies the cause of the error and the variable causing the decimal divide exception. The Specific Information area of the Error Analysis section indicates that the B-operand is the field in error. This variable contains X'000C'. The divisor in the statement in error is MONTH\_CODE.

**6. Find the contents of other variables in your program.**

Use Abend-AID to investigate the contents of other variables in your program. In this example, find the contents of RECORD\_CTR. Refer to the variable storage map (Figure 4-11). Find the storage CLASS and HEX offset for RECORD\_CTR.

**Figure 4-11.** Variable Storage Map

- VARIABLE STORAGE MAP -						
IDENTIFIER	LEVEL	OFFSET	(HEX)	CLASS	BLOCK	
DYNAMIC_LABEL	1	272	110	AUTO	PAYROLL	
SORT_EMPL	1	296	128	AUTO	PAYROLL	
NET_PAY	1	284	11C	AUTO	PAYROLL	
RETCODE	1	280	118	AUTO	PAYROLL	
EOF	1	288	120	AUTO	PAYROLL	
REGULAR_TOTAL	1	313	139	AUTO	PAYROLL	
EMP_NUMBER	1	313	139	AUTO	PAYROLL	
ACCRUED_HOURS	1	321	141	AUTO	PAYROLL	
COUNTERS	1	1072	430	STATIC	PAYROLL	
RECORD_CTR	1	1072	430	STATIC	PAYROLL	
PAGE_CTR	1	1074	432	STATIC	PAYROLL	
TOTAL_CTR	1	1076	434	STATIC	PAYROLL	
LINE_CTR	1	1081	439	STATIC	PAYROLL	

**Note:** If you cannot locate a variable in the variable storage map, refer to the compiler listing (Figure 4-12) to check the DECLARE statement. If it has an attribute of EXTERNAL, the statement is defined outside of the current program and has an absolute address that is located outside of the current program’s automatic or static storage areas.

**Figure 4-12.** Compiler Listing

```

9      DECLARE
      SORT_EMPL          CHAR(17),
      NET_PAY            FIXED(7,2),
      RETCODE            FIXED BIN(31,0),
      EOF                BIT(1) INIT('0'B);
10 DCL DYNAMIC_LABEL    LABEL;
11 DCL MONTHS           EXTERNAL RETURNS (CHAR(9));
      /******
      /*                FILE      OPENS                */

```

With the storage class and hexadecimal offset, use the following procedure to find the contents of RECORD\_CTR.

- a. Look at the storage class and procedure block information provided by the PL/I variable storage map for the variable. The class identifies the appropriate storage area to use: automatic or static. The class for RECORD\_CTR is STATIC, and the hexadecimal offset is 430.
- b. Review the Program Storage section of the Abend-AID report. In the static storage area, locate the contents of RECORD\_CTR. Use the hexadecimal offset from the variable storage map and the DSPL column in the static storage area to identify the beginning of the variable (Figure 4-13). In this example, the match indicates that RECORD\_CTR was set at 2 (X'002C').

Figure 4-13. Program Storage Section

```

*****
Static storage for PL/I procedure PAYROLL
in CSECT PAYROLL1 of load module PAYEXEC
Compiled with options: SYSTEM( MVS )
*****

DSPL Address ----- Data -----
00000 06900F78 E00005B4 06900558 0690060C 0690075C \.....*
00010 06900F88 06900820 06900882 069008AC 0690090E .....b.....
.
.
00410 06901388 06900A58 0690090E 06900A82 0690090E .....b....
00420 06901398 06900ADA 0690090E 06900B04 0690090E .....

00430 069013A8 002C001C 01000040 0C003C88 00000000 .....h....
00440 069013B8 00101C00 00000000 00000001 06900558 .....
00450 069013C8 000002C6 06901440 00000001 01140004 ...F...

```

7. Review record information.

The File section shows information about all files that are open at the time of the error. This information includes identification of the current record and previous records, when available. DCB and other control block information is also given. Abend-AID displays records using decimal locations, making fields easier to find when using record layouts. File information is provided for all file types, including VSAM and IAM.

You can directly access these files through File-AID from the online File Summary Selection List, which lists multiple open files. Inside a file you have full File-AID edit and browse capabilities.

## Searching Program Storage

The commands shown below enable you to immediately access the specific part of program storage that you need, if you are working with basic language support. Enter the commands within the Program Storage section of the Abend-AID report.

**AUTO**

Locates automatic storage.

**STAT**

Locates static storage.

**CTL**

Locates controlled storage.



## Chapter 5.

# Diagnosing an Assembler Data-Related Error

This chapter describes how to use Abend-AID to diagnose a common Assembler error. Abend-AID provides two levels of Assembler support: Extended Language Support (XLS) and basic language support. Assembler XLS is applicable to High-level Assembler only.

---

## Resolving a SOCB with Extended Language Support

When you select a report section online through the Compuware Viewing Facility (Compuware/VF), with the applicable Compuware language processor in use, program source code can be automatically merged into the report. This comprises Abend-AID Extended Language Support (XLS).

Assembler XLS provides:

- The source code of the statement in error displayed in the Error Analysis section. For data-related errors, all Assembler variables in the statement in error are shown with their current values.
- The source code of the statement being executed in the Error Location section.
- The names and contents of all individual Assembler variables in storage displayed in the Program Storage section.
- The source listings for Assembler programs on the calling chain displayed in the Program Listing section with the current statement indicated.

The following procedure shows how to read an extended language report on a common error, a SOCB abend.

- 1. Review the Error Analysis section to determine the cause of the error.**

First review the Error Analysis section (Figure 5-1) to find the cause of the error. Usually, all of the information you need is in this section. The source code of the instruction in error is displayed, and operand fields are shown with the current values. The Error Analysis section also gives a description of a SOCB abend. This example is a decimal divide exception, which is caused when the divisor is zero. The divisor in the instruction in error is XYEARS.

**Figure 5-1. Error Analysis Section**

```

A decimal divide exception, SOCB, occurred during execution of program
CWAADATE.

*****
*           Analysis of Error           *
*****

A Decimal Divide Exception occurred in the following statement:

  Stmt  Loc  Object Code      Source Statement
  48                    * Uncomment following line before rolling
  49                    * this program into production!
  50                    *
  51 00003C F221 B165 6000      ZAP  XYEARS,=P'3'
CURR => 000042 FD20 B165 B16A    PACK  PACKED_YEAR,RUN_YEAR
  53 000048 F900 B167 B176      DP   PACKED_YEAR,XYEARS
  54 00004E 4770 B064           CP   PACKED_YEAR+2(1),=P'0'
  55 000052 D501 7002 6002      BNE  EXIT
  56 000058 4770 B064           CLC  HIRE_MONTH,RUN_MONTH
                               BNE  EXIT

-----
Operands          Mapped-By      Def      Base Off Len      Hex
-----
PACKED_YEAR      CWAADATE      PL3      R11  165  3  00019F
XYEARS           CWAADATE      P        R11  16A  1  0C
-----

A decimal divide exception is caused when the divisor is zero.

                Specific Information
                Load
Absolute Program DISPL/  Load  DISPL/  DISPL/  Machine
Address  Name     Prog   Module EPA    Load   Len  Instruction
0AE14AA2 CWAADATE 00000042 CWAADATE 00000042 00000042 6  FD20 B165 B16A
                                                DP - divide decimal
                                                A-operand - dividend
0AE14BC5 CWAADATE 00000165 CWAADATE 00000165 00000165 3  00019F
                                                B-operand - divisor
0AE14BCA CWAADATE 0000016A CWAADATE 0000016A 0000016A 1  0C
                                                The above field is in error

```

**2. Review the Error Location section to find the location of the error.**

The Error Location section (Figure 5-2) indicates that the instruction being executed is contained in program CWAADATE.

The Error Location section also provides the following information:

- Program's compile date and length
- Program's link date and load module length
- Load module name and load library name
- Location of the last I/O operation or subroutine call, if applicable.

**Figure 5-2.** Error Location Section

```

*****
*                               *
*           Error Location       *
*                               *
*****

The statement being executed in CSECT CWAADATE was at displacement
00000042.

  Stmt  Loc  Object Code          Source Statement
  ----  ---  -
  48                               * Uncomment following line before rolling
  49                               * this program into production!
  50                               *
  51 00003C F221 B165 6000          ZAP  XYEARS,='P'3'
CURR => 000042 FD20 B165 B16A      PACK PPACKED_YEAR,RUN_YEAR
  53 000048 F900 B167 B176          DP  PPACKED_YEAR,XYEARS
  54 00004E 4770 B064              CP  PPACKED_YEAR+2(1),='P'0'
  55 000052 D501 7002 6002          BNE EXIT
  56 000058 4770 B064              CLC  HIRE_MONTH,RUN_MONTH
                                       BNE EXIT

The program was compiled on 08 FEB 2003 and is 00000178 bytes long.

It is part of load module CWAADATE.

The module was loaded from STEPLIB library CW.AA.TEMPL0A7.

The module was link edited on 08 FEB 2003 and is 00000178 bytes long.

```

The Error Analysis and Error Location sections usually provide enough information to resolve the problem. The other sections of the Abend-AID report provide supporting information that can be used to isolate the cause of the error.

### 3. Find the contents of other variables in your program.

To find the contents of other variables, review the Program Storage section in the Abend-AID report. Program storage is formatted by individual field name in the same order as defined in the program. The name, type, and current value for each field mapped by an active USING instruction at the time of the error are given (Figure 5-3).

Figure 5-3. Program Storage Section – CSECT CWAADATE

STORAGE FOR CSECT CWAADATE (R11)						
Offset	Address	Line	Label	Type	HEX	CHAR
000000	0AE14A60	6		DS 0H		
0000EC	0AE14B4C	125	SAVEAREA	DS 18F	0000000000030018	.....
0000F4	0AE14B54				0000000000000000	.....
		132	DATE_DAYS			
000134	0AE14B94			DS 0C		
000134	0AE14B94	133		DC C	F0F1F3F1	0131
000138	0AE14B98	134		DC C	F0F2F2F8	0228
00013C	0AE14B9C	135		DC C	F0F3F3F1	0331
000140	0AE14BA0	136		DC C	F0F4F3F0	0430
000144	0AE14BA4	137		DC C	F0F5F3F1	0531
000148	0AE14BA8	138		DC C	F0F6F3F0	0630
00014C	0AE14BAC	139		DC C	F0F7F3F1	0731
000150	0AE14BB0	140		DC C	F0F8F3F1	0831
000154	0AE14BB4	141		DC C	F0F9F3F0	0930
000158	0AE14BB8	142		DC C	F1F0F3F1	1031
00015C	0AE14BBC	143		DC C	F1F1F3F0	1130
000160	0AE14BC0	144		DC C	F1F2F3F1	1231
		145	CHECKED_FOR_EOM_SW			
000164	0AE14BC4			DC C	E8	Y
		146	PACKED_YEAR			
000165	0AE14BC5			DS PL3	00019F	...
		147	PACKED_YEAR2			
000168	0AE14BC8			DS PL2	0000	..
00016A	0AE14BCA	148	XYEARS	DC P	0C	.
				DS CL1		
		149	CALC_EOM_RETURN@			
00016C	0AE14BCC			DS F	8AE14A98	..óq
			LTORG			
000170	0AE14BD0	151		=C	F0F2	02
000172	0AE14BD2	152		=C	F2F8	28
000174	0AE14BD4	153		=C	F2F9	29
000176	0AE14BD6	154		=P	0C	.
000177	0AE14BD7	155		=P	4C	<
STORAGE FOR DSECT #EOM_SW (R4)						
Offset	Address	Line	Label	Type	HEX	CHAR
000000	0000F045	157	EOM_SW	DS C	D5	N
STORAGE FOR DSECT #ANNIV_IND (R5)						
Offset	Address	Line	Label	Type	HEX	CHAR
		159	ANNIV_IND			
000000	0000F046			DS C	D5	N
STORAGE FOR DSECT #RUN_DATE (R6)						
Offset	Address	Line	Label	Type	HEX	CHAR
000000	0000F070	161	RUN_DATE	DS OCL6		
000000	0000F070	162	RUN_YEAR	DS CL2	F1F9	19
		163	RUN_MONTH			
000002	0000F072			DS CL2	F9F8	98
000004	0000F074	164	RUN_DAY	DS CL2	F0F4	04

4. Review other supporting information.

Whenever Assembler source listings are available in the source listing dataset, XLS provides the source listings for all active Assembler programs with the current instruction indicated. This information is shown in the Program Listing section.

Figure 5-4 shows the program listing for CWAADATE.

Figure 5-4. Program Listing Section

```

*****
*                               Program Listing Section - CWAADATE                               *
*****

  Stmt   Loc   Object Code          Source Statement
  42                               * Calculate years-of-service
  43                               * by subtracting employee year
  44                               * of hire from the current
  45                               * year.
  46                               *****
  47                               CALC_ANNIVERSARY EQU *
  48                               * Uncomment following line before rolling
  49                               * this program into production!
  50                               *      ZAP  XYEARS,=P'3'
  51                               PACK  PACKED_YEAR,RUN_YEAR
CURR => 000042 FD20 B165 B16A          DP   PACKED_YEAR,XYEARS
  53                               CP   PACKED_YEAR+2(1),=P'0'
  54                               BNE  EXIT
  55                               CLC  HIRE_MONTH,RUN_MONTH
  56                               BNE  EXIT
  57                               MVI  ANNIV_IND,C'Y'
  58                               B    EXIT
  60                               *****c*****
  61                               * Exit *****
  62                               *****

```

## 5. Review record information.

The File section shows information about all files that are open at the time of the error. This information includes identification of the current record and previous records, when available. DCB and other control block information is also given. Abend-AID displays records using decimal locations, making fields easier to find when using record layouts. File information is provided for all file types, including VSAM and IAM.

You can directly access these files through File-AID from the online File Summary Selection List, which lists multiple open files. Inside a file you have full File-AID edit and browse capabilities.

## Report Command

The View command in Assembler XLS enables you to see source data beyond column 72 of your terminal. The View setting continues throughout a session until changed. New sessions begin with the default View setting.

### View Left (VL)

Default setting. Standard view from the line number, right 72 columns.

### View Right (VR)

Compresses View Left data to the left and presents the complete label or any other data that was off screen in View Left.

---

## Resolving a SOCB with Basic Language Support

When you access a report section through the Compuware Viewing Facility, your site's System Display and Search Facility (SDSF) or printed output (without the applicable Compuware language processor in use) does not provide source-level support for the report. This comprises Abend-AID support.

Assembler basic support provides:

- The program name and the displacement of the instruction in error. Disassembly of the next sequential instruction and the instructions surrounding it.
- A call trace showing program names and displacements.
- Program storage for Assembler programs on the calling chain:
  - Formatted save area used to call each program
  - Storage of the actual CSECT
  - Formatted save area owned by each program.

The following procedure shows how to read a basic language report on the same error and program that was used in “Resolving a SOCB with Extended Language Support” on page 5-1.

**1. Review the Error Analysis section to identify the error.**

When using Abend-AID, first review the Error Analysis section (Figure 5-5) for the analysis of the problem. Usually, all of the information you need is in this section. The Error Analysis section also gives a definition of a SOCB abend. This example is a decimal divide exception, which is caused when the divisor is zero.

**Figure 5-5. Error Analysis Section**

```

A decimal divide exception, SOCB, occurred during execution of program
CWAADATE.

*****
*           Analysis of Error           *
*****

A decimal divide exception is caused when the divisor is zero.

                Specific Information
                Load
Absolute Program  DISPL/  Module  DISPL/  DISPL/      Machine
Address  Name     Prog    Name    EPA     Load      Len Instruction
-----
0AE14AA2 CWAADATE 00000042 CWAADATE 00000042 00000042   6  FD20 B165 B16A
                                                DP - divide decimal
                                                A-operand - dividend
0AE14BC5 CWAADATE 00000165 CWAADATE 00000165 00000165   3  00019F
                                                B-operand - divisor
0AE14BCA CWAADATE 0000016A CWAADATE 0000016A 0000016A   1  0C
                                                The above field is in error
    
```

**2. Find the name of the program in error.**

Review the Error Location section in your Abend-AID report. The Error Location section (Figure 5-6) identifies the CSECT name and the offset of the next sequential instruction to be executed.

The Error Location section also provides the following information:

- Program’s compile date and length
- Program’s link date and load module length
- Load module name and the load library name
- Location of the last I/O operation or subroutine call, if applicable.
- Disassembly of the next sequential instruction and the three instructions before and after it.

**Figure 5-6.** Error Location Section

```

*****
*           Error Location           *
*****

The next sequential instruction to be executed in program CWAADATE
was at displacement 00000048.

      00000038 92E8B164      MVI  356(R11),X'E8'
      0000003C F221B1656000  PACK 357(3,R11),0(2,R6)
      00000042 FD20B165B16A  DP   357(3,R11),362(1,R11)
NSI==> 00000048 F900B167B176  CP   359(1,R11),374(1,R11)
      0000004E 4770B064      BNE  100(,R11)
      00000052 D50170026002  CLC  2(2,R7),2(R6)
      00000058 4770B064      BNE  100(,R11)

The program was compiled on 08 FEB 2003 and is 00000178 bytes long.

It is part of load module CWAADATE.

The module was loaded from STEPLIB library CW.AA.TEMPL0A7.

The module was link edited on 08 FEB 2003 and is 00000178 bytes long.

```

**3. Obtain a copy of the correct assembly listing.**

Make sure that your assembly listing matches the date provided by Abend-AID exactly. Look at the compile date provided in the Error Location section in Figure 5-6. Compare it to the date in the assembly listing (Figure 5-7). If you had multiple compiles on that date, then look at the compiled program length that is also provided in the Error Location section.

**Figure 5-7.** Assembly Listing

```

          Calculate years-of-service
Active Usings: PARMLIST,R3 #EOM_SW,R4 #ANNIV_IND,R5 #RUN_DATE,R6 #HIRE_DATE,R7 CWAADATE,R11
Loc Object Code Addr1 Addr2 Stmt Source Statement HLASM R2.0 2000/04/07 09.52
          *****
          25 *****
          26 * Start of program logic *****
          27 *****
          30 *****
          31 * Reset the employee anniversary indicator and check if we
          32 * have already tested for end-of-month.
          33 *****
000028 92D5 5000      00000      34          MVI  ANNIV_IND,C'N'
00002C 95D5 B164      00164      35          CLI  CHECKED_FOR_EOM_SW,C'N'
000030 4770 B03C      0003C      36          BNE  CALC_ANNIVERSARY
000034 4DA0 B06E      0006E      37          BAS  10,CALC_EOM
000038 92E8 B164      00164      38          MVI  CHECKED_FOR_EOM_SW,C'Y'
          39 *****
          41 *****
          42 * Calculate years-of-service by subtracting employee hire date
          43 * from current year. If the years of service are divisible by
          44 * X, set the anniversary indicator on. These employees will
          45 * be flagged on the employee compensation report.
          46 *****
          47 CALC_ANNIVERSARY EQU *
          48 * Uncomment following line before rolling
          49 * this program into production!
          50 *          ZAP  XYEARS,=P'3'          3-year anniversary
00003C F221 B165 6000 00165 00000 51          PACK  PACKED_YEAR,RUN_YEAR
000042 FD20 B165 B16A 00165 0016A 52          DP   PACKED_YEAR,XYEARS
000048 F900 B167 B176 00167 00176 53          CP   PACKED_YEAR+2(1),=P'0'  Remainder zero?
00004E 4770 B064      00064      54          BNE  EXIT          No, not X-year anniversary
000052 D501 7002 6002 00002 00002 55          CLC  HIRE_MONTH,RUN_MONTH  Yes, same as this month?
000058 4770 B064      00064      56          BNE  EXIT          No, not an anniversary
00005C 92E8 5000      00000      57          MVI  ANNIV_IND,C'Y'          Yes, set flag in caller
000060 47F0 B064      00064      58          B   EXIT

```

**4. Look at the source code of the instruction in error.**

The Error Location section (Figure 5-6) provides the hexadecimal displacement of the next sequential instruction. Look at the assembly listing in Figure 5-7 and find the next sequential instruction using this displacement. Typically, the instruction preceding the next sequential instruction is the instruction in error.

### 5. Determine the operand in error.

The instruction in error contains two fields (Figure 5-7). Refer again to the Error Analysis section (Figure 5-5 on page 5-6). Abend-AID identifies the cause of the error and the field causing the decimal divide exception. The Specific Information area of the Error Analysis section indicates that the B-operand is the field in error. This variable contains X'0C'. The divisor in the instruction in error is XYEARS.

**Figure 5-8.** Supporting Environmental Data Section

```

*****
*           Supporting Environmental Data           *
*****

PARM Data - 00003
Length of data - 5

Abend PSW - 078D1000 8AE14AA8  A(CWAADATE) + 00000048
Prog PSW - 078D1000 8AE14AA8  A(CWAADATE) + 00000048
Load Module - CWAADATE                               Entry Point Address - 0AE14A60
ILC - 06,  INTX - 0B                               Load Point Address - 0AE14A60

Registers at time of error (Descriptions based on 31 bit addresses)

REG HEX      Decimal      Description
R0 00030320      197,408  A(0002C000) + 00004320, PVT SP=001 ALLOC
R1 0000EAD0       60,112  A(CWAACOB ) + 00008A30
R2 00021719      136,985  A(00021000) + 00000719, PVT SP=001 ALLOC
R3 0000EAD0       60,112  A(CWAACOB ) + 00008A30
R4 0000F045       61,509  A(CWAACOB ) + 00008FA5
R5 0000F046       61,510  A(CWAACOB ) + 00008FA6
R6 0000F070       61,552  A(CWAACOB ) + 00008FD0
R7 00010155       65,877  A(CWAACOB ) + 0000A0B5
R8 00000000         0
R9 0AE14BC4      182,537,156  A(CWAADATE) + 00000164
R10 8AE14A98    -1,964,946,792  A(CWAADATE) + 00000038
R11 0AE14A60      182,536,800  A(CWAADATE) + 00000000
R12 0001F6A0      128,672  A(0001D000) + 000026A0, PVT SP=001 ALLOC
R13 0AE14B4C      182,537,036  A(CWAADATE) + 000000EC
R14 800244A8    -2,147,335,000  A(IGZCLNK ) + 00000410
R15 8AE14A60    -1,964,946,848  A(CWAADATE) + 00000000

Floating point registers at time of error

                R0                R2                R4                R6
4930D7E5A8000000  4E000000021F6F28  4E000000000250C7  0000000000000000

```

### 6. Find the contents of other variables in your program.

Use Abend-AID to investigate the contents of other variables in your program. Find the contents of PACKED\_YEAR. In Figure 5-7 on page 5-7, the assembly listing indicates that this field is based on register 11 at a displacement of X'165' bytes and has a length of three bytes. In Figure 5-8, the address in register 11 is shown in the Supporting Environmental Data section of the Abend-AID report. Adding the field's displacement of X'165' bytes to this address X'0AE14A60' yields X'0AE14BC5' which is the actual address of the field. In Figure 5-9 on page 5-9, the contents of field PACKED\_YEAR are found in the three bytes of data starting at this address.

Figure 5-9. Program Storage for CSECT CWAADATE

```

*****
* Program storage for CSECT CWAADATE *
* located in load module CWAADATE *
* Length is 00000178 *
* Language is HLASM *
*****

*****
* Save area used to call CSECT CWAADATE *
*****
* Located at: 00030018 A(0002C000) + 00004018, PVT SP=001 ALLOC *
* Descriptions based on 31 bit addresses *
*****
HEX          Decimal      Description
WD1 00102401      1,057,793 UNALLOCATED - LSQA
BCK 0000E858          59,480 A(CWAACOB ) + 000087B8
FWD 00030320      197,408 A(0002C000) + 00004320, PVT SP=001 ALLOC
R14 800244A8 -2,147,335,000 A(IGZCLNK ) + 00000410
R15 8AE14A60 -1,964,946,848 A(CWAADATE) + 00000000
R0 00030320      197,408 A(0002C000) + 00004320, PVT SP=001 ALLOC
R1 0000EAD0          60,112 A(CWAACOB ) + 00008A30
R2 00021719      136,985 A(00021000) + 00000719, PVT SP=001 ALLOC
R3 0000EAD0          60,112 A(CWAACOB ) + 00008A30
R4 0000654B          25,931 A(CWAACOB ) + 000004AB
R5 00000004              4
R6 000507B8      329,656 A(0002C000) + 000247B8, PVT SP=001 ALLOC
R7 0000E9B0          59,824 A(CWAACOB ) + 00008910
R8 800244AA -2,147,334,998 A(IGZCLNK ) + 00000412
R9 0000E858          59,480 A(CWAACOB ) + 000087B8
R10 00050038      327,736 A(0002C000) + 00024038, PVT SP=001 ALLOC
R11 80024098 -2,147,336,040 A(IGZCLNK ) + 00000000
R12 0001F6A0      128,672 A(0001D000) + 000026A0, PVT SP=001 ALLOC

*****
* Storage of CSECT CWAADATE *
*****
DSPL Address ----- Data -----
00000 0AE14A60 90ECD00C 18BF41B0 B00050D0 B0F041D0 ..).....&|.0.)
00010 0AE14A70 B0EC1831 58403000 58503004 58603008 .....&|.0.)
00020 0AE14A80 5870300C 41707000 92D55000 95D5B164 .....kN&.nN..
00030 0AE14A90 4770B03C 4DA0B06E 92E8B164 F221B165 ...(>kY..2...
00040 0AE14AA0 6000FD20 B165B16A F900B167 B1764770 -.....-9.....
00050 0AE14AB0 B064D501 70026002 4770B064 92E85000 ..N...-.....kY&.
00060 0AE14AC0 47F0B064 58D0B0F0 98ECD00C 07FE50A0 .0...|.0q.)...&.
00070 0AE14AD0 B16CD501 6002B170 4780B0AC 4180000C .%N.-.....
00080 0AE14AE0 4190B134 D5019000 60024780 B09A4190 ....N...-.....
00090 0AE14AF0 90044680 B08447F0 B0ACD501 90026004 ....d.0..N...-
000A0 0AE14B00 4770B0A8 92E84000 47F0B0E6 F221B165 ...yky .0.W2...
000B0 0AE14B10 6000FD20 B165B177 F900B167 B1764780 -.....9.....
000C0 0AE14B20 B0D4D501 6004B172 4770B0E6 92E84000 .MN.-.....WkY .
000D0 0AE14B30 47F0B0E6 D5016004 B1744770 B0E692E8 .0.WN.-.....WkY
000E0 0AE14B40 400047F0 B0E658A0 B16C07FA 00000000 ..0.W...%.....
000F0 0AE14B50 00030018 00000000 00000000 00000000 .....
00100 0AE14B60 00000000 00000000 00000000 00000000 .....
      LINES 0AE14B70-0AE14B80 SAME AS ABOVE
00130 0AE14B90 00000000 F0F1F3F1 F0F2F2F8 F0F3F3F1 ...013102280331
00140 0AE14BA0 F0F4F3F0 F0F5F3F1 F0F6F3F0 F0F7F3F1 0430053106300731
00150 0AE14BB0 F0F8F3F1 F0F9F3F0 F1F0F3F1 F1F1F3F0 0831093010311130
00160 0AE14BC0 F1F2F3F1 E800019F 00000C00 8AE14A98 1231Y.....0q
00170 0AE14BD0 F0F2F2F8 F2F90C4C 022829.<

```

7. Review record information.

The File section shows information about all files that are open at the time of the error. This information includes identification of the current record and previous records, when available. DCB and other control block information is also given. Abend-AID displays records using decimal locations, making fields easier to find when using record layouts. File information is provided for all file types, including VSAM and IAM.

You can directly access these files through File-AID from the online File Summary Selection List, which lists multiple open files. Inside a file you have full File-AID edit and browse capabilities.



## Chapter 6.

# Diagnosing VS FORTRAN Errors

This chapter summarizes the use of Abend-AID to diagnose VS FORTRAN errors. For VS FORTRAN, Abend-AID provides only basic language support.

---

## VS FORTRAN Diagnostics

Abend-AID helps FORTRAN programmers diagnose application program errors by reporting information that the VS FORTRAN normal error recovery process obscures. VS FORTRAN run time routines intercept application program abends when its SPIE and STAE run-time options are in effect. VS FORTRAN then terminates the application with a U0240 abend, hiding the original error. Although basic information about the application's problem may be provided by VS FORTRAN messages, usually this information is insufficient in helping to solve errors. However, upon installation of Abend-AID VS FORTRAN support, crucial diagnostic information pertaining to the original error is presented by Abend-AID following the U0240 abend.

Abend-AID provides extensive diagnostic capabilities for VS FORTRAN. Figure 6-1 shows a sample Error Analysis section for a VS FORTRAN program.

**Figure 6-1.** VS FORTRAN Error Analysis Section

```

A storage reference exception, SOC4, occurred during execution of program
FORTTST.

*****
*           Analysis of Error           *
*****

The system completion code of 0C4 is issued when the program attempts to
use storage that is not accessible.

*** List of Probable 0C4 Causes ***

1.  Missing or incorrect DD statement -
    Check system messages from abending step.

2.  Tried to read or write an unopened file.

3.  Tried to reference record area before file opened.

4.  Indexing or subscripting outside defined limits.

```

Abend-AID automatically handles all U0240 abends by identifying the actual problem that caused the abend. It displays the complete CSECT and fully traces any called subroutines. Abend-AID's full-function abend support does not inhibit the normal VS FORTRAN diagnostic capabilities.

## VS FORTRAN Extended Error Handling Facility

Abend-AID VS FORTRAN support does not interfere with the VS FORTRAN normal error recovery and reporting process. This means that VS FORTRAN may allow a number of errors of a particular type to occur in an application before taking corrective action or terminating the application with a U0240 abend. Therefore, if an application program

encounters errors but completes before the error count is exceeded, no U0240abend occurs. Consequently, no Abend-AID report is produced.

FORTTRAN programmers may find that they need lower error counts in order to obtain Abend-AID reports for certain program errors. The site can modify option tables to change default error counts for all VS FORTRAN application programs running on a system. In addition, an individual program may change error counts in effect for the duration of a single application run by calling ERRSET. These VS FORTRAN facilities are described in the IBM manuals *VS FORTRAN Language and Library Reference* and *VS FORTRAN Programming Guide - CMS, MVS*.

## Chapter 7.

# Understanding Database Diagnostics

This chapter summarizes the features of Abend-AID's database diagnostics:

- Abend-AID for DB2
- Abend-AID for IMS
- Abend-AID for IDMS.

**Note:** Database files identified in the File section of a report can be accessed through File-AID. Refer to "File Section" on page 12-19 for information.

---

## Abend-AID for DB2

Abend-AID for DB2 provides support for IBM's relational database manager, DB2. It presents the information needed to solve not only everyday but also unique, complex DB2 abends in a few concise report pages.

The Abend-AID for DB2 report provides a diagnostic report containing information about the statement in error and the specific SQL command that failed. It identifies the cause of the error and suggests a course of action.

A comprehensive DB2 Environment section under TSO, CALL, or RRSF (Recoverable Resource Manager Services Attachment Facility) attach mode processing contains a summary of information to assist you in resolving the problem. This section includes:

- SQL code interpretation
- SQL statement in error
- Interpreted contents of the SQLCA
- Contents of the SQLDA, for dynamic SQL
- Display of the columns referenced
- Names and contents of the host variables
- Plan name, bind time, and bind date
- Package bind information and package precompile information
- DB2 release, subsystem, and authorization ID
- Related information.

The Abend-AID for DB2 report also provides abend return codes with corresponding explanations. This information is especially useful for resolving S04E reason codes.

Figure 7-1 illustrates an Abend-AID for DB2 Error Analysis section for an S04E abend.

**Figure 7-1.** Abend-AID for DB2 Error Analysis Section – S04E Abend

```

An S04E abend occurred during execution of program INVDB01.

*****
*           Analysis of Error           *
*****

DB2 has returned a 00C90101 reason code after a S04E abend

The data manager detected an internal error within DB2. This error
may indicate inconsistent data or an error in internal DB2 control
structure or code.
Probable causes:
  1. Improper migration or fallback procedures.
  2. DB2 directory and DB2 catalog restored to different
     points in time.
  3. Table space restored improperly.
  4. An internal DB2 failure.
     Notify your systems programmer.

The SQL statement returning this SQLCODE at preprocessor sequence
number 93 in program 'TST04E ' is:

EXEC SQL FETCH TEMPL_CURSOR
      INTO : DCLEMP3

The SQL statement that defined the cursor TEMPL_CURSOR
at preprocessor sequence number 69 is:

EXEC SQL OPEN TEMPL_CURSOR

The SQL statement that defined the cursor TEMPL_CURSOR
at preprocessor sequence number 62 is:

EXEC SQL DECLARE TEMPL_CURSOR
      CURSOR FOR
      SELECT * FROM CWXAAD2 . SAMPEMP
      WHERE LASTNAME = 'HAAS'

See the DB2 environment data below for further details.

```

## Using Report Types

Four different situations will produce an Abend-AID report with DB2 support. Each of these situations produces a report with slightly different types of information. Different parts of the Abend-AID report are significant. The following describes the four situations and corresponding importance of the Error Analysis, Error Location, and DB2 sections of the Abend-AID report. Other sections do not differ among the four report types and should be viewed as needed.

- Non-DB2 system error occurs in a DB2 program:
  - Error Analysis section is important and should be viewed first.
  - Error Location section contains useful information about the location of the error.
  - DB2 section should be checked for supporting information (for example, the last SQL code returned).
- DB2 system abend occurs (S04E, S04F):
  - Error Analysis section is important and should be viewed first. Location of the error is found here.
  - Error Location section is not pertinent because the abend does not occur in the application program.
  - DB2 section should always be viewed.
- Negative SQL code – user abend is forced:
  - Error Analysis section is significant only if customized diagnostic messages are provided for the user abend.

- Error Location section is not pertinent because the abend does not occur in the application program.
- DB2 section is most valuable. Location and description of the error is found here. View this section first.
- Negative SQL code – SNAP-AID called by the application program:
  - Error Analysis section is not present because no abend occurs.
  - Error Location section points to the application program, but the location is the call to SNAP-AID, not where the DB2 error occurred.
  - DB2 section is most valuable. Location and description of the error is found here. View this section first.

If your shop standards do not require the forcing of user abends for negative SQL codes, you should consider using SNAP-AID. The program can then be terminated or continue to execute based on the severity of the error.

## Using SNAP-AID to Report Negative SQL Codes

Abend-AID is automatically invoked when an abend occurs. However, when a negative SQL code is encountered, an abend does not occur and program processing continues. Abend-AID for DB2 provides support for more than 500 SQL codes. To obtain complete DB2 information at various points in the program without terminating the program, use SNAP-AID. A simple call to the SNAPAID module in the application program is all that is needed to invoke this support. The following three figures show examples of a SNAP-AID call in an application program.

In Figure 7-2 and Figure 7-3, the SQLCODE is a field in the SQL Communications Area (SQLCA) that contains the last SQL return code. The RETURN-CODE is the step's completion code that appears in the job log. It can be used to indicate if further steps of the job should be run.

**Figure 7-2.** SNAP-AID Example for a COBOL Program

```
PROCEDURE DIVISION.
  EXEC SQL WHENEVER SQLERROR GO TO 9999-SQLERROR END-EXEC.

9999-SQLERROR.
  CALL 'SNAPAID'.
  MULTIPLY SQLCODE BY -1 GIVING RETURN-CODE
  GOBACK.
```

**Figure 7-3.** SNAP-AID Example for a PL/I Program

```
ERROR_CHECK: PROC;
  EXEC SQL WHENEVER SQLERROR GO TO 9999_SQLERROR;
END ERROR_CHECK;

9999-SQLERROR: PROC;
  CALL 'SNAPAID'
  RETURN_CODE = SQLCODE * -1;
END 9999_SQLERROR;
```

The method shown in Figure 7-4 preserves structured programming and brings the call to SNAPAID closer to the statement that produced the error.

**Figure 7-4.** SNAP-AID Example for a COBOL Program

```

8888-GET-RECORD.
  EXEC SQL
    SELECT ....
      INTO ....
      FROM ....
      WHERE....
  END EXEC

  IF SQLCODE EQUAL ZERO
    NEXT SENTENCE
  ELSE IF SQLCODE EQUAL +100
    MOVE "Y" TO NO-ROWS-SWITCH
  ELSE
    CALL 'SNAPaid'
    PERFORM 9999-SQLERROR.

```

Many shops prefer to issue user abends when negative SQL codes indicate severe errors. The following are examples of coding user abend codes.

In Figure 7-5, the SQLCODE is a field in the SQLCA that contains the last SQL return code. 'ILBOABNO' is the COBOL-supplied routine to force an abend. A user-written routine that produces a dump can be used instead of 'ILBOABNO'.

**Figure 7-5.** User Abend Example for a COBOL Program

```

PROCEDURE DIVISION.
  EXEC SQL WHENEVER SQLERROR GO TO 9999-SQLERROR END-EXEC.

9999-SQLERROR.
  MULTIPLY SQLCODE BY -1 GIVING RETURN-CODE
  CALL 'ILBOABNO' USING RETURN-CODE.

```

In Figure 7-6, the SQLCODE is a field in the SQLCA that contains the last SQL return code. PLIRETC is the PL/I-supplied routine to set a return code.

**Figure 7-6.** User Abend Example for a PL/I Program

```

ERROR_CHECK:  PROC;
  EXEC DQL WHENEVER SQLERROR GO TO 9999_SQLERROR;
END ERROR_CHECK;

9999_SQLERROR:  PROC;
  RETURN_CODE = SQLCODE * -1;
  CALL PLIRETC (RETURN_CODE);
END 9999_SQLERROR;

```

Refer to **Chapter 8, "Using SNAP-AID"** for additional information on SNAP-AID.

**Note:** Abend-AID for DB2 uses the call and RRSaf attach interfaces to DB2. The load modules for these attach facilities must be available to Abend-AID for DB2 during the link-edit part of the installation and at execution.

## With TSO, Call, or RRSaf Attach Mode

Whenever an Abend-AID report is produced for a DB2 program, diagnostic information about the last SQL completion code is provided in the DB2 Environment Data section. DB2 support does not require any language processing to pinpoint the exact SQL statement and the host variable names.

The DB2 Environment Data section combines IBM dump, SQLCA, and DB2 catalog information to provide essential data needed to resolve infrequent but complex DB2 errors.

In the TSO, call, or RRSF attach mode environment, the following information is also provided:

- Full text and statement number of SQL statement in error as well as any related SQL statements
- The source data name of all host variables referenced
- When appropriate and required, the name, type, and table name of all columns referenced
- Bind options, date, and time
- Precompile options
- DBRM library name
- Names and types of all DB2 objects on which the Application Plan is dependent
- DB2 release, authorization ID, subsystem ID, plan name, and DBRM name
- Detailed Plan Package data, including bind, precompile, and dependency information.

Figure 7-7 through Figure 7-10 on page 7-7 show examples of the Abend-AID for DB2 Environment section under TSO, call, or RRSF attach mode processing.

**Figure 7-7.** TSO/Call/RRSAF Attach Mode – SQL Code and Statement in Error

```

                                DB2 Environment Data
                                -----
                                AADB2 Release 5.0.6

                                SQL Return Code
                                -----

SQLCODE      -302

The value of input variable is too large for the target column.

Following is a list of those host variables that are too large
for their matching columns.

Host Variable Name/
Column Name/
Table Name
-----
:WS-FIELDS.WS-ACCOUNT          DECIMAL(015,006)

DESC_ACCOUNT                   DECIMAL(005,000)
DESC

The SQL statement returning this SQLCODE at preprocessor sequence
number 88 in program 'DTC2302S' is:

EXEC SQL INSERT
      INTO CWXAAD2 . DESC
      ( DESC_ACCOUNT ,
        DESC_PRODUCT ,
        DESC_ACTION )
      VALUES
      ( : WS-FIELDS.WS-ACCOUNT ,
        : WS-FIELDS.WS-PRODUCT ,
        : WS-FIELDS.WS-ACTION )

```

**Figure 7-8.** TSO/Call/RRSAF Attach Mode – General Information and Host Variables Referenced

```

                                DB2 General Information
                                -----
DB2 Release:      4.1.0                Subsystem ID: D41A
Authorization ID: EFHJFG0              Attach Mode:  TSO

                                Application Plan Name: DTC2302

Bind Date:       18 OCT 2000          Bind Time:    14:27:40.89
Isolation:      CURSOR STABILITY      Acquire:      USE
Release:        COMMIT                Validate:     BIND

                                Database Request Module (DBRM): DTC2302S

Precompile Date: 18 OCT 2000          Precompile Time: 18:27:11.90
Host Language:  COBOL
SQL Escape:     ' (APOSTSQL)         SQL Decimal:  . (PERIOD)

Library Name:   D2.SAMPLES.V2R3M0.DBRM

                                Host Variables Referenced
                                -----
Field              Type              Values
-----
:WS-FIELDS.WS-ACCOUNT    DECIMAL(015,006)    123456789.123456

:WS-FIELDS.WS-PRODUCT    CHAR(030)           Below

0004BF67  CHAR  123456789012345678901234567890
          ZONE  FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF
          DIGIT 123456789012345678901234567890
          1...5...10....*...20....*...30

:WS-FIELDS.WS-ACTION     CHAR(024)           Below

0004BF87  CHAR
          ZONE  44444444444444444444444444444444
          DIGIT 00000000000000000000000000000000
          1...5...10....*...20....
    
```

**Figure 7-9.** TSO/Call/RRSAF Attach Mode – Columns Referenced

```

                                Columns referenced
                                -----
Column Name/      Type
Table Name
-----
DESC_ACCOUNT      DECIMAL(005,000)
DESC

DESC_PRODUCT      VARCHAR(00024)
DESC

DESC_ACTION       VARCHAR(00024)
DESC
    
```

Figure 7-10. TSO/Call/RRSAF Attach Mode – SQLCA and Plan Dependencies

SQL Communications Area (SQLCA)		
-----		
SQLCAID	SQLCA	
SQLCABC	136	
SQLCODE	-302	
SQLERRML	4	
SQLERRMC		
001.		
SQLERRP	DSNXRBND	
SQLERRD(1)	-740	X'FFFFFFD1C'
SQLERRD(2)	0	X'00000000'
SQLERRD(3)	0	X'00000000'
SQLERRD(4)	-1	X'FFFFFFF'
SQLERRD(5)	0	X'00000000'
SQLERRD(6)	0	X'00000000'
SQLWARN0		
SQLWARN1		
SQLWARN2		
SQLWARN3		
SQLWARN4		
SQLWARN5		
SQLWARN6		
SQLWARN7		
SQLSTATE	22001	
-----		
Object Qualifier	Object Name	Object Type
-----	-----	-----
CWXAAD2	DESC	TABLE
AAD41ADB	AAD41ATS	TABLE SPACE

### With IMS or DL/I Attach Mode

In IMS or DL/I attach mode, the DB2 catalog cannot be accessed because of environment limitations. Therefore, the reports generated in these environments are slightly different from those generated for TSO, call, or RRSAP attach mode.

The DB2 Environment Data section formats IBM dump and SQLCA information to provide essential data needed to resolve complex DB2 errors.

In the IMS or DL/I attach mode environment, the following information is provided:

- Statement number and verb of the SQL statement in error
- DB2 release, authorization ID, subsystem ID, plan name, and DBRM name
- COBOL base locator cell and offset of all host variables referenced in the SQL statement in error. When XLS is used, the host variable names are provided instead of base locator cell/offset.

Figure 7-11 shows the SQL Return Code and DB2 General Information areas of the Abend-AID for DB2 Environment Data section. These areas identify the SQL verb in error for the SQL statement returning the SQL code.

**Figure 7-11.** IMS or DL/I Attach Mode – SQL Code and Verb in Error

```

                                DB2 Environment Data
                                -----
                                SQL Return Code
                                -----

SQLCODE      -811

One of the following has occurred:

1.    The execution of a 'SELECT...INTO' statement has returned a
      result table containing more than one row.

2.    A subquery contained in a basic predicate has produced more
      than one value.

Corrective Action:
      Examine the syntax of the statement to ensure that it contains the
      proper condition specifications.  If it does, there may be a problem
      with the data that is causing more than one row or value to be
      returned when you do not expect it.

The SQL statement returning this SQLCODE at preprocessor sequence
number 2093 in program 'LUN8000U' is:

EXEC SQL SELECT

                                DB2 General Information
                                -----

DB2 Release:      3.1.0                Subsystem ID: DSP2
Authorization ID: PO11520             Attach Mode:  IMS

                                Application Plan Name: LUN8000U

                                Database Request Module (DBRM): LUN8000U
Precompile Date: 15 JAN 2000         Precompile Time: 13:11:36.35

```

Figure 7-12 shows the Host Variables Referenced area of the Abend-AID report. Because the variable names cannot be accessed from the DB2 catalog, this area includes the COBOL base locator cell and offset of the host variables; or for other languages, the relative addresses.

**Figure 7-12.** IMS or DL/I Attach Mode – Host Variables Referenced

Host Variables Referenced			
Field		Type	Values
OFFSET=0D2C IN BLW	9 (X'9')	DECIMAL(009,000)	222222222
OFFSET=0D31 IN BLW	9 (X'9')	DECIMAL(005,000)	3401
OFFSET=0D34 IN BLW	9 (X'9')	CHAR(010)	Below
000FDD5C	CHAR 12 20 86		
	ZONE FFOFF000FF		
	DIGIT 1202000086		
	1...5...10		

If COBOL XLS is used, Abend-AID for DB2 can provide the data name for each host variable. Figure 7-13 shows the same host variables when COBOL XLS is used.

**Figure 7-13.** IMS or DL/I Attach Mode – Host Variables Referenced Using COBOL XLS

Host Variables Referenced		
Field	Type	Values
:WS-SSN	DECIMAL(009,000)	222222222
:WS-ACCOUNT	DECIMAL(005,000)	3401
:WS-DATE	CHAR(010)	Below
000FDD5C	CHAR 12 20 86	
	ZONE FFOFF000FF	
	DIGIT 1202000086	
	1...5...10	

## Using DB2 Plan Package Support

With DB2 Version 2 Release 3, IBM introduced DB2 Plan Packages, reducing the complexity of DB2 plan management and eliminating time-consuming rebinds of large plans. Abend-AID for DB2 Plan Package support provides the following additional information in the DB2 section of the Abend-AID report:

- Package information
- Package bind information
- Package precompile information
- Package dependencies.

Figure 7-14 shows the DB2 General Information area of an Abend-AID for DB2 report with plan package support.

**Figure 7-14.** DB2 General Information Section

Package Bind Information			
Location:	DEFAULT	Collection-id:	AATCVCOL
Name:	DTCV508S	Qualifier:	CWX0070
Owner:	CWX0070	Creator:	CWX0070
Bind Date:	03 MAR 2000	Bind Time:	10:06:05.01
Create Date:	02 MAR 2000	Create Time:	15:42:41.87
Isolation:	CURSOR STABILITY	Validate:	BIND
Release:	COMMIT	SQL Error:	NOPACKAGE
Valid Package:	YES	Operative:	YES
Current Data:	NO		
Package Precompile Information			
Precompile Date:	03 MAR 2000	Precompile Time:	09:59:01.14
Precompile Version:	AADB2TST		
Host Language:	COBOL	DEC31:	NO
SQL Escape:	' (APOSTSQL)	SQL Decimal:	.(PERIOD)
Mixed Data:	NO	Katakana:	NO
Precompile Release:	2.2.0		
Library Name:	CW.D2.SAMPLES.V3R1M0.DBRM		

## Using DB2 Stored Procedure Support

Abend-AID for DB2 provides diagnostic information for stored procedures in Language Environment (LE). Stored procedures (user-written applications) run in a special DB2 stored procedure address space. It is difficult to diagnose problems because only the SQLCODE is returned to the calling program. Abend-AID for DB2 provides diagnostic information for easy problem resolution.

Figure 7-15 shows Abend-AID for DB2 diagnostic information when the application is a stored procedure.

**Figure 7-15.** DB2 Diagnostic and General Information Section

```

                                DB2 Environment Data
                                -----
                                AADB2 Release 5.0.6

                                SQL Return Code
                                -----
SQLCODE      -407

An 'UPDATE' or 'INSERT' value or the value in a predicate is NULL, but
the object column cannot contain NULL values.

Corrective action:
  Examine the definition of the object table to determine which
  columns of the table have the NOT NULL attribute, and correct
  the SQL statement.

The SQL statement returning this SQLCODE at preprocessor sequence
number      79 in program 'AADPSP2 ' is:

EXEC SQL UPDATE
      TEMPL
      SET
      WORKDEPT = : DCLTEMPL.WRKDEPT : DCLTEMPL.WRKDEPTI WHERE WORKDEPT =
      '001'

                                DB2 General Information
                                -----
DB2 Release:      4.1.0                Subsystem ID:  D410
Authorization ID: D410SPA              Attach Mode:  CALL

                                Plan Information
                                -----

                                Application is a Stored Procedure

```

## Supported Reason Codes

Table 7-1 shows the number of reason codes, by DB2 subcomponent, that are supported by Abend-AID for DB2.

**Table 7-1.** Abend Reason Code Support Information

DB2 Subcomponent	Hex ID	Abend-AID for DB2 Support	# of Reason Codes
Call Attachment Facility	X'C1'	Yes	54
Buffer Manager	X'C2'	Yes	116
CICS Attachment Facility	X'C3'	Yes	14
TSO Attachment Facility	X'C5'	Yes	16
Message Generator	X'C6'		
Precompiler, DSNH	X'C8'	Yes	10
Data Manager	X'C9'	Yes	101
Recovery Log Manager	X'D1'	Yes	155
Distributed Data Facility	X'D3'		
IMS/VS Attachment Facility	X'D4'	Yes	29
DB2I Help Panel	X'D5'		
Data Space Manager	X'D7'	Yes	34
Recovery Manager 5+	X'D9'	Yes	67
Storage Manager	X'E2'	Yes	47
Service Controller	X'E3'	Yes	76
Utilities	X'E4'		

**Table 7-1.** Abend Reason Code Support Information

DB2 Subcomponent	Hex ID	Abend-AID for DB2 Support	# of Reason Codes
Agent Services Manager	X'E5'	Yes	84
Instrumentation Facility	X'E6'	Yes	72
Relational Data System	X'E7'	Yes	50
Initialization Procedures	X'E8'	Yes	61
System Parameter Manager	X'E9'	Yes	5
Service Facilities	X'F1'	Yes	2
Subsystem Support Subcomponent	X'F3'	Yes	202
Sample Applications	X'F8'		
General Command Processor	X'F9'	Yes	14
Total			1261

## ROLLBACK Statement

Use the DB2 ROLLBACK statement to terminate the current unit of recovery, back out the database changes that were made within that unit of recovery, and start a new unit of recovery. Compuware considers ROLLBACK to be an important part of error recovery processing. Note the method that Abend-AID uses to handle DB2 diagnosis during ROLLBACK.

When a ROLLBACK occurs, the control blocks that Abend-AID relies on to diagnose DB2 problems are freed. If Abend-AID is invoked after a ROLLBACK, Abend-AID finds the control blocks for the new unit of recovery and reports that the DB2 connection was not utilized. For ROLLBACK recovery, Compuware recommends a call to the module SNAP-AID before the ROLLBACK is issued. SNAP-AID allows Abend-AID to properly diagnose the DB2 problem and return control back to the program. When the program regains control, you can issue the ROLLBACK, and the integrity of the database is preserved.

## File-AID Access

From the DB2 section, you can directly access a DB2 database through File-AID for DB2. Edit and Browse commands in the report take you into File-AID edit and browse modes within the database. A current version of File-AID for DB2 must be available on the operating system.

---

## Abend-AID for IMS

Abend-AID for IMS provides information about the IMS DB and TM environments, the application program, and the abending program's PCBs and JCBs. In addition, the last six calls to the database are listed. Abend-AID for IMS diagnoses all IMS user abends and gives both the cause of the error and the solution. Additional information such as the contents of DFSPRX0 and DFSECP is provided, if appropriate.

Figure 7-16 through Figure 7-19 on page 7-13 show Abend-AID for IMS examples.

**Figure 7-16.** Abend-AID for IMS Section – COBOL XLS

```

                                IMS-AID Diagnostics

Application program name: PAYIMSLP           IMS Rel:510 I510
Calling PARM FORMAT:COBOL                 Region type: DLI Batch
PSB Name: PSBCBLBT

    The last IMS call was:
000160          EM-PCB
000161          EM1-ROOT
000162          EMROOT-SSA.

    This statement is contained in paragraph "P200-UPDATE-DB" of
    program PAYIMSLP which is 00001180 bytes long. This program is
    part of load MODULE PAYIMSLP which is 00002828 bytes long.
*****
    To assist the programmer, the following key IMS control blocks
    are printed.

    1. Program Communications Block (PCB). one for each data base
    being accessed.

    2. Control block and table module DFSPRPX0.

    Up to the last 6 calls against the data base as logged in each
    JCB will be printed.

    If multiple PCBs are used, the current PCB (if any), is labeled and
    printed first.
*****

```

**Figure 7-17.** Abend-AID for IMS Section – COBOL Basic Support

```

                                IMS-AID Diagnostics

Application Program Name: PCBTEST           IMS Rel: 510 IMS2
Calling PARM FORMAT: COBOL                 Region Type: DLI BATCH
PSB Name: PSBCBLBT

    The last IMS call was made at displacement 00003C in
    program IBMBDLI1 which is 0000008C bytes long and is part
    of load module PCBTEST which is 00008538 bytes long.
*****
    To assist the programmer, the following key IMS control blocks
    are printed.

    1. Program Communication Block (PCB). One for each data base
    being accessed.

    2. Control block and table module DFSPRPX0.

    Up to the last 6 calls against the data base as logged in each
    JCB will be printed.

    If multiple PCBs used, the current PCB (if any) is labeled and
    printed first.
*****

```

Figure 7-18. Abend-AID for IMS Section – Database Calls (Batch Statistics)

```

DL/I Call Statistics (from PST accounting area)

DL/I Database Calls
  GU   GN   GNP   GNU   GHN   GHNP  ISRT  DLET  REPL
1234567 1234568 1234569 1234570 1234571 1234572 1234573 1234574 1234575

Total DLI database calls 11111139

DL/I Message Calls
  GU   GN   ISRT  PURGE  CMD   GCMD
1234577 1234578 1234579 1234580 1234581 1234582

DL/I System Service Calls
  APSB  DPSB  CMSG  ICMD  RCMD  CHKP  XRST
1234586 1234587 1234588 1234589 1234590 1234591 1234592

  ROLB  ROLS  SETS  SETU  INIT  INQY  LOG
1234593 1234594 1234595 1234596 1234597 1234598 1234599
    
```

Figure 7-19. Abend-AID for IMS PCB and Call Trace Summary

```

*****
* Current PCB *
* Function=GU *
*****

PCB      Database  Segment  Status  Process  Segment  KEY   Number of
Address  Name         Level    Code    Options  Name     Len   Segments

00028124 EMPLOYDB  01      'GE'    AP       EMROOT   4     2

PCB Name=EMPLPCB   PCB Relative Number= 4

KEY feedback From last call
00028148  CHAR 1222
        ZONE FFFF
        DIGIT 1222
        1...

JCB Database Call Trace

# Call Type          Status Code and Description

  GU-GHU             GE-Segment not found
- 1 GU-GHU           GE-Segment not found
- 2 GU-GHU           -Normal return from call
- 3 GU-GHU           -Normal return from call
- 4 GU-GHU           -Normal return from call
- 5 GU-GHU           -Normal return from call

Display of SSA number 1

000A5588  CHAR EMROOT *--
        ZONE CDDDE44566
        DIGIT 54966300C00
        1...5...10.

Display of SSA number 2

000A5620  CHAR EMSALARY*--(EMSALKEY = *)
        ZONE CDECDCE5664CDECDCE4700255
        DIGIT 54213198C00D542132580E013CD
        1...5...10....*...20....*..
    
```

Abend-AID for IMS consists of modules that locate and interpret IMS control blocks. It includes specialized diagnostic modules for IMS-generated user abends. An Abend-AID for IMS report provides you with the following information:

- Extended Error Analysis section to diagnose the cause of most IMS user abends and to provide possible solutions to the problem.
- Contents of the Key Feedback Area in an expanded format.

- Trace of the last six calls to the IMS database for every database PCB in the application program's PSB. All non-blank status codes are displayed with their respective descriptions.
- Display of the current segment from the I/O area.
- Segment Search Arguments (SSA) displayed in an easy-to-read format. The segments used in the most recent IMS call are identified and printed with their applicable names and lengths.
- DFSPRPX0 and DFSECP modules printed in hexadecimal format to assist in the resolution of the abend.
- Database call statistics from the PST accounting area, for reference when debugging loops and reviewing I/O.
- IMS environment-specific information:
  - Type of IMS environment
  - IMS release number
  - Name of application program and language
  - PSB Name
  - Location of last IMS call in the program
  - Terminal PCBs
  - Alternate terminal PCBs
  - Database PCBs with index PCBs.
- From the IMS PSB:
  - Program name
  - Programming language
- From other control blocks:
  - Release of IMS
  - Region type
  - PSB Name
- When it is possible to determine the last IMS call:
  - Program name and the displacement into the program from which the call was made.
  - PCB used in this call is printed as the current PCB.
- For the current PCB:
  - Key feedback area
  - Database PCBs, the SSA (segment search argument) used in this call
  - Segments returned in the I/O area.
- Information for database PCBs:
  - PCB address, name, number
  - Database name
  - Segment level
  - Status code
  - Process options
  - Segment name last retrieved
  - Key length
  - Number of segments
  - Call trace from the JCB
  - Key feedback area.
- For terminal PCBs:
  - PCB address
  - Logical terminal name
  - Status code from the last call using this PCB
  - JCB call trace for this PCB. Up to the last six calls to the database are given.

## File-AID Access

From the IMS section, you can directly access an IMS database through File-AID for IMS. Edit and Browse commands in the report take you into File-AID edit and browse modes within the database. A current version of File-AID for IMS must be available on the operating system.

---

## Abend-AID for IDMS

Abend-AID for IDMS captures all data prior to rollback, in contrast to the normal dump, which can display data only after rollback is completed. Thus, a true analysis of the data is provided at the time of abend.

You can obtain the following information from an Abend-AID for IDMS report:

- A specialized Error Analysis section that includes:
  - The text and location of the IDMS command in error
  - The particular error status code
  - An error message.
- An IDMS Command Trace section that assists in tracking the program flow of the last ten calls. This section identifies:
  - Program reference statement of each call
  - Complete text of the database command
  - Status code of each call
  - Database key cross-reference with the time and actual database (DB) key in both hexadecimal and decimal.
- A Currency Table that provides references for current:
  - Record
  - Set
  - Area.
- Record information that includes:
  - Current and previous record contents for all record types
  - Working-storage record areas when they differ from current records.
- Database information that includes:
  - Number of commits
  - Most recent commit
  - Database keys in decimal
  - Database statistics section.
- IDMS environmental data that includes:
  - Subschema
  - Version number
  - Region type
  - IDMS release number
  - Central version system ID.

Figure 7-20 shows a sample Abend-AID for IDMS Error Analysis Section for COBOL XLS.

**Figure 7-20.** Abend-AID for IDMS Error Analysis Section - COBOL XLS

```

An IDMS U2222 abend occurred following a database call during execution
of program IDMSCANC.

*****
*           Analysis of Error           *
*****

CA-IDMS has returned a 0307 error status for the command

OBTAIN NEXT JOB WITHIN AREA ORG-DEMO-REGION

This command corresponds to the following statement:

000369          CALL 'IDMS' USING SUBSCHEMA-CTRL
000370          IDBMSCOM (11)
000371          SR440
000372          ORG-DEMO-REGION
000373          IDBMSCOM (43).

This statement is contained in paragraph "0530-GETJOB" of program
CMHT1205.

The end of AREA 'ORG-DEMO-REGION' was reached or the AREA was empty.
Check the database trace table to see if the most recently retrieved
record was the last occurrence or the AREA was empty.

```

Figure 7-21 shows a sample Abend-AID for IDMS Error Analysis Section for COBOL Basic Support. This section reports on the status code of the call directly preceding the ROLLBACK. Usually, this call is the failing database call. If you have made additional database calls between the failing database call and the ROLLBACK, Abend-AID for IDMS still reports on the last call preceding ROLLBACK.

**Figure 7-21.** Abend-AID for IDMS Error Analysis Section - COBOL Basic Support

```

An IDMS U2222 abend occurred following a database call during execution
of program IDMSCANC.

*****
*           Analysis of Error           *
*****

CA-IDMS has returned a 0307 error status for the command
OBTAIN NEXT EMPLOYEE WITHIN SET EMP-NAME-NDX
This command is DML sequence number 0007 in program 'COB0307'.

The end of SET 'EMP-NAME-NDX' was reached or the SET was empty. Check
the database trace table to see if the most recently retrieved record
was the last occurrence or the SET was empty.

See the CA-IDMS environment data below for further details.

          CA-IDMS is a registered trademark of
          Computer Associates International, Inc.

```

Figure 7-22 shows an example of Abend-AID for IDMS call tracing.

Figure 7-22. Abend-AID for IDMS Command Trace

Database Command Trace		
Program Reference	Status	Database Command
COB0307		
DML		
7	0000	OBTAIN NEXT EMPLOYEE WITHIN SET EMP-NAME-NDX
7	0000	OBTAIN NEXT EMPLOYEE WITHIN SET EMP-NAME-NDX
7	0000	OBTAIN NEXT EMPLOYEE WITHIN SET EMP-NAME-NDX
7	0000	OBTAIN NEXT EMPLOYEE WITHIN SET EMP-NAME-NDX
7	0000	OBTAIN NEXT EMPLOYEE WITHIN SET EMP-NAME-NDX
7	0000	OBTAIN NEXT EMPLOYEE WITHIN SET EMP-NAME-NDX
7	0000	OBTAIN NEXT EMPLOYEE WITHIN SET EMP-NAME-NDX
7	0000	OBTAIN NEXT EMPLOYEE WITHIN SET EMP-NAME-NDX
7	0307	OBTAIN NEXT EMPLOYEE WITHIN SET EMP-NAME-NDX
9	0000	ROLLBACK

Status Legend	
0000	NORMAL RETURN
0307	END OF SET

Figure 7-23 shows an example of Abend-AID for IDMS currency information. Currency tables list the database keys translated to page and line, program reference (DML offset, sequence number or statement number), and usage mode for each area. At a glance, you can see what currency has been established.

Figure 7-23. Abend-AID for IDMS Currency Information

Current Records			
Record Name	DB-Key	Page	Line
EMPLOYEE	01252A01	75,050	1
DEPARTMENT	No Currency		
STRUCTURE	No Currency		
. . .			

Current Sets					
Set Name	Record Name	Program Reference	DB-Key	Page	Line
COB0307					
DML					
EMP-NAME-NDX		7	0124FA01	75,002	1
COVERAGE-CLAIMS		None	No Currency		
DEPT-EMPLOYEE	EMPLOYEE	None	01252A01	75,050	1
EMP-COVERAGE	EMPLOYEE	None	01252A01	75,050	1
. . .					

Current Areas						
Area Name	Record Name	Usage Mode	Program Reference	DB-Key	Page	Line
EMP-DEMO-REGION		RETRIEVAL	None	0124FA01	75,002	1
INS-DEMO-REGION		RETRIEVAL	None	No Currency		
ORG-DEMO-REGION			None	No Currency		

Figure 7-24 shows an example of the current and previous record areas. Contents for all records are shown. Working-storage record contents are displayed if they differ from the current record area.



## Chapter 8.

# Using SNAP-AID

This chapter describes how to use Abend-AID's SNAP-AID facility. You can use SNAP-AID to produce Abend-AID output without terminating the program. The SNAP-AID report includes working storage and file information. SNAP-AID is invoked by a simple call to the module SNAPPAID from COBOL, PL/I, Assembler, or FORTRAN programs. SNAP-AID can help in resolving logic problems or when working with a DB2 or IDMS database management system.

---

## SNAP-AID General Information

Beginning with Abend-AID Release 9.5, the SNAPPAID module has been enhanced to operate in any addressing mode (24-bit, 31-bit, or 64-bit). The SNAPPAID module is distributed with an addressing mode of 31 (AMODE=31), a residency mode of ANY (RMODE=ANY), and REENTRANT and REUSABLE attributes. This AMODE and RMODE combination satisfies the requirements of most SNAP-AID users. Prior to Abend-AID Release 9.5, SNAP-AID did not support being called by a program executing in 64-bit mode and was distributed AMODE=ANY and RMODE=24. It has always been REENTRANT and REUSABLE. SNAP-AID users can do either of the following:

- If the SNAPPAID module is included within a load module for which some other combination of AMODE or RMODE is desired, it can be re-linked or re-bound. However, you may encounter error messages from the IBM binder. To avoid binder error messages, you can re-link or re-bind the SNAPPAID module that Compuware distributes using the IBM linkage editor or binder with any AMODE or RMODE. Refer to the IBM DFSMS/MVS program management manual or the z/OS MVS program management user's guide and reference manual for a list of valid combinations of AMODE and RMODE.
- An alternate method is to call the SNAPPAID module dynamically. For Assembler programs, issue a LOAD for the SNAPPAID module and a CALL to it.

Beginning with Abend-AID Release 9.5, the SNAPPAID module has been reduced in size. It now loads and calls another module that performs all of the functions that versions prior to 9.5 performed.

If you have combined the SNAPPAID module with the calling program through use of the linkage editor or binder instead of calling it dynamically, you do not have to replace it. SNAPPAID versions prior to Release 9.5 will continue to operate correctly. However, re-linking or re-binding a load module to replace an older SNAPPAID module with a Release 9.5 or more current version has the following advantages:

- SNAPPAID passes all of the 64-bit register contents to ABEND-AID. Consequently, a program executing in AMODE=64 can call SNAPPAID.
- If statically loaded (included with the calling program within a load module), the resulting load module requires less storage space because the SNAPPAID module is smaller.
- If statically loaded, the calling program is able to take advantage of future enhancements to the SNAP-AID process without the need to re-link or re-bind the load module because of the Release 9.5 or more current version's loading and calling a processing module.

Assembler programmers, note the following:

- General register 13 must point to a save area that is at least 72 bytes long. Upon being entered in AMODE24/31, SNAP-AID saves all general register contents into this save area. Upon being entered in AMODE64, the SNAP-AID Release 9.5 or more current version saves bits 32 through 63 of all the general registers into this save area.
- All GPR, AR, and CR register contents that exist at the time SNAP-AID is called are restored except for general register 15, which contains a return code. See “SNAP-AID Return Codes” on page 8-4 for more information.
- The save area that is pointed to by general register 13 must reside in a storage area that is addressable by the SNAP-AID caller while in the AMODE existing at the time SNAP-AID is called. An AMODE24 caller cannot pass a save area that resides in 31-bit or 64-bit storage. An AMODE31 caller cannot pass a save area that resides in 64-bit storage.

## Invoking SNAP-AID

**Note:** Do not call SNAP-AID from a program running in access register mode. Exit access register mode before calling SNAP-AID, then return to access register mode when execution of your program resumes.

To invoke SNAP-AID with a DD specified, perform the following steps:

1. Code a call to the module SNAPAID or SNPAID for FORTRAN. Figure 8-1 shows a SNAPAID call from a COBOL program.

**Figure 8-1.** SNAPAID Call in a COBOL Program

```

PROCEDURE DIVISION.

(OOPEN FILES)

PERFORM READ-RECORD THRU READ-RECORD-EXIT
    UNTIL END-OF-FILE.

READ-RECORD.

    READ INPUT-RECORD INTO WS-RECORD
        AT END MOVE 'Y' TO EOF-SWITCH
        GO TO READ-RECORD-EXIT.
    ADD 1 TO RECORD-CTR.
    IF WS-EMP-NUMBER IS NOT NUMERIC
        CALL 'SNAPAID'
        GO TO READ-RECORD.
    PERFORM FORMAT-REPORT-RECORD-ROUTINE.
    PERFORM WRITE-REPORT-RECORD-ROUTINE.

READ-RECORD-EXIT.
EXIT
  
```

Figure 8-2 on page 8-3 shows SNAPAID calls from a PL/I program.

Figure 8-2. SNAPAID Calls in a PL/I Program

```

MAIN3: PROC OPTIONS (MAIN);
/*****
/* SNAPAID CAN BE INVOKED FROM PL/I MAIN PROGRAMS, */
/* AND INTERNAL OR EXTERNAL SUBROUTINES: */
*****/
:
:
/*****
/* DECLARE THE SNAPAID SUBROUTINE AS FOLLOWS: */
*****/
DCL SNAPAID EXTERNAL ENTRY
    OPTIONS (ASSEMBLER, RETCODE);
:
:
/*****
/* MAIN PROGRAM BEGINS HERE: */
*****/
:
SELECT (COLOR);
    WHEN ('GREEN', 'BLUE ', 'WHITE') COLOR_ALL = '1'B;
    WHEN ('NAVY ', 'RED ', 'BEIGE') COLOR_ALL = '1'B;
    WHEN ('BRWN ', 'TAUPE') COLOR_MEN = '1'B;
    WHEN ('YELLOW', 'PINK ') COLOR_WMN = '1'B;

    OTHERWISE CALL SNAPAID; <-----SNAPAID used in
END;                                     OTHERWISE clause
                                         of SELECT statement

IF ORDER_SIZE= 'XXL' & yCOLOR_WMN
THEN CALL PROCESS_XXLARGE (COLOR);
ELSE IF ORDER_SIXE = 'XL' & yCOLOR_WMN
THEN CALL PROCESS_XLARGE (COLOR);
ELSE IF ORDER_SIZE = 'L'
THEN CALL PROCESS_LARGE (COLOR);
ELSE IF ORDER_SIZE = 'M'
THEN CALL PROCESS_MEDIUM (COLOR);
ELSE IF ORDER_SIZE = 'S' & ~COLOR_MEN
THEN CALL PROCESS_SMALL (COLOR);
SNAPAID used ELSE IF ORDER_SIZE = 'P' & ~COLOR_MEN
in last nested THEN CALL PROCESS_PETITE (COLOR);
IF statement ----->ELSE CALL SNAPAID;

```

2. Compile and link-edit or bind the program using one of the following:

- The DYNAM compiler option, which is available for COBOL
- A //SYSLIB DD statement for the link edit that includes the Abend-AID load library:

```
//SYSLIB DD DSN=SYS1.ABENDAID,DISP=SHR
```

- A linkage editor INCLUDE statement for the SNAPAID subroutine module:

```
//SYSIN DD *
INCLUDE SYSLIB(SNAPAID)
```

3. Add an //ABENDAID DD statement to the execution JCL.

The SNAP-AID report is written to an output destination chosen in the same manner as is done for a normal Abend-AID report. The only exception to this is that a SNAP-AID report cannot be written to the SYSUDUMP and SYSABEND IBM dump DDs. Normally, the SNAP-AID report is written using the site default report shared directory named by CWROUTE. However, you can override this destination by specifying as follows:

- //ABNLTERM DD, which overrides
- CWEXIT02, which overrides
- CWJOBTAB, which overrides
- CWROUTE routing group specification, which overrides
- CWROUTE site default report shared directory specification.

To write the SNAP-AID report to the //ABENDAID DD, use CWEXIT02, CWJOBTAB, or a CWROUTE routing group to designate that the report be written to SYSOUT. Refer to the *Abend-AID Installation and Customization Guide*, Chapter 5, “Customization” for more information about routing report output.

---

## SNAP-AID Execution

SNAP-AID performs identically to Abend-AID with the following exceptions:

- An //ABENDAID DD statement *must* be present to produce SNAP-AID output. If one is not present, it can be dynamically allocated.
- SNAP-AID reports the pseudo abend code SNAP.
- The SNAP-AID report is entitled “Abend-AID Snapshot.”
- The system produces no IBM dump.
- The //ABNLIGNR DD statement has no effect on SNAP-AID and does not suppress SNAP-AID output.
- The //ABNLIGNS DD statement can be used to suppress SNAP-AID output.

---

## Using SNAP-AID and XPEDITER/TSO

To take full advantage of the Abend-AID SNAP-AID feature while using XPEDITER/TSO, the ABENDAID DD must be allocated to the test session prior to the SNAP-AID call. An Abend-AID report can also be generated any time during the interactive session by issuing the AA SNAP command. If the AA SNAP command is used, the ABENDAID DD will be dynamically allocated by XPEDITER/TSO.

---

## SNAP-AID Return Codes

Return codes from SNAP-AID are:

**0:**

OK. SNAP-AID is complete.

**4:**

SNAP-AID cannot locate the required Abend-AID modules, or a compatible Abend-AID hook is not installed. SNAP-AID is bypassed.

**8:**

No //ABENDAID DD statement is available, or the //ABENDAID DD statement DCB attributes are invalid.

**12:**

There is not enough memory to allow SNAP-AID to run. SNAP-AID is bypassed.

**16:**

SNAP-AID execution abnormally terminated.

**20:**

A subsequent call has been made to SNAP-AID, but SNAP-AID has been disabled for one of the reasons listed above.

---

## SNAP-AID Parameter List

The SNAP-AID parameter list lets you do the following:

- Customize your SNAP-AID report by selecting or suppressing specified report sections. These report sections include:
  - Location in program of the call to SNAP-AID
  - Register contents and PSWs
  - Trace of program flow and program attributes
  - Program Storage
  - File information - data management control blocks
  - IMS diagnostic information and PCBs
  - IDMS diagnostic and status information
  - DB2 diagnostic and status information
  - Abend-AID for WebSphere MQ diagnostic and status information
  - Current COBOL sort information.
- Identify individual SNAP-AID reports in the report dataset directory when using Compuware Viewing Facility.
- Cause dynamic allocation of the //ABENDAID DD. The creation of the dynamic allocation request can receive input from various sources and employs a hierarchy in deciding which source to create the dynamic allocation parameters from:
  - a. Data passed in the parameter list takes precedence over all other sources.
  - b. For optional parameter values not passed, model information can be extracted from one of the following sources:
    - An existing //CEEDUMP DD
    - An existing //SYSUDUMP DD
    - An existing //PLIDUMP DD
    - An existing //PL1DUMP DD.If the //CEEDUMP DD was dynamically allocated, it will not be considered eligible for a model. If more than one of the above DDs exists, the first one found in the above order will be used as a model.
  - c. If no existing //CEEDUMP, //SYSUDUMP, //PLIDUMP, or //PL1DUMP DD is found, the default values established by the Abend-AID installer will be used.
  - d. If the Abend-AID installer did not establish one or more defaults, the Abend-AID defaults will be used.
- Display storage ranges between selected addresses.

To code a SNAP-AID parameter list, define the parameter interface in your program with the following fields:

- **Identification:** This six-byte field must be coded as SNPRML.
- **Action flag:** This field is used to select the action (display or suppress) that SNAP-AID applies to the sections specified. Valid values are:
  - 0 (default): Display all report sections
  - 1: Display specified report sections
  - 2: Suppress specified report sections.
- **Section selection flags:** When the action flag is set to 1 or 2, use the section selection flag(s) to identify the report section(s) to be displayed or suppressed. Valid values are:
  - 0 (default): Do not apply the action specified by the action flag.
  - 1: Apply the action specified by the action flag.

- **Parameter list version:** When the version is set to 1, the dynamic allocation parameters are recognized. Otherwise, they are not recognized.
- **Comment:** This ten-character field is specified in the program to identify the SNAPAID call that generated the report. The content of the comment field is displayed in the DESC field on the report dataset directory.
- **Dynamic allocation request:** When the request is set to D, dynamic allocation of the //ABENDAID DD is requested. When the request is set to F, dynamic allocation and FREE=CLOSE are requested. Otherwise, dynamic allocation is not requested.

**Note:** If an //ABNLTERM DD is allocated by your JCL or dynamically allocated because of a global request, then the SNAP-AID report will be routed to the //ABNLTERM allocation and not to the //ABENDAID allocation.

- **Output class:** When the class is set to any valid JES class, that class is used for the allocation. A class of \* denotes usage of the MSGCLASS value. Specifying an invalid class or no class causes the model or default class to be used.
- **Hold the output:** When the optional hold parameter is set to Y, the output will be placed in the hold queue by JES. When hold is set to N, the output will be directed to the output queue by JES. Otherwise, whether to hold output or not will be determined by the model or default hold specification.
- **Destination:** This optional eight-character field specifies the node to which you want to direct the output. Consult the DD DEST section of your JCL reference manual for more information on nodes. If you leave this field blank, the destination will be determined by the model or default destination value.
- **User ID:** This optional eight-character field specifies the user ID at the node destination where that you want the output routed. If you leave this field blank, the user ID will be determined by the model or default user ID value.
- **Output writer name:** This optional eight-character field specifies a custom output writer to be used to process the output. Note that the use of this parameter is mutually exclusive with user ID. If both are specified, user ID will be used. Output writer names are site-dependent.
- **User form name:** This optional four-character field specifies the form name to be used for the output. If you leave this field blank, the form name will be determined by the model or default form name value. User form names are site-dependent.

**Note:** The Abend-AID installation library contains parameter list interface layouts: member PRMICBL for COBOL, member PRMIPLI for PL/I, and member PRMIASM for Assembler.

- You can use two additional parameters to specify a range of storage to be displayed in the Program Storage section. The field name specified as the second parameter defines the beginning storage address. The third name specified as the third parameter defines the ending storage address. Subsequent pairs of parameters are processed as additional ranges of storage to be displayed. If these parameters are used, the specified ranges of storage replace the Program Storage section.

The following are examples of SNAPAID calls in the Procedure Division to produce a SNAP-AID report:

**Example 1: Without using a parameter list:**

- COBOL:  

```
CALL 'SNAPAID'.
```

- Assembler:

```

LA R1,0          Indicate 'no parameter list'
CALL SNAPAID

```

**Example 2: Using a parameter list:**

- COBOL:

```
CALL 'SNAPAID' USING PARM-INTERFACE.
```

- PL/I:

```
CALL SNAPAID (PARM_INTERFACE)
```

- Assembler:

```

OI   ADDR0,X'80'   Set end-of-list bit
LA   R1,PARMLIST  Point to parameter list
B    AROUND_LIST
PARMLIST DS OF
ADDR0 DC A(SNPMITR) Address of SNAPAID parameters
AROUND_LIST EQU *
CALL SNAPAID

```

**Example 3: Using a parameter list specifying a range of addresses:**

- COBOL:

```
CALL 'SNAPAID' USING PARM-INTERFACE
WS-RANGE1-BEG WS-RANGE1-END.
```

- PL/I:

```
CALL SNAPAID (PARM_INTERFACE,
RANGE1_BEG,RANGE1_END);
```

- Assembler:

```

OI   ADDR2,X'80'   Set end-of-list bit
LA   R1,PARMLIST  Point to parameter list
B    AROUND_LIST
PARMLIST DS OF
ADDR0 DC A(SNPMITR) Address of SNAPAID parameters
ADDR1 DC A(BEGDATA) Address of storage dump start
ADDR2 DC A(ENDDATA) Address of storage dump stop
AROUND_LIST EQU *
CALL SNAPAID

```

**Example 4: Using a parameter list specifying ranges of addresses:**

- COBOL:

```
CALL 'SNAPAID' USING PARM-INTERFACE
WS-RANGE1-BEG WS-RANGE1-END
WS-RANGE2-BEG WS-RANGE2-END.
```

- PL/I:

```
CALL SNAPAID (PARM_INTERFACE
RANGE1_BEG,RANGE1_END,
RANGE2_BEG,RANGE1_END);
```

- Assembler:

```

        OI  ADDR4,X'80'      Set end-of-list bit
        LA  R1,PARMLIST     Point to parameter list
        B   AROUND_LIST
PARMLIST DS  0F
ADDR0  DC  A(SNPMITR)      Address of SNAPAID parameters
ADDR1  DC  A(BEGDATA)      Address of storage dump start
ADDR2  DC  A(ENDDATA)      Address of storage dump stop
ADDR3  DC  A(BEGDATA#)     Address of storage dump start
ADDR4  DC  A(ENDDATA#)     Address of storage dump stop
AROUND_LIST EQU *
        CALL SNAPAID

```

**Note:** The Abend-AID installation library contains sample programs that produce SNAP-AID reports using a parameter list: member PRMSCBL for COBOL, member PRMSPLI for PL/I, and member PRMSASM for Assembler.

**Figure 8-3.** Parameter Interface Defined in a COBOL Program

```

01  PARM-INTERFACE.
03  PARM-IDENT          PIC X(6)  VALUE 'SNPRML'.
03  PARM-ACTION         PIC 9      VALUE ZERO.
    88  DISPLAY-ALL-SECTIONS      VALUE 0.
    88  DISPLAY-SECTION          VALUE 1.
    88  SUPPRESS-SECTION         VALUE 2.
*
*      0 FULL SNAPAID REPORT (NO CUSTOMIZATION)
*      1 DISPLAY SELECTED SECTIONS
*      2 SUPPRESS SELECTED SECTIONS
03  PARM-SECTION-SELECTION.
    05  NSI-SECTION            PIC 9      VALUE ZERO.
    88  DO-NOT-APPLY-PARM-ACTION VALUE 0.
    88  APPLY-PARM-ACTION      VALUE 1.
*
*      0 DO NOT APPLY PARM-ACTION TO THIS SECTION
*      1 APPLY PARM-ACTION TO THIS SECTION
    05  REGISTERS-PSW          PIC 9      VALUE ZERO.
    05  TRACE-SUMMARY         PIC 9      VALUE ZERO.
    05  PROGRAM-STORAGE       PIC 9      VALUE ZERO.
    05  FILES-SECTION         PIC 9      VALUE ZERO.
    05  IMS-SECTION           PIC 9      VALUE ZERO.
    05  IDMS-SECTION          PIC 9      VALUE ZERO.
    05  DB2-SECTION           PIC 9      VALUE ZERO.
    05  SORT-SECTION          PIC 9      VALUE ZERO.
    05  ECM-SECTION           PIC 9      VALUE ZERO.
    05  PARML-VERSION         PIC 9      VALUE ZERO
*
*      05 DYNAMICAL ALLOCATION INFORMATION NOT PRESENT IF BLANK
*      05 DYNAMIC ALLOCATION INFORMATION PRESENT
    PARM-COMMENT             PIC 9      VALUE SPACE.
*
*      DYNALC-REQ            PIC X(10)  VALUE SPACE.
    3 88  DON'T-ALLOCATE-ABENDAID VALUE SPACE.
    88  ALLOCATE-ABENDAID      VALUE 'D'.
    88  ALLOC-AND-FREE-ON-CLOSE VALUE 'F'.
*
*      THE ABENDAID DD WILL NOT BE DYNAMICALLY ALLOCATED IF
*      BLANK
*      D DYNAMICALLY ALLOCATE THE ABENDAID DD
*      F DYNAMICALLY ALLOCATE THE ABENDAID DD AND FREE=CLOSE
03  OUTPUT-CLASS          PIC X      VALUE SPACE.
03  HOLD-OUTPUT           PIC X      VALUE SPACE.
    88  DONT-HOLD-DEF        VALUE SPACE.
    88  HOLD                 VALUE 'Y'.
    88  DONT-HOLD           VALUE 'N'.
03  FILLER                PIC X      VALUE SPACE.
03  DESTINATION-PARM      PIC X(8)   VALUE SPACE.
03  USERID               PIC X(8)   VALUE SPACE.
03  OUTPUT-WRITER         PIC X(8)   VALUE SPACE.
03  USER-FORM            PIC X(4)   VALUE SPACE.

```

Figure 8-4. Parameter Interface Defined in a PL/I Program

```

DECLARE          1  PARM_INTERFACE,
                2  PARM_IDENT      CHAR(6)  INIT('SNPRML'),
                2  PARM_ACTION    CHAR(1)  INIT('0'),
/*              = 0 FULL SNAP AID REPORT (NO CUSTOMIZATION) */
/*              = 1 DISPLAY SELECTED SECTIONS */
/*              = 2 SUPPRESS SELECTED SECTIONS */
                2  PARM_SECTION(11)
                CHAR(1)  INIT((11)('0'),(1)('1')),
/*              (1) NSI */
/*              (2) REGISTERS-PSW */
/*              = 0 DO NOT APPLY PARM_ACTION FOR THIS SECT */
/*              = 1 APPLY PARM_ACTION FOR THIS SECTION */
/*              (3) TRACE-SUMMARY */
/*              (4) PROGRAM-STORAGE */
/*              (5) FILES */
/*              (6) IMS-SECTION */
/*              (7) IDMS-SECTION */
/*              (8) DB2-SECTION */
/*              (9) SORT-SECTION */
/*              (10) UNUSED */
/*              (11) PARML-VERSION */
/*              = 1 DYNAMIC ALLOCATION DATA IS PRESENT */
                2  PARM_COMMENT   CHAR(10) INIT((10)' '),
                2  DYNALC-REQ     CHAR(1)  INIT('F'),
/*              = D DYNAMIC ALLOCATION OF THE ABENDAID DD */
/*              = F DYNAMICALLY ALLOCATE AND DO FREE=CLOSE */
                2  OUTPUT-CLASS   CHAR(1)  INIT('A'),
/*              = X ANY VALID OUTPUT CLASS */
                2  HOLD-OUTPUT    CHAR(1)  INIT('Y'),
/*              = Y HOLD THE OUTPUT */
/*              = N DON'T HOLD THE OUTPUT */
                2  FILLER         CHAR(1)  INIT(' '),
                2  DESTINATION    CHAR(8)  INIT('RMT5'),
                2  USERID        CHAR(8)  INIT('MYID'),
                2  OUTPUT-WRITER  CHAR(8)  INIT(' '),
                2  USER-FORM      CHAR(4)  INIT('SPCL');
DCL SNAP AID EXTERNAL ENTRY OPTIONS(RETCODE,ASSEMBLER);

```

Figure 8-5. Parameter Interface Defined in an Assembler Program

```

SNPRMITR DS OH
PARMIDEN DC CL6'SNPRML' +0 CALLER ID
*
PARMACTN DC CL1'0' +6 ACTION FLAG
* EQUATES TO BE USED IN SETTING PARMACTN (ACTION).
FULLFLG EQU C'0' FULL SNAPAID REPORT
* (NO CUSTOMIZATION)
DISPLYFLG EQU C'1' DISPLAY SELECTED SECTIONS
SUPPRFLG EQU C'2' SUPPRESS SELECTED SECTIONS
*
PARMSECT EQU * SECTION FLAGS - SET TO "0" OR "1"
NSISCT DC CL1'0' +7 NSI
REGSCT DC CL1'0' +8 REGISTERS-PSW
TRACSCT DC CL1'0' +9 TRACE-SUMMARY
PROGSCT DC CL1'0' +10 PROGRAM-STORAGE
FILESCT DC CL1'0' +11 FILES
IMSSCT DC CL1'0' +12 IMS-SECTION
IDMSCT DC CL1'0' +13 IDMS-SECTION
DB2SCT DC CL1'0' +14 DB2-SECTION
SRTSCT DC CL1'0' +15 SORT-SECTION
ECMSET DC CL1'0' +16 E-COMMERCE-SECTION
PRMLVERS DC CL1'1' +17 DYNAMIC ALLOCATION DATA PRESENT
* EQUATES TO BE USED IN SETTING SECTION FLAGS ABOVE.
SECTNOFF EQU C'0' DO NOT APPLY DISPLAY/SUPPRESS
* ACTION TO THIS SECTION.
SECTNON EQU C'1' APPLY DISPLAY/SUPPRESS ACTION
* TO THIS SECTION.
PARMCMNT DC 10CL1' ' +18 COMMENT - APPEARS IN PROGRAMMER
* COLUMN OF REPORT FILE DIRECTORY
DYNASECT EQU * DYNAMIC ALLOCATION SECTION
DYNALC DC CL1' ' +28 DYNAMICALLY ALLOC ABENDAID
* AND OPTIONALLY SPECIFY
* FREE=CLOSE
DYNALLOC EQU C'D' DYNAMICALLY ALLOC ABENDAID
FREEQCLS EQU C'F' SPECIFY FREE=CLOSE TOO
OUTPTCLS DC CL1' ' +29 SYSOUT CLASS TO BE USED
HOLDOUTP DC CL1' ' +30 HOLD THE OUTPUT (Y/N)
UNUSE2 DC CL1' ' +31 UNUSED
DESTNATN DC CL8' ' +32 DESTINATION (LOCAL / REMOTE)
USERID DC CL8' ' +40 USER I.D.
OUTPWTRR DC CL8' ' +48 OUPUT WRITER NAME
USERFORM DC CL4' ' +56 USER FORM NAME
SNPRMLNG EQU *-SNPRMITR
END

```

## Suppressing SNAP-AID

SNAP-AID output can be suppressed without removing the call to SNAP-AID from your program. The way you do this depends on how the //ABENDAID DD statement is allocated.

- If the //ABENDAID DD is allocated by a DD statement in the execution JCL, remove the //ABENDAID DD statement from the JCL.
- If the //ABENDAID DD is dynamically allocated because of a request in the SNAP-AID parameter list, add the //ABNLIGNS DD to the execution JCL.

## Chapter 9.

# Using Abend-AID DD Statements

This chapter contains information about using the Abend-AID DD statements. You can add DD statements to the execution JCL to override specifications in the Abend-AID tables and user exits.

The following types of Abend-AID DD statements can be coded:

- General usage
- IBM dump-related
- Processing control
- Report output
- Storage-related
- Record format
- IDMS-related

The Abend-AID tables and user exits are installed and modified by the Abend-AID installer. The tables and user exits listed below may be installed at your site.

### ***Abend-AID Tables***

- Global site options table (CWGLOBAL) created during installation
- Routing criteria (CWROUTE) created during installation
- Job and program selection tables (CWJOBTAB and CWPGMTAB)
- Abend code tables (CWTABS01, CWTABU01, CWTABP01, CWTABL01)
- CSECT inclusion table (CWINCLUD)
- CSECT bypass table (CSECTBYP).

### ***Abend-AID User Exits***

- Processing control (CWEXIT01)
- Report routing and control (CWEXIT02)
- Customized storage display (CWEXIT03).

---

## Control Hierarchy

When the DD statements, tables, and user exits are used, there is a hierarchy that determines Abend-AID control. The following control hierarchy within Abend-AID defines the order in which overrides occur:

- JCL DD statements override what is specified in user exits, job and program selection tables, routing criteria, and the global site options table.
- User exits override job and program selection tables, routing criteria, and the global site options table.
- The job selection table overrides what is specified in the program selection table, routing criteria, and the global site options table. The program selection table is ignored when a match is found in the job selection table.
- The program selection table overrides what is specified in the routing criteria and global site options table.

---

## Abend-AID DD Statements

Any of the DD statements listed in this section can be included in the execution JCL to control Abend-AID processing and/or reports. If two mutually exclusive DD statements are present in the JCL, the last DD statement encountered will be in effect. Mutually exclusive DD statements are noted in this chapter.

### General Usage

Following is a description of the general usage DD statements:

<code>//SYSUDUMP DD SYSOUT</code> or <code>//SYSABEND DD SYSOUT</code> or <code>//SYSMDUMP DD SYSOUT</code>	Any one of these DD statements will invoke Abend-AID. However, users of <code>//SYSMDUMP</code> must use the <code>//ABENDAID DD</code> (see below) to receive Abend-AID output because Abend-AID does not write to <code>//SYSMDUMP</code> . If more than one DD is specified, the last listed DD is used.
<code>//ABENDAID DD SYSOUT</code>	An alternate DD for Abend-AID output. If it is not present in the JCL, it may be dynamically allocated. A <code>//SYSUDUMP</code> or <code>//SYSABEND DD SYSOUT</code> is still required. Abend-AID's output is written to the <code>//ABENDAID DD</code> when using Language Environment support or Abend-AID's abending or non-abending PL/I support.  <b>JCL Override:</b> When <code>//ABENDAID DD SYSOUT</code> is specified, all output goes to <code>//ABENDAID DD SYSOUT</code> , not to <code>//SYSUDUMP</code> or <code>//SYSABEND</code> .
<code>//ABNLHELP DD DUMMY</code>	Produces the Abend-AID Help pages. These pages go to the same DD specified for the Abend-AID report output.  <b>Table Override:</b> <code>//ABNLHELP DD</code> overrides the Display Help Text in Abend-AID Report CWGLOBAL option, which suppresses the Help pages.  <b>Table Usage:</b> Help pages can be either displayed or suppressed globally by using the Display Help Text in Abend-AID Report CWGLOBAL option.
<code>//ABNLIGNR DD DUMMY</code>	Suppresses Abend-AID and allows normal IBM dump processing.
<code>//ABNLIGNS DD DUMMY</code>	Suppresses SNAP-AID and allows normal processing to continue.
<code>//ABNLTERM DD DSN</code>	Specifies an Abend-AID report dataset for Abend-AID output.
<code>//ABNLTERM DD SYSOUT</code>	Routes Abend-AID output to SYSOUT in 72-column format.
<code>//ABNLWIDE DD DUMMY</code>	Specifies 121-column output when the default is 72 columns.

## IBM Dump-Related

Following is a description of the IBM-related DD statements:

**//ABNLDUMP DD DUMMY** Requests printing of the normal IBM dump in addition to the Abend-AID report. Dump output is routed to //SYSUDUMP DD SYSOUT or //SYSABEND DD SYSOUT. It is not routed to the Abend-AID report dataset or to Abend-AID-specific SYSOUTs. Refer to the overrides.

**//ABNLFMTD DD DUMMY** Requests printing of only the formatted control blocks part of the IBM dump as defined by your installation. Refer to the overrides.

**//ABNLNODP DD DUMMY** Suppresses printing of the normal IBM dump.

**Mutually Exclusive:** //ABNLDUMP and //ABNLFMTD are mutually exclusive of //ABNLNODP.

## Overrides

**User Exit Override:** //ABNLDUMP, //ABNLFMTD, or //ABNLNODP DD takes precedence over printing or suppressing the IBM dump as specified in the CWEXIT01abend-handling user exit and the abend-handling tables below.

**Method of Hierarchy:** The abend-handling user exit and tables are listed by precedence; that is, each one listed takes priority over the ones below.

- CWEXIT01
- CWJOBTAB
- CWPGMTAB
- CWTABS01, CWTABU01, CWTABP01, CWTABL01.

## Processing Control

Use the following DD statements to control Abend-AID processing.

### Enabling Abend-AID

Following is a description of the ABNLENAB DD statement:

**//ABNLENAB DD DUMMY** Enables Abend-AID processing when it has been disabled in the CWGLOBAL table.

If //ABNLENAB DD is present in the JCL, it can be overridden, and Abend-AID processing will be ignored. See “Bypassing Abend-AID”.

**Table Override:** Use //ABNLENAB DD to override the “Disable Abend-AID Processing” global options, which disables Abend-AID processing. See Appendix C, “Global Options”.

### Bypassing Abend-AID

After Abend-AID processing is active, it can be bypassed in the following ways:

- Include the //ABNLIGNR DD DUMMY statement to ignore Abend-AID processing for a particular job step.

- Include the //ABNLIGNS DD DUMMY statement to ignore SNAP-AID processing for a particular job step.
- Use the CWEXIT01 processing control exit to ignore Abend-AID processing for a specific abend code or job name.
- Use the CWEXIT02 user exit to bypass Abend-AID processing.
- Use the CWJOBTAB selection table to bypass Abend-AID processing based on a specific job name or job name prefix. Use the CWPGMTAB selection table to bypass Abend-AID processing based on a specific program name or program name prefix.

## Report Output

This section discusses how to control where Abend-AID report output is routed. Abend-AID output can be routed to one of the three following destinations:

- Abend-AID report shared directory
- Abend-AID report database attached to a shared directory
- Abend-AID report file
- Sequential file
- SYSOUT.

## Report Datasets - Shared Directories, Databases, and DDIO Files

Abend-AID uses the Compuware Viewing Facility (Compuware/VF) and the features of an ISPF/PDF environment to provide interactive viewing of reports and source listings.

Abend-AID report datasets, or specifically, report shared directories and the report databases attached to them, as well as DDIO report files, must be preallocated and preformatted. Refer to Chapter 2, “Allocating and Formatting DDIO Files”, in the *Compuware Shared Services User/Reference Guide* for information on defining, allocating, and formatting report datasets.

Abend-AID reports can be routed to the site default shared directory or to selected report datasets in any of the following ways:

- Specify a single default Abend-AID report shared directory name in the CWROUTE default set during installation.
- Specify an Abend-AID report dataset name in the output processing user exit, CWEXIT02.
- Use the //ABNLTERM DD DSN to specify an Abend-AID report dataset name. For example, insert the card //ABNLTERM DD DSN=MY.ABEND.REPORTS to route Abend-AID reports to that report dataset.
- CWJOBTAB

**Note:** //ABNLTERM DD DSN and //ABNLTERM DD SYSOUT are mutually exclusive.

The following overrides occur:

- The //ABNLTERM DD statement overrides what is specified in CWEXIT02, CWJOBTAB, and CWROUTE.
- CWEXIT02 overrides what is specified in CWJOBTAB and CWROUTE.
- CWJOBTAB overrides what is specified in CWROUTE.

**Note:** SNAP-AID output is also routed to the Abend-AID report dataset. IBM dumps are *not* routed to the Abend-AID report dataset.

## Defining a Sequential File

Use the //ABNLTERM DD DSN statement in your JCL to route the Abend-AID output to a sequential file. The DCB attributes must be RECFM=VBA and LRECL=125. Otherwise, Abend-AID issues the error message ABONL-2. If Abend-AID is unable to open this file, one of the following DD statements is used to route the Abend-AID output:

- //SYSUDUMP DD
- //SYSABEND DD
- //ABENDAID DD.

**User Exit Override:** The //ABNLTERM DD DSN overrides the Abend-AID file name specified in the output processing user exit, CWEXIT02.

**Table Override:** The //ABNLTERM DD DSN overrides the Abend-AID shared directory from CROUTE or CWJOBTAB.

**Mutually Exclusive:** //ABNLTERM DD DSN and //ABNLTERM DD SYSOUT are mutually exclusive.

## Routing Output to SYSOUT

Use the //ABNLTERM DD SYSOUT statement in your JCL to route the Abend-AID output to SYSOUT. For example, an //ABNLTERM DD SYSOUT=\* card in your JCL routes the Abend-AID report to the MSGCLASS destination as coded on the JOB card.

### *Specifying Narrow Output*

Use the //ABNLTERM DD SYSOUT statement to route output in narrow (72-column) format.

### *Specifying Wide Output*

Use the //ABNLWIDE DD DUMMY statement to specify 121-column output when the default report width has been changed to 72 columns.

**User Exit Override - CWEXIT02:** The //ABNLTERM DD DSN overrides the Abend-AID file name specified in the output processing user exit, CWEXIT02.

**Table Override:** The //ABNLWIDE DD statement overrides the following tables:

- CWJOBTAB
- CWPGMTAB
- CWGLOBAL.

**Note:** Use the //ABNLWIDE DD DUMMY statement with the //ABNLTERM DD SYSOUT statement to cause wide (121-column) output to be written to the //ABNLTERM SYSOUT.

## Controlling Report Format

Viewing or printing Abend-AID reports can be done in a narrow (72-column) or wide (121-column) format when routed to SYSOUT or a sequential file. The report format in the Abend-AID report dataset cannot be altered. Refer to Table 9-1 to determine the column width of the Abend-AID report.

**Table 9-1.** ABNLTERM Decision Table

"Use 72-column width format" CWGLOBAL option setting of Yes or No, CWJOBTAB, or CWPGMTAB (ONLINE=)	//ABNLTERM	FORMAT
N	N	121 on //SYSUDUMP
N	Y	72 on //ABNLTERM

**Table 9-1.** ABNLTERM Decision Table

Y	N	72 on //SYSUDUMP
Y	Y	72 on //ABNLTERM

## Storage-Related

Use these DD statements to control displaying program working storage and control block information in the Abend-AID report. Mutually exclusive DD statements are noted.

## Overrides

Use the following DD statements to override the specific program working storage and control block setting(s) made in these tables:

### Table Override:

- CWGLOBAL
- CWTABS01
- CWTABU01
- CWTABP01
- CWTABL01.

<b>//ABNLALL DD DUMMY</b>	Requests formatting of all program storage and data management control blocks.  <b>Mutually Exclusive:</b> //ABNLALL DD and //ABNLNONE DD
<b>//ABNLNONE DD DUMMY</b>	Suppresses formatting of all program storage and data management control blocks.  <b>Mutually Exclusive:</b> //ABNLNONE DD and //ABNLALL DD
<b>//ABNLPCBS DD DUMMY</b>	Requests displaying of the Abend-AID data management control blocks section.  <b>Mutually Exclusive:</b> //ABNLPCBS DD and //ABNLNCBS DD
<b>//ABNLNCBS DD DUMMY</b>	Suppresses displaying of the Abend-AID data management control blocks section.  <b>Mutually Exclusive:</b> //ABNLNCBS DD and //ABNLPCBS DD.
<b>//ABNLWSPT DD DUMMY</b>	Requests displaying of the Abend-AID Program Storage section.  <b>Mutually Exclusive:</b> //ABNLWSPT DD and //ABNLNWSP DD
<b>//ABNLNWSP DD DUMMY</b>	Suppresses displaying of the Abend-AID Program Storage section.  <b>Mutually Exclusive:</b> //ABNLNWSP DD and //ABNLWSPT DD

**//ABNLINCL DD DUMMY** Causes all active load modules to be considered for CSECT inclusion when the CWINCLUD table is present. Refer to Chapter 6, “Customizing Abend-AID,” in the *Abend-AID Installation and Customization Guide* for additional information.

These are the effects on the Program Storage section:

- Without CWINCLUD, the report shows all Assembler CSECTs on the calling chain.
- With CWINCLUD only, Assembler CSECTs in load modules on the calling chain are eligible for inclusion in the report.
- With CWINCLUD and ABNLINCL, Assembler CSECTs in all currently loaded modules of the abending task are eligible for inclusion in the report.

## Record Format

Following is a description of the ABNLSPRT DD statement:

**//ABNLSPRT DD DUMMY** Displays the entire record in the file summary section of the Abend-AID report when the default has been changed by the Display the Entire Current Record CWGLOBAL option to be NO.

**Table Override:** CWGLOBAL

## IDMS-Related

Following is a description of the IDMS-related DD statements:

**//ABNLIGNI DD DUMMY** Bypasses only the Abend-AID for IDMS reporting facility.

**Note:** This does not affect any other Abend-AID report processing, including SNAP-AID.

**//ABNLIDTR DD SYSOUT** Used by Abend-AID for IDMS to produce a dynamic trace output. Traces and displays all calls made to the IDMS database.

**//ABNLIFRE DD DUMMY** Causes the work areas that are acquired by Abend-AID for IDMS for each bind run unit to be freed when a finish is issued.



## Chapter 10.

# Understanding Language Processors

This chapter summarizes the Compuware language processor information presented in the Compuware Shared Services (CSS) user manuals. If you would like detailed information, refer to the applicable chapters of the CSS manuals:

- *Enterprise Common Components Installation & Customization Guide*: Overview and installation chapters.
- *Compuware Shared Services User/Reference Guide*: CSS Utilities and applicable language processor chapters.

---

## Use of Language Processors

The Compuware language processors enable XLS by copying source code and processing information from the compiler listing of a program into a Compuware source listing dataset. This makes XLS source information available for an Abend-AID report. Compuware provides a separate language processor for COBOL, PL/I, and Assembler (HLASM) languages.

The language processors are part of Compuware Shared Services (CSS), which is a set of components that are used by multiple Compuware products. The same Compuware language processor and source listing dataset that enable XLS for Abend-AID may also be used by other Compuware diagnostic and testing products.

---

## Operating Modes

Compuware language processors have two different operating modes and several output and processing options. These are typically set by the installer during Abend-AID and CSS installation but may be changed after installation.

The language processor on your system may be operated in either preprocessing mode or postprocessing mode. The names indicate whether language processing is initiated before or after the compile step. Preprocessing includes both compiling and postprocessing. Postprocessing can also run as a separate step.

Preprocessing and postprocessing have the following differences.

Preprocessing:

- Collects from SYSIN and SYSLIB any source code suppressed with COPY SUPPRESS (COBOL), %NOPRINT (PL/I), or PRINT OFF/NOGEN (Assembler).
- Invokes compiling and postprocessing.
- Provides any compiler options needed for postprocessing.
- Requires minor set-up modifications to the compile step.

Postprocessing:

- Requires setting up a separate step after the compile step.
- May require setup modifications to the compiler options.

The installation and setup instructions recommend preprocessing when possible, except when handling compiler listings in a machine-readable format. If a question exists, apply these guidelines:

- Preprocessing — advisable in development or testing environments, when the program contains suppressed source code, or when the source listing will be accessed by XPEDITER/TSO.
- Postprocessing — advisable in a production environment new to XLS or when running a program that has not had a compiler listing in the source listing dataset.

## Processing Methods

A language processor is used most efficiently when it is set up to copy a compiler listing to the source listing dataset whenever a program is compiled. This approach ensures the availability of online XLS in the Abend-AID report whenever an abend occurs. Because postprocessing is executed as a separate step, you can also post-compile a listing into the source listing dataset after an abend occurs or postprocess an existing machine-readable compiler listing into the source listing dataset.

Test programs:

- Preprocessing: Run the preprocessor and link-edit the program.
- Postprocessing: Compile the program, run the postprocessor, and link-edit the program.

Production programs:

- Preprocessing: Run the preprocessor to recompile the program.
- Postprocessing: Recompile the program and run the postprocessor.

Machine-readable compiler listings:

- Postprocessing: Write the compiler listing to a sequential dataset using an appropriate utility program, then run postprocessing with the dataset as input. You can postprocess machine-readable compiler listings from most products including:
  - CA-OPTIMIZER (COBOL)
  - CA-PANVALET
  - CHANGE MAN
  - ENDEVOR
  - Software Configuration and Library Manager (SCLM)
  - SYSOUT Archival and Retrieval System (SAR)

Figure 10-1. Preprocessor Compile Process

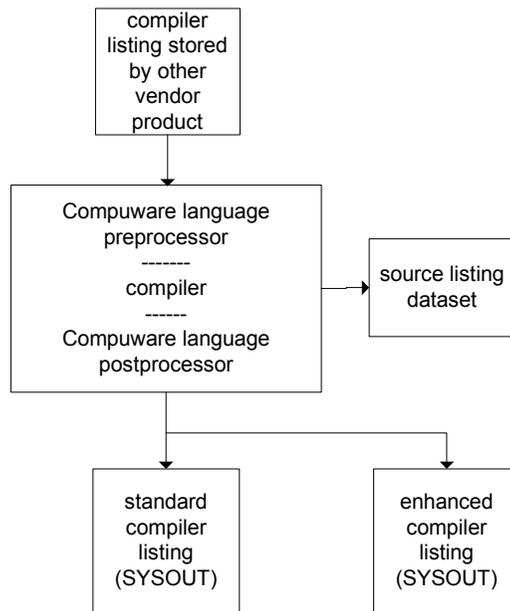
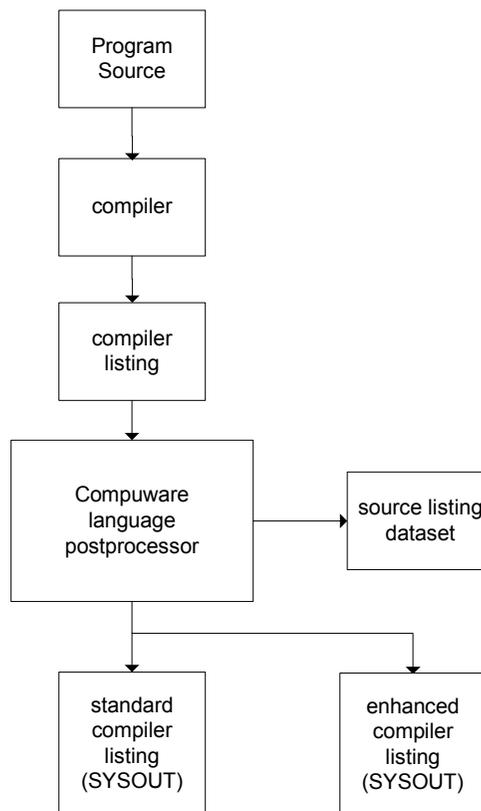
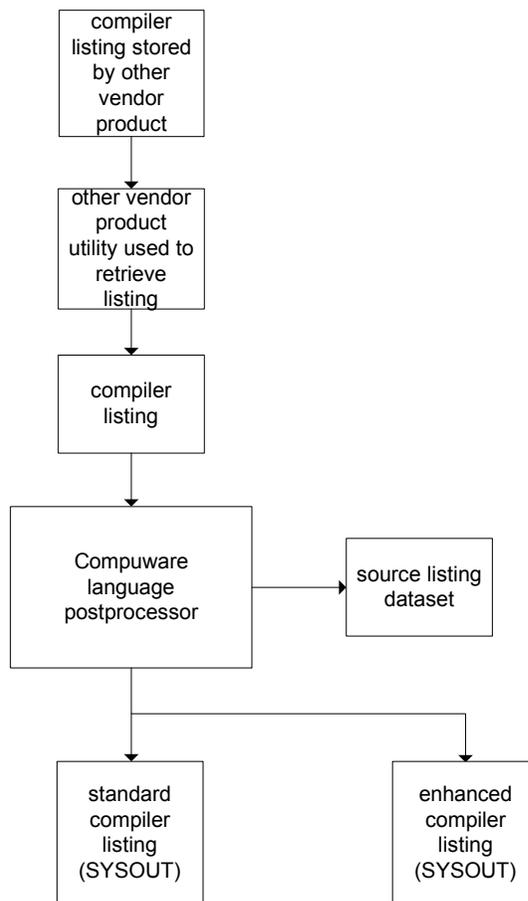


Figure 10-2. Postprocessor As a Step After the Compile



**Figure 10-3.** Postprocessor Using Stored Compiler Listings


---

## Processing Outputs

Language processor output consists of data copied or derived from the compiler listing. It includes information from the XREF, data maps, and object code sections of the listing. This information is merged into the Abend-AID report when you view it or print it using XLS.

With the COBOL language processor you can specify an enhanced compiler listing. It provides information not found in the standard listing, formatted for easy reference. The additional information is not shown in the Abend-AID report, but it is available for printing or viewing in the source listing dataset. The enhanced listing includes the following information:

- Compiler options, sorted alphabetically
- Merged MAP/DMAP information, BLW, BL, BLL, and displacement into the data division
- OFFSET/CLIST information merged into the procedure division
- Data clauses and their options: Redefines, Occurs, Depending on, File, External, Global
- Decimal format: record lengths, beginning and ending positions of data elements, location and length of items in working storage.

The enhanced listing is not available in PL/I and Assembler XLS.

## Output Options

You can use language processor parameters to customize printed and stored compiler listings. A language processor will not copy the compiler listing, or the COBOL enhanced compiler listing, to the source listing dataset unless the applicable output option is set. Compuware's default language processor options do not automatically direct output to the source listing dataset.

Each language processor provides similar outputs that are set during ECC/CSS installation. The COBOL language processor has additional options, including those for the enhanced compiler listing.

Several of the output alternatives are shown below. If you need more information about them, refer to the applicable chapters of the *Enterprise Common Components Installation and Customization Guide* and the *Compuware Shared Services User/Reference Guide*.

### Print:

- Enhanced compiler listing (COBOL) (*Compuware default*)
- Standard compiler listing
- Both listings (COBOL)
- No listing.

### Include in or exclude from output to print: (Compuware default: Include)

- XREF (COBOL, PL/I, ASSEMBLER)
- LIST (COBOL, PL/I)
- OFFSET (COBOL, PL/I)
- DMAP (COBOL)
- Source (COBOL, PL/I, ASSEMBLER)

### Store in source listing dataset: (Output to the source listing dataset must be specified)

- Enhanced compiler listing (COBOL)
- Standard compiler listing
- No listing.

### Include in or exclude from output to source listing dataset: (Compuware default: Include)

- XREF (COBOL)
- PMAP/LIST (COBOL)
- CLIST/OFFSET (COBOL)

### Enhanced compiler listing to source listing dataset or to print:

- Display or do not display compiler warning messages at the front of the listing.
- Embed or do not embed compiler warning messages after the statement in error.
- Print and embed warning messages. (*Compuware default*)
- Print error messages in uppercase or mixed-case. (*Compuware default: uppercase*)
- In the "From-Thru" section, start offsets from one (positional) or zero (offset). (*Compuware default: one*)

## Change Language Processing Mode

A Compuware language processor is set up during Abend-AID and ECC/CSS installation. But you can change processing modes for a single processing run, or prepare new report and source listing datasets, with the CSS Utilities.

You can access the CSS Utilities on the Abend-AID Primary Menu. For information about using the utilities, refer to the help selections on the menu, to the Compuware Viewing Facility online help, or to the CSS Utilities chapter of the *Compuware Shared Services User/Reference Guide*.

## Change Language Processor Options

1. Refer to the applicable language processor chapter of the *Compuware Shared Services User/Reference Guide* to familiarize yourself with available options.

2. Determine whether the options were specified at setup in the program EXEC statement, members or statements CWPPRMO or CXLPCOBB, or elsewhere. Installation instructions recommend CWPPRMO.
3. Change the options as desired.

# Chapter 11.

## Using Abend-AID in Language Environment

This chapter contains basic information for Abend-AID users who are using Language Environment. In addition to showing Abend-AID's LE support, it answers typical questions about Abend-AID's operation in Language Environment, an IBM run-time environment. If you need general information about Language Environment, refer to the *IBM z/OS Language Environment Concepts Guide*.

---

### Basic Operation

Abend-AID diagnoses errors occurring in programs running in Language Environment (LE). Abend-AID provides the module LEAID, which is installed as an abnormal termination exit (ATE) under LE. Abend-AID gets control at the LEAID ATE to analyze and diagnose errors.

Language Environment provides its own extensive condition-handling. One function of that is to make sure registered ATEs are called by LE in the event of an error. LEAID must be registered as an LE ATE in order for Abend-AID to be invoked when an error occurs and to create a diagnostic report. After Abend-AID produces its report, LEAID returns control to LE.

Language Environment's TRAP run-time parameter specifies how LE handles abends and program interrupts. TRAP(ON) causes LE to trap abends and program interrupts. This prevents normal operating system abend and dump services from having an opportunity to process.

#### Notes:

1. Abend-AID gets control after the CEE dump and so does not affect LE's response to a fault. You can specify LE responses ranging from no message to comprehensive dumps by setting a parameter in LE's Termination Thread Activity (TERMTHDACT) option.
2. Abend-AID does not affect an application's response to a fault. You can specify a response of a return code or an abend with the parameters of LE's Abnormal Termination Enclave (ABTERMENC) option.

### Invoking Abend-AID

Abend-AID can be invoked in Language Environment in two ways:

- **Implicit invocation:** Abend-AID is invoked implicitly at termination for unhandled conditions of severity 2 or greater. For these conditions, Language Environment error-handling calls all programs that have been registered as ATEs. If LEAID has been registered as an ATE, it is called by Language Environment and then invokes Abend-AID directly. Abend-AID is not invoked through SVC51 processing because in the LE environment itself, there is no abend to actually trigger MVS dump services.
- **Explicit invocation:** Abend-AID can be invoked explicitly by coding a call to LEAID within a user-written condition-handler. Refer to the *IBM Language Environment for MVS & VM Concepts Guide* for more information about Language Environment condition-handling.

Abend-AID cannot be invoked explicitly by coding a call to LEAID within an application program. A call to LEAID from an application program results in LEAID terminating immediately with a return code of 4. Instead, use the Abend-AID SNAP-AID facility to invoke Abend-AID explicitly from an application program outside of a user-written condition-handler. Refer to **Chapter 8, “Using SNAP-AID”** for more information.

**Note:** If LEAID is called from a user-written condition handler that does not handle the condition, two Abend-AID reports are produced. The first one results from the explicit call to LEAID coded within the condition handler. The second results from Language Environment calling LEAID as an ATE for the unhandled condition. Also, having multiple condition handlers and/or multiple ATEs can cause multiple Abend-AID reports to be produced for a single application error.

## Routing Abend-AID Output

In Language Environment, the Abend-AID report is written to an output destination chosen in the same manner as is done for normal Abend-AID processing outside of Language Environment. The only exception to this is that the report cannot be written to the SYSUDUMP and SYSABEND IBM dump DDs. Normally, the Abend-AID report is written using the site default report shared directory named by CWROUTE. However, this can be overridden as follows:

- //ABNLTERM DD, which overrides
- CWEXIT02, which overrides
- CWJOBTAB, which overrides
- a CWROUTE routing group specification, which overrides
- the CWROUTE site default report shared directory specification

If the //ABENDAID DD is not present in the application job step's JCL, Abend-AID's LE support dynamically allocates it. To write the Abend-AID report to the //ABENDAID DD, use CWEXIT02, CWJOBTAB, or a CWROUTE routing group to designate that the report be written to SYSOUT. Refer to the *Abend-AID Installation and Customization Guide*

---

## LE Run-time Options

When an abnormal termination is encountered, the programmer can easily identify the LE run-time options in effect at the time of the failure, and see how and where each option was set. Abend-AID shows the setting for each option and the name of the specific option control table selected by LE. When a program is running, there are options that are obtained from many sources — the option control tables (CEEUOPT, CEEDOPT, CEEROPT) and from JCL overrides. Some options may overlap and/or conflict, making it difficult to determine why an application behaves as it does, including performance issues and how the job terminates if an error occurs.

---

## LE User Heap Storage Analysis

Abend-AID displays the following for the LE User Heap Analysis:

1. User Heap run-time parameters and variables including initial heap size, increment size, number of segments, pointer to first segment, and pointer to last segment.
2. For each segment in the User Heap:
  - a. Analysis summary for each segment in the User Heap:
    - number of elements
    - size of allocated storage
    - number of free elements
    - size of storage still available in the segment
    - number of element allocation errors

- b. A display, by field, of each header in each segment.
- c. A display of the allocation map for each segment. An entry is displayed for each element in each segment with its associated data address, data length, and status (allocated or free).
- d. Validation for each element in a segment for allocation errors. If an allocation error is detected, the element is identified and the following is provided:
  - Storage surrounding the element in error
  - Storage that the elements in error are pointing to
  - Storage of the previous (last good) element, which may be suspect in overlay errors.

---

## LE Run Time Library Services (RTLS)

LE run-time libraries contain modules that can be accessed via the system LNKLST, STEPLIB, and/or an LE services called RTLS (Run Time Library Services). Sites may choose a single method of access to the LE libraries or may allow a combination of these access mechanisms, depending on their needs. Typically, a combination method is needed when the site is converting to LE for the first time or upgrading LE and needs compatibility with older LE releases.

This varied access to these LE libraries may cause many run-time issues that may be the involved in and/or be the root cause of program faults. Abend-AID provides the type of library access and associated values that assist in debugging these types of problems. The LIBRARY(lib) and VERSION(ver) options that are used to select which RTLS logical library and version are displayed. See the OS/390 IBM manual, Language Environment for z/OS *Programming Reference* for more information on using RTLS.

---

## Frequently Asked Questions

### 1. Does Abend-AID work in Language Environment?

Yes! IBM, as originally requested by Compuware, provides the CEEEXTAN abnormal termination exit CSECT. Compuware uses the abnormal termination exit to allow Abend-AID to get control in order to produce an Abend-AID report. Abend-AID provides the module LEAID, which is installed as an abnormal termination exit (ATE). LEAID calls Abend-AID.

An ATE is invoked by LE at program termination for all “unhandled conditions” of severity 2 or greater (return code 2000 or higher). LE can terminate with one of five severity codes, 0 through 4, which correspond to job step return codes of 0000 through 4000. For example, a data exception is a severity 3 condition. Prior to LE, a COBOL program that had a data exception would end with a SOC7 abend.

### 2. What releases of LE does Abend-AID support?

Abend-AID works with all releases of LE supported by IBM.

### 3. How do I install Abend-AID in LE?

Installation requires ATE registration in LE. Refer to the *Abend-AID Installation and Customization Guide* for details.

### 4. How do I get my SYSUDUMP?

Your program usually does not abend in LE. Abend-AID provides an LE condition table that works in conjunction with the Abend-AID abend code tables. Using these tables, you can request that an IBM dump be written to the //SYSUDUMP DD.

Another option is to add a //ABNLDUMP DD DUMMY to your JCL.

### 5. How do I get my Abend-AID reports written to my //SYSUDUMP DD?

Unfortunately, you cannot. Because no abend occurs, the //SYSUDUMP DD is not opened by MVS. Any product, other than MVS, opening the //SYSUDUMP DD can cause conflicts between MVS and that product. Abend-AID instead writes to an Abend-AID report dataset and, if requested, the //ABENDAID DD, which will be dynamically allocated if it is not in the JCL.

**6. How do I specify the SYSOUT class when the Abend-AID report is written to the dynamically allocated //ABENDAID DD?**

In the JES2 environment, dynamic allocation of the //ABENDAID DD is based on a model DD. The SYSOUT class and other subparameters of the model are used for the dynamically allocated //ABENDAID DD. If a model cannot be found, or if you are operating in a JES3 site, the //ABENDAID DD is dynamically allocated with a default SYSOUT class of \*. The default settings can be changed by updating global values using the Abend-AID installation dialog. For information refer to “Dynamic Allocation Program (#XAAMKDD)” in the *Abend-AID Installation and Customization Guide*.

**7. How do I get my job step to terminate so my JCL works the same as before LE?**

LE provides a run-time option, ABTERMENC, which determines whether the job step ends with a return code or with an abend code. ABTERMENC affects only JCL processing and not dump processing.

Abend-AID ignores these abends.

**8. What is the TERMTHDACT run-time parameter UADUMP?**

Starting with LE Release 5, the run-time parameter, TERMTHDACT(UADUMP), replaced the IBM-supplied abnormal termination exit, CEEBDATX. This parameter issues a U4039-0 abend that requests an IBM dump written to the SYSUDUMP DD. It is provided by IBM to debug LE failures only and to provide an IBM dump for systems programmers. It is not intended for use by application programmers to debug program problems.

**9. When I use CEEBDATX or the TERMTHDACT(UADUMP) run-time parameter, I always get an IBM dump regardless of the error. How can I get an IBM dump just for my SOC4 abends?**

An Abend-AID LE condition table is available that controls whether an IBM dump is produced. When the table specifies that an IBM dump should be produced, LEAID issues a U4039-8 abend that requests an IBM dump written to the //SYSUDUMP DD. The LE condition table, CWTABL01, is used in conjunction with the Abend-AID abend code tables.

Using these tables, you can request an IBM dump based upon the error condition and the use of CEEBDATX and TERMTHDACT (UADUMP) are not necessary. For example, you can request an IBM dump when the error condition is equivalent to a SOC4 abend. For more information refer to the *Abend-AID Installation and Customization Guide*.

**10. If I already have an abnormal termination exit defined, can I still add LEAID to the table?**

IBM allows you to define multiple abnormal termination exits. If there is more than one name defined, the abnormal termination exits are called in the order found in the CEEEXTAN CSECT.

## Chapter 12. Report Samples

This chapter shows samples of various report sections produced by Abend-AID.

---

### Accessing the Abend-AID Report

The Abend-AID Output Selection Menu (Figure 12-1) lists all of the Abend-AID report sections for online selection and viewing. It is part of the Compuware Viewing Facility (Compuware/VF).

**Figure 12-1.** Output Selection Menu

```

COMPUWARE/VF ----- OUTPUT SELECTION MENU -----
SELECT SECTION ==>

'AA.SHDRRPT'  REPT.122  AA950P92  J788317

0 HEADER      System and job information
1 DIAGS       Analysis
2 NSI         Location (next sequential instruction)
3 TRACE       Program flow and program attributes
5 REGS        Register contents and PSWs
6 PROG        Program Storage
7 PLIST       Program Listing
8 FILES       Open files information
9 IMS         IMS information and PCBs
10 IDMS       CA-IDMS information
11 DB2        DB2 information
12 SORT       COBOL sort information
13 DATALOC    COBOL Data Locator
14 MQ         Websphere MQ information
15 LE         LE information
20 EPILOG     Abend-AID termination information

                                Key section number or name and press ENTER.
                                Or press ENTER to view the diagnostic summary of sections 1 through 5.

```

---

### Report Sections

Report sections are shown on the pages that follow.

Several sections have standard content regardless of the programming language: the Header, Registers, Trace, File, and Epilog sections. Other sections provide information specific to the programming language and database in use. Only those sections for which information is available at the time of the error are presented in the Abend-AID report. For example, you will not have a DB2 section if the program does not access DB2.

Press Enter to go directly to the Error Analysis section. You can directly obtain any report section by entering its identification number or name in the SELECT SECTION field. Alternatively, you can use the cursor point-and-shoot method by pressing the Tab key to position the cursor on any highlighted section identification name, and then pressing the Enter key.

## Header Section

The Header section is the first section of the Abend-AID report. This is a standard section that always provides the same type of information. The Header section identifies:

- Date and time of the error
- Job name
- Job number
- Step name
- Operating system release level
- Licensee name and number
- Abend-AID release number.

Other information given in the Header section includes:

- CP FMID
- System on which your program was executing
- DFP release level
- JES2 release level
- CPU model number

**Figure 12-2.** Header section – COBOL

```

MONDAY      11 FEB 2003                H09.05.00 F01/29/2003 R09.05.00
*****
*                A b e n d - A I D   D i a g n o s t i c s                *
*****
Copyright (C) 1976, 2003, Compuware Corporation. Unpublished.
Rights Reserved Under The Copyright Laws Of The United States.

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COMPUWARE CORPORATION

Online Technical Support available at:  frontline.compuware.com

JESID - JOB11861      OPSYS   - z/OS  1.1.0      Model   - 9672
Job    - AA94PLIC     DFSMS/MVS - V2R10M0    CP FMID - JBB7713
Step  - SAMPLEQ      JES2    - OS 2.10      System  - CW09
Time  - 14.52.39     LE      - OS/390 V2R10

```

## Error Analysis Section

The Error Analysis section usually provides enough diagnostic information to resolve the problem. The cause of the error and corrective actions are described. The information varies, depending upon the programming language used. For external errors like S813-04 (Figure 12-3), the diagnosis includes:

- Cause of the error
- DDNAME and dataset name (whenever possible).

**Figure 12-3.** Error Analysis Section – S813 Example

```

An S813 abend occurred during execution of program PAYBKUP1.

*****
*           Analysis of Error           *
*****

The system completion code of 813-04 is invoked when the OPEN
routines of data management are unable to complete an OPEN macro
instruction for a magnetic tape data set.

Additional information can be found in the System Messages manual
under message IEC149I, return code 04.

Specific problem information for 813-04:

    Abending DDNAME is MASTER

DSNAME from DD card and HDR1 label on magnetic label
(VOLSER=TS0000 ) do not agree.
DSNAMES from DD card and HDR1 magnetic tape label -

DD CARD -                               TS000.PAYROLL.BKUP
TAPE    -                               TS000.PYRL.BKUP1

*****
*   REMEMBER - Only the last 17 bytes of the   *
*   HDR1 label and DD card DSN are compared.   *
*****

```

In the example above, the file name from the DD card did not match the name on the tape label. Abend-AID provides a quick resolution to this problem. Change the JCL and resubmit the job.

**Figure 12-4.** Error Analysis Section – SFCC in Language Environment

```

An SFCC abend occurred during execution of program REGMAIN1.

*****
*           Analysis of Error           *
*****

The LE release in use at execution time is higher than the LE release that
was used to link edit application.

```

In this example, an application program identified in the Header section was compiled with a higher level of LE than was used for execution. Abend-AID identifies the type of fault, SFCA or SFCC, and the problem.

For data-related errors, the Error Analysis provides:

- Type of error
- Fields in error
- Location (displacement) of the fields within their respective base locator cell number
- Contents of the fields in error
- Description of the error.

For reports with XLS support enabled, you can use the cursor point-and-shoot method to display the Program Listing section by pressing the Tab key to position the cursor at the highlighted text and pressing Enter.



Figure 12-7. Error Analysis Section with PL/I XLS

```

The user abend code of U3001 was issued by PL/I after normal return from
an error or finish on-unit for error on-code 0320. That on-code
corresponds to the OS completion code of SOCB.

*****
*           Analysis of Error           *
*****

A Decimal Divide Exception occurred in the following statement:

000065          AVG_HOURS = TOTAL_HOURS / MONTH_CODE;

          Current values of fields on abending statement
--- Variable/Attributes ----- Value---1-----2-----3-----4
CALC_PAYROLL:AVG_HOURS
  AUTO    FIXED DEC(5,1)          +43.0
CALC_HOURS:TOTAL_HOURS
  STATIC  FIXED DEC(5)            +101
PAYROLL:TIME_RECORD.MONTH_CODE
  AUTO    PIC'99'                  00
-----
          "#" - Indicates field contains invalid data
    
```

Figure 12-8. Error Analysis Section with PL/I Basic Support

```

The user abend code of U3001 was issued by PL/I after normal return from
an error or finish on-unit for error on-code 0320. That on-code
corresponds to the OS completion code of SOCB.

*****
*           Analysis of Error           *
*****

A decimal divide exception is caused when the divisor is zero.

          Specific Information
          CSECT  DISPL/  Module  DISPL/  DISPL/
          Name   CSECT  Name     EPA     Load
06900F2E PAYROLL1 000009DE PAYEXEC 00000A5E 00000A5E 6 FD91 D098 D0C8
          DP - divide decimal

          A-operand - dividend

00011F18          10 0000001010000000000000C

          B-operand - divisor

00011F48          2 000C
          The above field is in error

Note: The CSECT and module displacements are not applicable
      because the operands are located in storage outside
      of the program.
    
```



## Error Location Section

The Error Location section provides information that can be used to locate the statement in error. Information presented in this section includes:

- Program's compile date
- Program's link-edit date
- Program name and module lengths
- Load module name and the load library name
- Location of the last I/O operation or subroutine call, if applicable.

For reports with XLS support enabled, you can use the cursor point-and-shoot method to display the Program Listing section by pressing the Tab key to position the cursor at the highlighted text and pressing Enter.

**Figure 12-11.** Error Location Section with COBOL XLS

```

*****
*           Error Location           *
*****

The statement being executed was:

000115          SUBTRACT TCR-TOTAL-TAXES FROM TCR-GROSS-PAY
000116          GIVING WS-NET-PAY

This statement is contained in
paragraph "READ-A-RECORD" in program "PAYROLLX".

The program was compiled on 08 FEB 2003 and is 00000FB8 bytes long.

It is part of load module PAYLOAD.

The module was loaded from STEPLIB library CW.AA.TEMPLOA7.

The module was link edited on 08 FEB 2003 and is 00001400 bytes long.

The last known I/O request or call in the program above was:

000101          READ TIMECARD INTO WS-TIMECARD-REC.

This statement is contained in
paragraph "READ-A-RECORD" in program "PAYROLLX".

```

**Figure 12-12.** Error Location Section with COBOL Basic Support

```

*****
*           Error Location           *
*****

The next sequential instruction to be executed in program PAYROLLX was
at displacement 0000065A.

The program was compiled on 08 FEB 2003 and is 00000FB8 bytes long.

It is part of load module PAYLOAD.

The module was loaded from STEPLIB library CW.AA.TEMPLOA7.

The module was link edited on 08 FEB 2003 and is 00001400 bytes long.

The last known I/O request or call in the program above was issued with
a return address at displacement 000005AC.

```

**Figure 12-13. Error Location Section with PL/I XLS**

```

*****
*           Error Location           *
*****

The statement being executed was:

000065          AVG_HOURS = TOTAL_HOURS / MONTH_CODE;

This statement is contained in
procedure PAYROLL:CALC_PAYROLL:CALC_HOURS.

The program was compiled on 08 FEB 2003 and is 00000A28 bytes long.

It is part of load module PAYEXEC.

The module was loaded from STEPLIB library CW.AA.TEMPLOA7.

The module was link edited on 08 FEB 2003 and is 00003B30 bytes long.

The last known I/O request or call in the program above was:

000063          OVERTIME_TOTAL.ACCRUED_HOURS = OVERTIME_TOTAL.ACCRUED_HOURS +
                OVERTIME_HOURS_WEEKLY;

This statement is contained in
procedure PAYROLL:CALC_PAYROLL:CALC_HOURS.

```

**Figure 12-14. Error Location Section with PL/I Basic Support**

```

*****
*           Error Location           *
*****

The next sequential instruction to be executed was in statement 65 at
offset 00000016C in procedure CALC_HOURS.

The program was compiled on 08 FEB 2003 and is 00000A28 bytes long.

It is part of load module PAYEXEC.

The module was loaded from STEPLIB library CW.AA.TEMPLOA7.

The module was link edited on 08 FEB 2003 and is 00003B30 bytes long.

The last known I/O request or call in the program above was issued with
a return address at displacement 0000097C.

```

Figure 12-15. Error Location Section with Assembler XLS

```

*****
*           Error Location           *
*****

The statement being executed in CSECT CWAADATE was at displacement
00000042.

  Stmt  Loc  Object Code          Source Statement
  48                                * Uncomment following line before rolling
  49                                * this program into production!
  50                                *
  51 00003C F221 B165 6000          ZAP  XYEARS,=P'3'
CURR => 000042 FD20 B165 B16A      PACK PACKED_YEAR,RUN_YEAR
  53 000048 F900 B167 B176          DP  PACKED_YEAR,XYEARS
  54 00004E 4770 B064                CP  PACKED_YEAR+2(1),=P'0'
  55 000052 D501 7002 6002          BNE EXIT
  56 000058 4770 B064                CLC  HIRE_MONTH,RUN_MONTH
                                       BNE EXIT

The program was compiled on 08 FEB 2003 and is 00000178 bytes long.

It is part of load module CWAADATE.

The module was loaded from STEPLIB library CW.AA.TEMPL0A7.

The module was link edited on 08 FEB 2003 and is 00000178 bytes long.

```

Figure 12-16. Error Location Section with Assembler Basic Support

```

*****
*           Error Location           *
*****

The next sequential instruction to be executed in program CWAADATE
was at displacement 00000048.

      00000038 92E8B164      MVI  356(R11),X'E8'
      0000003C F221B1656000  PACK 357(3,R11),0(2,R6)
      00000042 FD20B165B16A  DP   357(3,R11),362(1,R11)
NSI==> 00000048 F900B167B176  CP   359(1,R11),374(1,R11)
      0000004E 4770B064      BNE  100(,R11)
      00000052 D50170026002  CLC  2(2,R7),2(R6)
      00000058 4770B064      BNE  100(,R11)

The program was compiled on 08 FEB 2003 and is 00000178 bytes long.

It is part of load module CWAADATE.

The module was loaded from STEPLIB library CW.AA.TEMPL0A7.

The module was link edited on 08 FEB 2003 and is 00000178 bytes long.

```

## Trace Section

The Trace section is a standard section that shows you which programs were called and in what order. Also provided in this section are the Application Program Attributes for all application programs in the Call Trace Summary. The Trace section gives the following information:

- Called/linked programs on the save area chain
- Program location(s) where the call(s) occurred
- Program in error, when available
- Library that each load module in the Call Trace was loaded from
- Application Program Attributes listing:
  - Each program's name and its load module
  - Compile date, length, and language for each program.

For reports with XLS support enabled, you can use the cursor point-and-shoot method to display the Program Listing section by pressing the Tab key to position the cursor at the highlighted values and pressing Enter.

Figure 12-17 on page 12-10 shows a sample Trace section.

**Figure 12-17. Trace Section**

```

*****
*          Call Trace Summary          *
*****

*****Calling*****      ****Return****      *****Called*****
Load-Mod Program          Type      Value          Program Load-Mod

*SYSTEM                                     Links to CWAACOB CWSLRPT
CWSLRPT CWAACOB                                     Calls CEEBTOR CEEBINIT
CEEBINIT CEEBTOR                                     Calls CWAACOB CWSLRPT
CWSLRPT CWAACOB DISP 00000A38 Calls IGZCLNK IGZCLNK
IGZCLNK IGZCLNK DISP 00000410 Calls CWAACOB CWAACOB *
CWAACOB CWAACOB DISP 00000336 Calls IGZCLNK IGZCLNK
IGZCLNK IGZCLNK                                     Calls CEEHDSP CEEPLPKA
CEEPLPKA CEEHDSP DISP 00001868 Calls LEAID LEAID
LEAID LEAID DISP 00000ABC Calls SNAPAID LEAID

Program Causing Error *

-----
Load-Mod Amode Rmode Resides in
CWAACOB ANY 24 TSUSER.COBLEINX.LOAD
CWSLRPT ANY 24 TSUSER.COBLEINX.LOAD
CEEBINIT 24 24 CEE.V1R5MO.SCEERUN
IGZCLNK 31 24 CEE.V1R5MO.SCEERUN
CEEPLPKA 31 ANY CEE.V1R5MO.SCEERUN
LEAID 31 ANY AA.R950.ALPHA.LOADLIB
SNAPINTF 31 ANY AA.R950.ALPHA.LOADLIB
-----

*****
*          Application Program Attributes          *
*****

Load-Mod Program Compile Date Length Language
CWSLRPT CWAACOB 07 AUG 2003 0000A188 COBOL/370 V1R1M1
CWAACOB CWAACOB 07 AUG 2003 00002683 COBOL/370 V1R1M1

```

## Registers Section

The Registers section is a standard section that displays Supporting Environmental Data, which identifies:

- Abending program status word (PSW) and program PSW
- Entry point (EPA) and load point addresses (LPA)
- Instruction length code (ILC)
- Register contents and descriptions at the time of the error
- Load module name.

Figure 12-18. Registers Section

```

*****
*      Supporting Environmental Data      *
*****

PARM Data - HEAP(400,400,ANY),ABTERMENC(RETCODE),RPTSTG(ON)/
Length of data -
48

Abend PSW - 078D1000 8000690A   A(PAYROLLX) + 00000542
Prog PSW - 078D1000 8000690A   A(PAYROLLX) + 00000542
Load Module - PAYROLLX                               Entry Point Address - 00054958
ILC - 06, INTC - 07                               Load Point Address - 00054958

Registers at time of error (Descriptions based on 31 bit addresses)

REG HEX      Decimal      Description
R0 00000001          1
R1 09BF5030    163,532,848 A(09BF4000) + 00001030, PVT SP=000 ALLOC
R2 000177EC      96,236 A(00017000) + 000007EC, PVT SP=001 ALLOC
R3 00006D00      27,904 A(PAYROLLX) + 00000938
R4 00006FC0      28,608 A(PAYROLLX) + 00000BF8
R5 80006860   -2,147,456,928 A(PAYROLLX) + 00000498
R6 09BF8270    163,545,712 A(09BF8000) + 00000270, PVT SP=000 ALLOC
R7 09BF5030    163,532,848 A(09BF4000) + 00001030, PVT SP=000 ALLOC
R8 00007161      29,025 A(PAYROLLX) + 00000D99
R9 00007220      29,216 A(PAYROLLX) + 00000E58
R10 000064C4     25,796 A(PAYROLLX) + 000000FC
R11 80010330   -2,147,417,296 A(CEEBBEXT) + 00000000
R12 00017B10      97,040 A(00017000) + 00000B10, PVT SP=001 ALLOC
R13 00006B28      27,432 A(PAYROLLX) + 00000760
R14 8004C3DC   -2,147,171,364 A(IGZEQBL ) + 00000604
R15 00DD01E0    14,483,936 A(IGG019AA) + 00000000

```

## Program Storage Section

The Program Storage section formats program storage for application programs on the calling chain.

Figure 12-19. Program Storage Section with COBOL XLS

Working-Storage Section				
Level/Field Name	Picture/Type	Offs	Value	
-----+-----1-----+-----2				
77 WS-LINE-CTR	S999	COMP-3	+4	
77 WS-PAGE-CTR	S999	COMP-3	+1	
77 WS-RECORD-CTR	S999	COMP-3	+4	
77 WS-TOTAL-NET-PAY	S9(7)V99	COMP-3	+339117	
77 WS-NET-PAY	# S9(5)V99	COMP-3	X'CC33110F'	
77 WS-EMP-NO	9(8)		04060293	
01 WS-TIMECARD-REC				
02 TCR-EMP-NO	9(8)		04060293	
02 TCR-MONTH-CODE	99		02	
02 TCR-EMP-NAME	X(32)		EDWARDS, ALEXANDER	
02 TCR-GROSS-PAY	# 9(5)V99		X'7C7CF3F3F1F1F0'	
02 TCR-TOTAL-TAXES	9(4)V99		013222	
Linkage Section				
Level/Field Name	Picture/Type	Offs	Value	
-----+-----1-----+-----2				
01 PARMDATA				
02 PARM-LEN	9(3)	COMP	7	
02 PARM-STRING	X(7)		SPACES	
-----				
Supporting data				
Contents of BLW cells				
BLW	0 (X'0')	-	00007220	
Contents of BLL cells				
BLL	0 (X'0')	-	00000000	BLL 1 (X'1') - 00013808
Contents of BLF cells				
BLF	0 (X'0')	-	09BF8270	BLF 1 (X'1') - 00007161
BLF	2 (X'2')	-	09BF5030	
Task Global Table (TGT)				
DSPL Address	----- Data -----			
00000	00006B28	00108001	00015E98	00000000 80006A52 .....;q.....].
00010	00006B38	89BD52D8	8004C3DC	00DD01E0 00000001 i..Q..C....\....
00020	00006B48	00006F60	000177EC	00006D00 00006FC0 ..?-....._...?{
00030	00006B58	80006860	09BF8270	09BF4FE0 00007161 ...-..b... \.../
00040	00006B68	0000680C	000064BC	F3E3C7E3 00026018 .....3TGT...-



Figure 12-21. Program Storage Section with PL/I XLS

Variable Storage - Procedure CALC_PAYROLL		Value			
Variable/Attributes		1	2	3	4
AVG_HOURS	AUTO FIXED DEC(5,1)				+43.0
1 CNTL_STRUCT	(0)				
CTL					
2 TABLE_NAME	CHAR(30)				JOHNSTONE, REGINALD B.
2 TABLE_DATA (1:2)					
(1) FLT DEC(5)					+2.000000E+0
(2) FLT DEC(5)					+2.000000E+0
2 TABLE_ACTIVITY	CHAR(18)				02RECORD 2
1 CNTL_STRUCT	(-1)				
CTL					
2 TABLE_NAME	CHAR(30)				JONES, KERI, M.
2 TABLE_DATA (1:2)					
(1) FLT DEC(5)					+1.000000E+0
(2) FLT DEC(5)					+1.000000E+0
2 TABLE_ACTIVITY	CHAR(18)				01RECORD 1
1 INVENTORY_RANGE (1:3)					
AUTO					
2 (1) WAREHOUSE					
3 MAX_STOCK	(1) FIXED DEC(4,1)				+99.0
3 MIN_STOCK	(1) FIXED DEC(3,1)				+88.0

**Note:** PL/I basic support and XLS do not support based variables with the ALLOCATE statement.

Figure 12-22. Program Storage Section with PL/I Basic Support

```

*****
Static storage for PL/I procedure PAYROLLX
in CSECT PAYRLX1 of load module PAYEXEC
Compiled with options: SYSTEM( MVS )
*****

DSPL Address ----- Data -----
00000 06901800 E0000DC4 06900C64 06900D32 06900FC4 \..D.....D
00010 06901810 069016D8 0690173A 06901750 069017AA ...Q.....&....
00020 06901820 069017AA 069017AA 069017AA 069017AA .....

00410 06901C10 40404040 E3D6E3C1 D340D5C5 E340D7C1 TOTAL NET PA
00420 06901C20 E8D5C5E3 40D7C1E8 40404040 40404040 YNET PAY
00430 06901C30 E3D6E3C1 D340E3C1 E7C5E240 40404040 TOTAL TAXES
00440 06901C40 40C7D9D6 E2E240D7 C1E84040 40404040 GROSS PAY
00450 06901C50 D4D6D5E3 C8404040 40404040 40404040 MONTH
00460 06901C60 40C5D4D7 D3D6E8C5 C540D5E4 D4C2C5D9 EMPLOYEE NUMBER

*****
Automatic storage for PL/I procedure PAYROLLX
which issued CALL or BEGIN at offset
relative to main entry of procedure
That offset was located at statement 21003FA
*****

DSPL Address ----- Data -----
00000 00011888 E0250000 000114D0 00000000 8690105E \.....)....f..:
00010 00011898 06903B08 00011DF8 06901BAC 86900FC4 .....8....f..D
00020 000118A8 06901800 069025F8 00000000 00011D92 .....8.....k

002F0 00011B78 F4F3F2F4 40404040 40404040 40404040 4324
00300 00011B88 40404040 4040C5C4 E6C1D9C4 E26B40C1 EDWARDS, A
00310 00011B98 D3C5E7C1 D5C4C5D9 40404040 40404040 LEXANDER
00320 00011BA8 40404040 40404040 40404040 F0F4F0F6 0406
00330 00011BB8 F0F2F9F3 40404040 40404040 40404040 0293
00340 00011BC8 40404040 40404040 40404040 5BF1F26B $12,
00350 00011BD8 F0F3F34B F3F24040 4040405B F36BF1F2 033.32 $3,12
00360 00011BE8 F94BF9F2 40404040 40404040 5840F86B 9.92 $ 8,
00370 00011BF8 F9F0F34B F4F04040 40404040 40404040 903.40

*****
* Program storage for CSECT PLISTART *
* located in load module PAYEXEC *
*****

DSPL Address ----- Data -----
00000 06900BD8 47000000 47000002 90ECD00C 053047F0 .....}....0
00010 06900BE8 30180014 CE0A0203 06900C04 D7D3C9E2 .....PLIS
00020 06900BF8 E3C1D9E3 000058F0 F070050F 069025D0 TART...00.....}
00030 06900C08 069025D8 00000000 00000000 00000000 ...Q.....
00040 06900C18 FFFF0044 00000000 00000000 00000000 .....

```

**Note:** PL/I basic support and XLS do not support based variables with the ALLOCATE statement.

Figure 12-23. Program Storage Section with Assembler XLS

STORAGE FOR CSECT CWAADATE (R11)						
Offset	Address	Line	Label	Type	HEX	CHAR
000000	0AE14A60	6		DS OH		
0000EC	0AE14B4C	125	SAVEAREA	DS 18F	00000000000030018	.....
0000F4	0AE14B54				00000000000000000	.....
		132	DATE_DAYS			
000134	0AE14B94			DS OC		
000134	0AE14B94	133		DC C	F0F1F3F1	0131
000138	0AE14B98	134		DC C	F0F2F2F8	0228
00013C	0AE14B9C	135		DC C	F0F3F3F1	0331
000140	0AE14BA0	136		DC C	F0F4F3F0	0430
000144	0AE14BA4	137		DC C	F0F5F3F1	0531
000148	0AE14BA8	138		DC C	F0F6F3F0	0630
00014C	0AE14BAC	139		DC C	F0F7F3F1	0731
000150	0AE14BB0	140		DC C	F0F8F3F1	0831
000154	0AE14BB4	141		DC C	F0F9F3F0	0930
000158	0AE14BB8	142		DC C	F1F0F3F1	1031
00015C	0AE14BBC	143		DC C	F1F1F3F0	1130
000160	0AE14BC0	144		DC C	F1F2F3F1	1231
		145	CHECKED_FOR_EOM_SW			
000164	0AE14BC4			DC C	E8	Y
		146	PACKED_YEAR			
000165	0AE14BC5			DS PL3	00019F	...
		147	PACKED_YEAR2			
000168	0AE14BC8			DS PL2	0000	..
00016A	0AE14BCA	148	XYEARS	DC P	0C	.
				DS CL1		
		149	CALC_EOM_RETURN@			
00016C	0AE14BCC			DS F	8AE14A98	..6q
			LTORG			
000170	0AE14BD0	151		=C	F0F2	02
000172	0AE14BD2	152		=C	F2F8	28
000174	0AE14BD4	153		=C	F2F9	29
000176	0AE14BD6	154		=P	0C	.
000177	0AE14BD7	155		=P	4C	<
STORAGE FOR DSECT #EOM_SW (R4)						
Offset	Address	Line	Label	Type	HEX	CHAR
000000	0000F045	157	EOM_SW	DS C	D5	N
STORAGE FOR DSECT #ANNIV_IND (R5)						
Offset	Address	Line	Label	Type	HEX	CHAR
		159	ANNIV_IND			
000000	0000F046			DS C	D5	N
STORAGE FOR DSECT #RUN_DATE (R6)						
Offset	Address	Line	Label	Type	HEX	CHAR
000000	0000F070	161	RUN_DATE	DS OCL6		
000000	0000F070	162	RUN_YEAR	DS CL2	F1F9	19
		163	RUN_MONTH			
000002	0000F072			DS CL2	F9F8	98
000004	0000F074	164	RUN_DAY	DS CL2	F0F4	04

Figure 12-24. Program Storage Section with Assembler Basic Support

```

*****
* Program storage for CSECT CWAADATE *
* located in load module CWAADATE *
* Length is 00000178 *
* Language is HLASM *
*****

*****
* Save area used to call CSECT CWAADATE *
*****
* Located at: 00030018 A(0002C000) + 00004018, PVT SP=001 ALLOC *
* Descriptions based on 31 bit addresses *
*****
HEX          Decimal      Description
WD1 00102401      1,057,793 UNALLOCATED - LSQA
BCK 0000E858          59,480 A(CWAACOB ) + 000087B8
FWD 00030320          197,408 A(0002C000) + 00004320, PVT SP=001 ALLOC
R14 800244A8 -2,147,335,000 A(IGZCLNK ) + 00000410
R15 8AE14A60 -1,964,946,848 A(CWAADATE) + 00000000
R0 00030320          197,408 A(0002C000) + 00004320, PVT SP=001 ALLOC
R1 0000EAD0          60,112 A(CWAACOB ) + 00008A30
R2 00021719          136,985 A(00021000) + 00000719, PVT SP=001 ALLOC
R3 0000EAD0          60,112 A(CWAACOB ) + 00008A30
R4 0000654B          25,931 A(CWAACOB ) + 000004AB
R5 00000004              4
R6 000507B8          329,656 A(0002C000) + 000247B8, PVT SP=001 ALLOC
R7 0000E9B0          59,824 A(CWAACOB ) + 00008910
R8 800244AA -2,147,334,998 A(IGZCLNK ) + 00000412
R9 0000E858          59,480 A(CWAACOB ) + 000087B8
R10 00050038          327,736 A(0002C000) + 00024038, PVT SP=001 ALLOC
R11 80024098 -2,147,336,040 A(IGZCLNK ) + 00000000
R12 0001F6A0          128,672 A(0001D000) + 000026A0, PVT SP=001 ALLOC

*****
* Storage of CSECT CWAADATE *
*****
----- Data -----
DSPL Address
00000 0AE14A60 90EC00C 18BF41B0 B00050D0 B0F041D0 ..).....&|.0.)
00010 0AE14A70 B0EC1831 58403000 58503004 58603008 .....&|.0.)
00020 0AE14A80 5870300C 41707000 92D55000 95D5B164 .....kN&.nN..
00030 0AE14A90 4770B03C 4DA0B06E 92E8B164 F221B165 ...(>kY..2...
00040 0AE14AA0 6000FD20 B165B16A F900B167 B1764770 -.....-9.....
00050 0AE14AB0 B064D501 70026002 4770B064 92E85000 ..N...-.....kY&
00060 0AE14AC0 47F0B064 58D0B0F0 98EC00C 07FE50A0 .0...|.0q.)...&
00070 0AE14AD0 B16CD501 6002B170 4780B0AC 4180000C .%N.-.....
00080 0AE14AE0 4190B134 D5019000 60024780 B09A4190 ....N...-.....
00090 0AE14AF0 90044680 B08447F0 B0ACD501 90026004 ....d.0..N...-
000A0 0AE14B00 4770B0A8 92E84000 47F0B0E6 F221B165 ..yky ..0.W2...
000B0 0AE14B10 6000FD20 B165B177 F900B167 B1764780 -.....9.....
000C0 0AE14B20 B0D4D501 6004B172 4770B0E6 92E84000 .MN.-.....WkY .
000D0 0AE14B30 47F0B0E6 D5016004 B1744770 B0E692E8 .0.WN.-.....WkY
000E0 0AE14B40 400047F0 B0E658A0 B16C07FA 00000000 ..0.W...%.....
000F0 0AE14B50 00030018 00000000 00000000 00000000 .....
00100 0AE14B60 00000000 00000000 00000000 00000000 .....
      LINES 0AE14B70-0AE14B80 SAME AS ABOVE
00130 0AE14B90 00000000 F0F1F3F1 F0F2F2F8 F0F3F3F1 ...013102280331
00140 0AE14BA0 F0F4F3F0 F0F5F3F1 F0F6F3F0 F0F7F3F1 0430053106300731
00150 0AE14BB0 F0F8F3F1 F0F9F3F0 F1F0F3F1 F1F1F3F0 0831093010311130
00160 0AE14BC0 F1F2F3F1 E800019F 00000C00 8AE14A98 1231Y.....0q
00170 0AE14BD0 F0F2F2F8 F2F90C4C 022829.<

```

## Program Listing Section

Available only with XLS. The Program Listing Section displays the program source code and identifies the *current statement*. The current statement in the program in error is either the actual statement in error or the last call. The current statement in any program other than the program in error indicates the last known call in that program.

Figure 12-25. Program Listing Section with COBOL XLS

```

*****
*           Program Listing Section - PAYROLLX           *
*****

000100      READ-A-RECORD.
000101          READ TIMECARD INTO WS-TIMECARD-REC
000102          AT END GO TO END-OF-JOB.
000103          MOVE WS-TIMECARD-REC TO MASTER-RECORD.
000104          ADD 1 TO WS-RECORD-CTR.
000105          IF TCR-EMP-NO > WS-EMP-NO
000106              MOVE TCR-EMP-NO TO WS-EMP-NO
000107          ELSE
000108              DISPLAY 'EMPLOYEE# SEQ ERROR ',
000109                  TCR-EMP-NO,
000110                  SPACE,
000111                  WS-EMP-NO UPON SYSOUT,
000112                  GO TO READ-A-RECORD.
000113          MOVE TCR-EMP-NO TO RPT-EMP-NO.
000114          MOVE TCR-EMP-NAME TO RPT-EMP-NAME.
CURR STMT ==>  SUBTRACT TCR-TOTAL-TAXES FROM TCR-GROSS-PAY
000116              GIVING WS-NET-PAY
000117          MOVE TCR-GROSS-PAY TO RPT-GROSS-PAY.
000118          MOVE TCR-TOTAL-TAXES TO RPT-TOT-TAXES.
000119          MOVE WS-NET-PAY TO RPT-NET-PAY.
000120          ADD WS-NET-PAY TO WS-TOTAL-NET-PAY.

```

Figure 12-26. Program Listing Section with PL/I XLS

```

*****
*           Program Listing Section - PAYROLL           *
*****

000059      CALC_HOURS: PROC;
000060          DCL      TOTAL_HOURS STATIC FIXED DEC(5);
000061          REGULAR_TOTAL.EMP_NUMBER = OVERTIME_TOTAL.EMP_NUMBER =
          EMPLOYEE_NUMBER_REMOTE_LOCATION;
000062          REGULAR_TOTAL.ACCRUED_HOURS = REGULAR_TOTAL.ACCRUED_HOURS +
          REGULAR_HOURS_WEEKLY;
000063          OVERTIME_TOTAL.ACCRUED_HOURS = OVERTIME_TOTAL.ACCRUED_HOURS +
          OVERTIME_HOURS_WEEKLY;
000064          TOTAL_HOURS = OVERTIME_TOTAL.ACCRUED_HOURS +
          REGULAR_TOTAL.ACCRUED_HOURS;
CURR STMT ==>  AVG_HOURS = TOTAL_HOURS / MONTH_CODE;
000066          SORT_EMPL = MONTH || EMPLOYEE_NUMBER_REMOTE_LOCATION;
000067          END CALC_HOURS;

```

Figure 12-27. Program Listing Section with Assembler XLS

```

*****
*                               Program Listing Section - CWAADATE                               *
*****

  Stmt  Loc  Object Code          Source Statement
  42                               * Calculate years-of-service
  43                               * by subtracting employee year
  44                               * of hire from the current
  45                               * year.
  46                               *****
  47                               CALC_ANNIVERSARY EQU *
  48                               * Uncomment following line before rolling
  49                               * this program into production!
  50                               *       ZAP  XYEARS,=P'3'
  51 00003C F221 B165 6000          PACK  PACKED_YEAR,RUN_YEAR
CURR => 000042 FD20 B165 B16A          DP   PACKED_YEAR,XYEARS
  53 000048 F900 B167 B176          CP   PACKED_YEAR+2(1),=P'0'
  54 00004E 4770 B064              BNE  EXIT
  55 000052 D501 7002 6002          CLC  HIRE_MONTH,RUN_MONTH
  56 000058 4770 B064              BNE  EXIT
  57 00005C 92E8 5000              MVI  ANNIV_IND,C'Y'
  58 000060 47F0 B064              B    EXIT
  60                               *****
  61                               * Exit *****
  62                               *****

```

## File Section

The File section is a standard section that provides information for every file open at the time of the error. This section identifies:

- Data Management Control Block information
- DDNAME and dataset name
- File statistics
- Current and previous record information, when available
- Other information that is based on the type of file access method used.

## File-AID Access

From the File section you can directly access a dataset through File-AID/MVS. Edit and Browse commands in the report take you into File-AID edit and browse modes within the dataset you've selected. A current version of File-AID/MVS must be available on the operating system.

The figure below shows a sample screen from which you access File-AID/MVS.

Figure 12-28. File Summary Selection List

```

COMPUWARE/VF  FILE SUMMARY SELECTION LIST  -----  ROW 1 TO 8 OF 8
COMMAND INPUT ==>                               SCROLL ==> PAGE

  S - view file control blocks  E - File-AID Edit  B - File-AID Browse
                               (except JES spooled datasets)

  DDNAME  DEVICE UNIT VOLSER DISP AMTYPE  EXCPS  -----  DCB INFORMATION  ---
  OUTLIST JES2 spooled                QSAM   81      (DSORG=PS,RECFM=FBA,
  MASTER  3380  3AB  CWX018 NEW  QSAM   0      LRECL=133,BLKSIZE=13300)
                               (DSORG=PS,RECFM=FBA,
                               LRECL=80,BLKSIZE=3200)
  S TIMECARD
  SYSUT1  3380  2C9  SMS801 SHR  VSAM   1
  SYSUT1  3380  2C9  SMS801 SHR  VSAM   4
  SYSUT1  3380  2C9  SMS801 SHR  BDAM   4      (DOSORG=DA,RECFM=F,
                               LRECL=121,BLKSIZE=12100)
*****  BOTTOM OF DATA  *****

```











Figure 12-34. COBOL Data Locator Summary

```

COMPUWARE/VF -----
COMMAND INPUT ==> _                               SCROLL ==> CSR
                                                    Formatting has completed
'PFHWFB0.DUMP.DDIO'   REPT.71 PFHWFBV2 J06619
Program: MLECOB       Compile Date: 07 JAN 2000   YEARWINDOW(1971)

'@' in column   36 denotes field with Data Locator PICTURE match.
'!' in column   36 denotes field with Data Locator DATE   match.
'#' in column   36 denotes field contains data not matching PICTURE clause.

Language Processor Interface Release   = 08.00.00
Language Processor Post Processor Release = 08.00.00

Working-Storage Section

Level/Field Name          Picture/Type Offs          Value
-----+-----1-----+-----2
77 CURRENT-YEAR           # 99                      SPACES
77 DAT-DATA-MATCH         ! 9(5)                   99366
77 DUE-YEAR               99                      05
77 END-YEAR               DATE FORMAT   YY          YEAR(2005)  2005
77 EXP-CUST-DATE          DATE FORMAT   YYYY        YEAR(2005)
77 EXP-CUST-DATE          DATE FORMAT   @ 9(8)      19580430
01 BASE-DATE              DATE FORMAT   YYYYXXXX   YEAR(1958)  580430
02 BASE-YEAR              9(2)
02 BASE-MONTH             9(2)
02 BASE-DAY               9(2)

```

## Abend-AID for WebSphere MQ Section

Displays either WebSphere MQ batch or WebSphere MQ IMS information created by Abend-AID for WebSphere MQ.

Figure 12-35. WebSphere MQ Selection List

```

COMPUWARE/VF ----- WebSphere MQ Selection List----- Row 1 to 2 of 2
COMMAND INPUT ==>                               SCROLL ==> PAGE

S - view WebSphere MQ Information

Name      Description
MQBatch   WebSphere MQ batch information
MQIMS     WebSphere MQ IMS information
***** Bottom of data *****

```

For more information about Abend-AID for WebSphere MQ, refer to the *Abend-AID for WebSphere MQ Installation and Product Description Manual*.

## LE Section

Abend-AID collects and interprets the runtime options from LE's options control block. This information is available from Abend-AID's Language Environment Selection List.

**Figure 12-36.** LE information identifying LE run-time options (OCB)

```

*****
* OS/390 V2R8 LE      Options in effect at time of error      *
*****

OPTION
TABLE in Module      Loaded From
-----
CEEDOPT   CEEBINIT   CEE.SCEERUN

OPTION                                           SET FROM
-----
ABPERC(NONE)                                   CEEDOPT
ABTERMENC(ABEND)                               INVOCATION (JCL,PARMS ETC)
NOAIXBLD                                       CEEDOPT
ALL31(OFF)                                     CEEDOPT
ANYHEAP(16384,8192,ANYWHERE,FREE)             CEEDOPT
NOAUTOTASK                                     CEEDOPT
BELOWHEAP(8192,4096,FREE)                     CEEDOPT
CBLOPTS(ON)                                   CEEDOPT
CBLPSHPOP(ON)                                 CEEDOPT
CBLQDA(ON)                                    CEEDOPT
CHECK(ON)                                     CEEDOPT
COUNTRY(US)                                  CEEDOPT
DEBUG                                         CEEDOPT
DEPTHCONDLMT(10)                             CEEDOPT
ENVAR("")                                     CEEDOPT
ERRCOUNT(20)                                CEEDOPT
ERRUNIT(6)                                    CEEDOPT
FILEHIST)                                     CEEDOPT

```

## LE Control Blocks

Abend-AID displays significant control blocks from the LE runtime environment. As an example, Figure 12-37 on page 12-27 shows the Common Anchor Area.

Figure 12-37. LE Section – Common Anchor Area

```

                                Significant Fields in CEECAA Control Block

CEECAA: 00019A38
+0002B0 CEECAALEVEL          LE/370 level indicator
+0002D8 CEECAAERR            A(Current CIB)
+0002E0 CEECAADDSA          A(Dummy DSA)
+0002F0 CEECAAEDB           A(EDB)
+0002F4 CEECAAPCB           A(PCB)
+000350 CEECAARCB           A(RCB)

*****
* Dump of CEECAA - Common Anchor Area                               *
* Each thread is represented by a CAA                               *
*****

DSPL Address  ----- Data -----
0000 00019A38 00000800 00000000 0002A000 00000000 .....

00010 00019A48 00000000 00000000 00000000 00000000 .....
          LINES 00019A58-00019A98 SAME AS ABOVE
DSPL Address  ----- Data -----

00070 00019AA8 00000000 80016690 00000000 00000000 .....
00080 00019AB8 00000000 00000000 00000000 00000000 .....
          LINES 00019AC8-00019B48 SAME AS ABOVE
00120 00019B58 100125E0 00000000 00000000 00000000 ...\.
00130 00019B68 00000000 00000000 00000000 00000000 .....
          LINES 00019B78-00019BB8 SAME AS ABOVE
00190 00019BC8 00000000 00000000 50C0D064 05C058C0 .....&{)..{
001A0 00019BD8 C00605CC 000121AE 0700C198 0700C198 {...Aq..Aq
001B0 00019BE8 0700C198 0700C198 0700C198 0700C198 ..Aq..Aq..Aq..Aq
          LINES 00019BF8-00019C18 SAME AS ABOVE
001F0 00019C28 00000000 00000000 00000000 00000000 .....
          LINES 00019C38-00019C78 SAME AS ABOVE
00250 00019C88 00000000 00000000 00000000 10011F30 .....

00260 00019C98 00000000 00000000 80013888 80013578 .....h...
00270 00019CA8 00000000 00000000 00000000 00000000 .....
          LINES 00019CB8-00019CC8 SAME AS ABOVE
002A0 00019CD8 00000000 00000000 00000000 03030290 .....
DSPL Address  ----- Data -----

002B0 00019CE8 09000000 00015F28 0001F038 00015E38 .....~..0...;.
002C0 00019CF8 00028000 00000000 00028018 100C4F9E .....|.
002D0 00019D08 84000FCA 00000000 10013AE8 00015BB8 d.....Y..$.
002E0 00019D18 0001A2E0 00000000 00000000 00000000 ..s\.....
002F0 00019D28 000189C8 00018558 00019A20 00019A38 ..iH.e.....
00300 00019D38 00015AD0 00000000 00000000 00000000 ..!}.....
00310 00019D48 00000000 00000000 00000000 00016018 .....~.
00320 00019D58 00000000 00000000 00000000 00000000 .....
00330 00019D68 00000000 00000000 00000000 80000000 .....
00340 00019D78 00000000 00000000 00000000 00000000 .....
00350 00019D88 00017918 00000000 0001A380 00000000 ..^.....t.....
00360 00019D98 00000000 00000000 00000000 00000000 .....
          LINES 00019DA8-00019DB8 SAME AS ABOVE
00390 00019DC8 00019DCC 00000001 00000000 F8000000 .....8...
003A0 00019DD8 84000000 0000000D 84000FCA 00000000 d.....d.....
003B0 00019DE8 0000DD80 00000000 10051490 00000000 .....
003C0 00019DF8 00000000 00000000 00000000 00000000 .....
***** Bottom of data *****

```

## LE Heap Storage

Abend-AID validates and analyzes LE Heap Storage. If damage to the heap storage structure is detected, Abend-AID provides diagnostic information to assist in problem determination and resolution. This includes valuable storage displays to help determine the cause of the original error.

Figure 12-38 on page 12-28 shows the LE Heap Storage Report section when damage to the heap storage structure is detected.

Figure 12-38. LE Section – Heap Storage – with errors

```

LE Heap Storage

User Heap:

Initial size..... 32768
Increment size..... 32768
Number of segments allocated..... 1

*****
*   Heap Header for Segment at 1011A000:   *
*****
Heap ID..... 0
Segment address..... 1011A000
Segment length..... 32768
Root address (largest free element).... 1011A038
Root length..... 32712

Allocation Map for Segment at 1011A000:

Element Addr   Data Addr   Data Len   Status
-----
1011A020      1011A028         16   Alloc
1011A038      1011A048      32696   Free   ** Error

** ERROR:

Left pointer in free element header at 1011A038 is invalid.

Possible causes:

The header of the free element may have been overlaid,
located at 1011A020. The element is large enough to
hold 00000016 (X'00000010') bytes of user data.

The allocated storage begins at 1011A028 and contains:
DSPL Address   Data
00000 1011A028  F1F2F3F4 F5F6F7F8 F9F0F1F2 F3F4F5F6 1234567890123456

The content of the damaged free element header at 1011A038,
and surrounding data is:
DSPL Address   Data
00000 10119FF8  00000000 00000000 C8C1D5C3 00017E60 .....HANC..=-
00010 1011A008  00017E60 00000000 1011A000 1011A038 ..=-.....
00020 1011A018  00008000 00007FC8 1011A000 00000018 .....H.....
00030 1011A028  F1F2F3F4 F5F6F7F8 F9F0F1F2 F3F4F5F6 1234567890123456
00040 1011A038  F7000000 00000000 00000000 00000000 7.....

DSPL Address   Data
000050 1011A048  00000000 00000000 00000000 00000000 .....
          LINES 1011A058-1011A068 SAME AS ABOVE
00080 1011A078  00000000 00000000 00000000 00000000 .....

User Action:

Review storage allocations and use in the application.

Summary of Analysis for Segment at 1011A000:

Number of allocated elements..... 1
User storage allocated (in bytes)..... 16
Number of free elements..... 1
User storage available (in bytes)..... 32696
Number of errors..... 1

Heap storage validation complete -- 001 error detected.
***** Bottom of Data *****

```

Figure 12-39 shows the LE Heap Storage Report section when no errors were detected in Heap Storage.

Figure 12-39. LE Section – no errors

```

                                LE Heap Storage

User Heap:
Initial size.....                32768
Increment size.....              32768
Number of segments allocated..... 1

*****
*                               Heap Header for Segment at 1011A000:                               *
*****
Heap ID.....                      0
Segment address.....              1011A000
Segment length.....               32768
Root address (largest free element)..... 1011A000
Root length.....                  32664

Allocation Map for Segment at 1011A000:

Element Addr      Data Addr      Data Len      Status
-----
1011A020          1011A028          16          Alloc
1011A038          1011A040           8          Alloc
1011A068          1011A078         32648         Free
1011A048          1011A050           8          Free
1011A050          1011A058          16          Alloc

Summary of Analysis for Segment at 1011A000:

Number of allocated elements..... 3
User storage allocated (in bytes)..... 40
Number of free elements.....       2
User storage available (in bytes)..... 32656

Heap storage validation complete -- no errors detected.

```

## Runtime Library Services (RTLS)

Figure 12-40. LE Section – RTLS Information

```

COMPUWARE/VF ----- Row 1 to 2 of 2
COMMAND INPUT ==>                                SCROLL ==> PAGE

'AA.R950.ENHINT.RPTFILE' REPT.65 AA950000 J23104

          RTLS - ON / ACTIVE LIBRARY - SCEERUN VERSION - CURRENT

***** Bottom of data *****

```

Abend-AID identifies the RTLS library name and version in use at the time of the error (Figure 12-40).

## Epilog Section

The Epilog section, at the end of a report, summarizes Abend-AID's action.

- How the report was printed, if applicable:
  - From batch (as a SYSOUT of your JOB)
  - From an Abend-AID report dataset, identifying name and number.
- The vertical and horizontal hexadecimal translation tables.
- Whether a system dump was printed or suppressed.
- The following warning messages when applicable:

The IBM COBOL Load List for this application appears to be corrupted.

The system save area chain for this application appears to be broken.

The COBOL environment appears to be corrupted.

Working Storage Display was suppressed for one or more CSECTs by CSECTBYP.

CWINCLUDE processing was suppressed because the CWINCLUDE table is incompatible with this release of Abend-AID. Contact your Abend-AID installer to run JCLINCLD.

## Report Routing Information

- Abend-AID's memory utilization statistics. Note that the Above, Below, and Total figures refer to the largest amount ever in use for each category. The amounts shown in the Total lines will tend to, but not necessarily, agree with the totals of the Above and Below detail lines.
- How Abend-AID was called.

Figure 12-41. Epilog Section

```

*****
* This software is confidential and proprietary *
* to Compuware Corporation. No use or disclosure *
* is permitted other than as expressly set forth *
* by written license with Compuware Corporation. *
*-----*
* Report printed from Abend-AID batch *
* Default table used to translate vertical hex *
* Default table used to translate horizontal hex *
*-----*
* No dump was requested by installations table *
* Table CWTABS01 loaded from JOB/STEPLIB+ 001 *
* The ID of the suppressed dump is 000 *
*-----*
* Report Routing Information - overrides listed *
* in order of precedence, highest first: *
* *
* >Requested via //ABNLTERM DD: *
* SYSOUT *
* *
* >Requested via CROUTE site default: *
* AA.PROD.RPTSHDIR *
* *
* CROUTE was loaded from STEPLIB library: *
* COMPWARE.CUST.LOAD *
* It was link edited on 26 JUL 2002 and is *
* 00000170 bytes long *
*-----*
* Maximum Abend-AID Memory Utilization (bytes): *
* Above 16M - LOAD: 88.36K GETMAIN: 58.08K *
* Below 16M - LOAD: 60.58K GETMAIN: 46.88K *
* Above 16M - Total: 143.56K *
* Below 16M - Total: 107.46K *
*-----*
* Abend-AID gained control through LEAID *
*****

```

Figure 12-42. Epilog Section with Warning

```
*** WARNING ***  
This Abend-AID report may be incomplete for the following reason(s):  
- CWINCLUD processing was suppressed because the CWINCLUD table  
  is incompatible with this release of Abend-AID. Contact your  
  Abend-AID installer to run JCLINCLD.  
  
*****  
*      Report printed from Abend-AID batch      *  
* Default table used to translate vertical hex  *  
* Default table used to translate horizontal hex *  
*-----*  
*      Dump requested due to Warning Message      *  
*****
```



## Chapter 13.

# Understanding the Compuware/VF Interface

This chapter summarizes the use of Abend-AID screens, field by field.

**Note:** When viewing an Abend-AID report via Compuware/VF, use a Compuware Shared Services (CSS) release that is the same as or more current than the CSS release that was used to write the report or listing. Using a older CSS release for viewing may cause unpredictable results.

---

## Compuware/VF Screens

Use the Compuware Viewing Facility (Compuware/VF) screens to interactively view Abend-AID reports and Compuware source listings in an ISPF/PDF-like environment.

### Entry Panel

Figure 13-1 shows the Compuware/VF Entry Panel, which you obtain when you access Abend-AID. Here you specify the datasets you want to use for XLS or base language support. For datasets on remote MVS images, you also specify the Abend-AID server identifications that you need for distributed viewing. You can also set processing conditions.

**Figure 13-1.** Entry Panel

```

COMPUWARE/VF ENTRY PANEL ----- COPYRIGHT COMPUWARE CORPORATION 1976, 2003.
Command ==>
Dataset choice . 0          (Select 0 - 8, from below, or C for Contact Data)
Member . . . . .          (MVS:jobname, SOURCE:program, or member*)
                          (Use the LNAME command to enter a Long Program Name)

                          Remote
Abend-AID Shared Directory or Report Dataset:      Volume Server
0 'AA.REPORTS'

Source Directory or Listing Datasets:
1 'AA.LISTING'
2
3
4
5
6
7
8

Processing options:
Confirm delete . . YES      (Yes or no)
Show print setup . YES      (Yes or no)
Show source warning YES      (Yes or no, used only for Abend-AID)
Language . . . . . ENGLISH
Local Server SSID .          (Required for Viewing Remote DDIO files)

Source browsing options:
Unit . . . . . VIO
Blocking . . . 10

```

The following sections discuss possible ways to complete each field on the Entry Panel. Your input is saved for future sessions.

#### Command Prompt

Enter one of the following:

- Valid TSO command
- CSSUTIL command to invoke CSS Utilities
- LNAME command to enter a long program name or wildcard names to be used for member search. See Member description below.

**Note:** Refer to the *Compuware Shared Services User/Reference Guide* for a complete description of the CSS Utilities.

### Dataset Choice

Enter the number corresponding to a report dataset or source listing dataset listed in the Abend-AID Shared Directory or Report File or Source Directory or Listing Files section of this screen. Or enter C for contact information

Enter one of the following based on the type of output you desire:

- To view an Abend-AID error analysis merged report and source information, enter 0 in the Dataset choice field.
- To view only a Source Listing, enter 1 through 8 in the Dataset choice field.
- To view only a Source Listing stored in a dataset not currently available in the list, enter a number that is not currently being used (for example, in Figure 13-1 on page 13-1 numbers 2 through 8 are not used). When you enter a number not currently being used, you must also enter the source listing dataset name to the right of the corresponding number in the list.

#### Notes:

1. If a dataset number is not specified, 0 will be used.
  2. When you press Enter after completing the remaining fields on the Compuware/VF Entry Panel, the Dataset Directory screen is displayed. For a description of this screen, see "Dataset Directory" on page 13-4.
- To display contact information, enter C in the Dataset choice field.

The Contact Information feature allows you to associate contact information (for example, the phone number and e-mail address of the off-duty systems programmer) with a particular job name. If a job abends, users may search the contact information list to determine whom to inform about the abend.

### Member

Specify the member name or group of member names of the file selected via your entry in the Dataset Choice field. Enter one of the following:

<b>blank</b>	Lists all members of the dataset choice above.
<b>job name or program name</b>	Lists all members in the file associated with the job name (for Abend-AID reports) or program name (for source listings).
<b>Member*</b>	Lists all members in the file with the job or program names beginning with the characters specified before the wildcard character '*'.  To enter a program name or wildcard longer than eight characters, you must use the LNAME command <b>instead</b> . The LNAME command is described in "Command Prompt" on page 13-1.

### Abend-AID Shared Directory or Report File

To work with Abend-AID reports, enter the name of the Abend-AID report shared directory, report database, or report file. The dataset entered in this field (corresponding to Dataset choice 0) is the primary dataset. If the high-level qualifier of the dataset name is your TSO ID (prefix), begin with the next qualifier. Otherwise, enclose the dataset name in single quotation marks.

If you do not use Abend-AID, you may specify a source listing file in this entry (the 0 entry).

### **Source Directory or Listing Files**

Enter the names of one or more source listing shared directories, source listing databases, or listing files containing the output of the Compuware COBOL, PL/I, Assembler, or C language processor. If the high-level qualifier of the dataset names is your TSO ID (prefix), begin with the next qualifier. Otherwise, enclose the dataset names in single quotation marks.

This area lists up to eight source listing datasets on lines 1 - 8. To view one of the listed datasets, the line number appearing to the left of the dataset name must be entered in the Dataset choice field.

The number on the line determines the order in which the datasets are searched when merging source information with an Abend-AID report. Blank lines can occur anywhere in the list.

### **Volume**

If the report or source listing dataset is not cataloged, or the catalog is not available, enter the serial number of the DASD volume containing the dataset.

### **Remote Server**

If a dataset is located on a remote MVS system, identify the Abend-AID server on that system. Both the local and remote Abend-AID servers must be configured to use Compuware Base Services and HCI, which is required to support Distributed Viewing Support.

**Note:** Not currently available for source listing databases or shared directories.

### ***Processing Options***

Use these options to determine the format of the output, and to display or suppress certain information.

#### **Confirm delete**

Enter **YES** to display a Confirm Delete screen before deleting a report or source listing.

#### **Show print setup**

Enter **YES** to display and update print options prior to printing reports or source listings. Refer to "Hardcopy Options" on page 13-8 for additional information.

#### **Show source warning**

Enter **YES** to display a warning screen when the compile date and time of the program in the Abend-AID report does not match a source listing in the source listing dataset. Refer to "COBOL Mismatched Date and Time" on page 2-14 for additional information.

### **Language**

The default is mixed-case English. Enter **USAUC** for uppercase English if your terminal does not support mixed case. Enter **JAPANESE** for terminals that support DBCS.

### **Local Server SSID**

If you are accessing a dataset on a remote MVS system, identify the Abend-AID server of the local system. Both the local and remote Abend-AID servers must be configured for distributed viewing.

### ***Source browsing options***

These options create a temporary file that is used when browsing a source listing.

**Unit**

Enter the type of device where the temporary file is to be allocated when browsing a source listing. Recommended entries are **VIO** (if site-supported) or **SYSDA**.

**Blocking**

Enter the number of records in each block of the temporary file. A larger number may improve response time. If you want Abend-AID to calculate the most efficient blocking for you, enter **9999**. Abend-AID sets the blocking after you view a source listing.

## Alternate Logon

If you entered specifications at the Entry Panel for access to a remote MVS system, the Compuware Viewing Facility displays the Alternate Logon screen. Here you log on to the Abend-AID server on that system.

**Figure 13-2.** Alternate Logon

```

----- COMPUWARE/VF ALTERNATE LOGON -----
Command ==>

Logon attempt to AASRV01 requires a USERID/PASSWORD. Please
supply an alternate userid/password to complete access requirement
for DDIO file: AA.R950.CXR800.RPTFILE

Alternate USERID: PFHAJF0    <== USERID on remote system
PASSWORD:

```

**Alternate USERID, PASSWORD**

Enter your ID and password to access the remote Abend-AID server.

## Dataset Directory

The dataset directories show the members in the datasets specified in the Report dataset and Source dataset fields of the Compuware/VF Entry Panel.

### Abend-AID Dataset Directory

The Abend-AID Dataset Directory screen displays the list of members in the file specified in the Report dataset field of the Entry Panel. The Abend-AID Dataset Directory screen for a report shared directory is shown in Figure 13-3 on page 13-5. By default, the members are listed in date and time order on the Entry Panel.

Figure 13-3. Abend-AID Dataset Directory

```

COMPUWARE/VF ---- 'ABENDAID.REPORT.FILE'----- ROW 1 OF 52
COMMAND INPUT ==>                                SCROLL ==> PAGE

                ABEND-AID DATASET DIRECTORY

      S - View C - Contact Info D - Delete P - Print L - Lock U - Unlock

JOBNAME  REPT NUMBER JESID  CODE   DATE      TIME    DESC      SIZE(K)
TSS070CS      71 J08263 SOC7   05 MAR 2003 17.50.22 CLAYTON D   31
TSS070CS (L)  70 J07553 U1035 05 MAR 2003 16.45.18 DONNA C    15
TSM050TS      68 J09691 U0240 02 MAR 2003  9.11.49 WOODS      15
TSM050TS (L)  67 J09465 SOC2   02 MAR 2003  8.51.20 T WOODS    15
TSM030SN      66 J05446 SNAP   01 MAR 2003 16.33.07 T SMITH    15
TSM020TX      65 J00942 SOC1   01 MAR 2003  9.31.15 GARY K     15
TSM050TS      64 J00406 U1020 01 MAR 2003  8.42.12 WOODS TINA  15
TSM050TS      63 J07030 SOC7   10 FEB 2003 16.54.14 KAYLOR G  31
TSM050TS (L)  62 J06927 SOCB   10 FEB 2003 16.46.36 WOODS T    31
TSM030LP      61 J05611 SOC7   10 FEB 2003 14.50.09 T SMITH    15
TSM050X1 (M)  58 J08064 SD37   08 FEB 2003 11.29.39 TINA WOODS 15
TSS070CS      57 J08885 SOC7   05 FEB 2003 16.53.20 DONNA C    31
TSA060RI      55 J00512 U2222 03 FEB 2003 13.54.07 RANDY S   31
TSA060RO      52 J08065 SOC7   02 FEB 2003 17.36.52 SMITH R    31
TSM020ST      51 J03476 SOCF   02 FEB 2003 10.19.17 KAYLOR G   15
TSA060ORA     50 J09305 U2222 01 FEB 2003 15.41.46 RANDY S   31
TSA080PR      46 J05500 SOC7   01 FEB 2003  9.19.48 HEIDI M    15

```

Each report dataset directory entry contains the following:

#### JOBNAME

The job name.

#### REPT NUMBER

The number assigned by Abend-AID to identify the report. The following status indicators also appear if applicable:

- (L): Report is automatically locked.
- (M): Report is manually locked.
- \*I: Report is incomplete.
- \*IL: Report is incomplete and automatically locked.
- \*IM: Report is incomplete and manually locked.

#### JESID

The job number assigned by the job entry subsystem (JES).

#### CODE

The system or user abnormal termination code, or *SNAP* for a SNAP-AID report, or the PL/I on-code.

#### DATE

The date on which the error occurred or the date of the SNAP-AID report.

#### TIME

The time at which the Abend-AID or SNAP-AID report was created.

#### DESC

By default, the first ten characters of the PROGRAMMER NAME field of the job statement. When using Abend-AID user exit CWEXIT02 or when calling Snap-AID, you can override this value.

#### SIZE

The number of bytes allocated for the report in the report dataset.

## Source Listing Dataset Directory

The Abend-AID Source Listing Dataset Directory screen displays all source listings in a specified source listing dataset.

**Figure 13-4.** Source Listing Dataset Directory

```

COMPUWARE/VF -- Source Listing File Member List ----- Row 1 to 14 of 67
COMMAND INPUT ==>                                     SCROLL ==> PAGE
Source DDIO File: AA.R950.ENHINT.LSTFILE

SELECT S - Select  P - Print  D - Delete  L - Lock  U - Unlock  I - Info
CODE  PROGRAM      LIST NUMBER  COMP DATE  TIME        RC  LANGUAGE  SIZE(K)
-----
_____ ABNDIMM (L)      67          31 MAY 2003 13:08:27  04  COBOL/390M  48
_____ ABNDIMM      66          31 MAY 2003 13:06:57  04  COBOL/390M  48
_____ ABEND476 (L)      65          30 MAY 2003 16:06:38  04  COBOL/MVSM  80
_____ TEST4002 (L)      64          30 MAY 2003 15:35:29  04  COBIIIR4    32
_____ TESTSRTA (L)      63          30 MAY 2003 15:35:13  04  COBIIIR4    64
_____ TEST40LE (L)      62          30 MAY 2003 14:16:29  04  COBOL/MVSM  48
_____ IMSSRTLE (L)      61          30 MAY 2003 14:16:20  04  COBOL/MVSM  48
_____ TEST400B (L)      60          30 MAY 2003 14:14:24  04  COBOL/390M  48
_____ TESTSRTB (L)      59          30 MAY 2003 14:14:08  04  COBOL/390M  80
_____ CWAASUBC (L)      58          30 MAY 2003 13:51:30  00  COBOL/370   32
_____ CWAASHOUR (L)     57          30 MAY 2003 13:51:15  00  COBOL/370   32
_____ CWAADATE (L)     56          30 MAY 2003 13:51:00  00  COBOL/370   32
_____ CWAACOB (L)     55          30 MAY 2003 13:50:43  00  COBOL/370  112
_____ CWAASUBC      54          30 MAY 2003 13:49:10  00  COBOL/370   32

```

Each source listing directory entry displays the following information:

### PROGRAM

The program name.

### LIST NUMBER

The number assigned by the Compuware language processor to identify the source listing. The following status indicators also appear if applicable:

- (L): Source listing is automatically locked.
- (M): Source listing is manually locked.
- \*I: Source listing is incomplete.
- \*IL: Source listing is incomplete and automatically locked.
- \*IM: Source listing is incomplete and manually locked.

### COMP DATE

The date the program was compiled.

### TIME

The time the program was compiled.

### RC

The Compuware language processor return code.

### LANGUAGE

The program language.

### SIZE

The number of bytes allocated for the source listing in the source listing dataset.

## Primary Commands

In addition to the standard scrolling commands, you can enter the following commands in the COMMAND INPUT area on the Dataset Directory screens:

### LOCATE (L) *jobname*

Positions the matched job name as the first entry on the Abend-AID Dataset Directory screen. The asterisk (\*) wildcard character is valid.

### LOCATE (L) *program*

Positions the matched program name as the first entry on the Source Listing Dataset Directory screen. The asterisk (\*) wildcard character is valid.

### NEXT (N) *nnnn*

Scrolls forward to the job or program name specified in the previous LOCATE command, where *nnnn* is the next nth match to be located. The nnn default value is 1.

### SORT

Sorts the directory list by the specified sort key. Sort-key can be any column except TIME. By default, the directory is displayed in descending order by REPT NUMBER for Abend-AID reports and LIST NUMBER for source listings.

- JOBNAME (JN)
- NUMBER (NUM)
- JESID
- CODE
- DATE
- DESC
- SIZE

Valid sort keys and their abbreviations for the source listing directory are:

- PROGRAM (PGM)
- NUMBER (NUM)
- DATE
- RC
- LANGUAGE (LANG)
- SIZE

## Line Commands

The following line commands are also valid on the Dataset Directory screens. Enter one or more of the following commands to the left of the desired report or source listing directory entries:

- **S:** Selects a report or source listing to be viewed.
- **C:** Accesses a utility for identifying a programmer with a job and how that person may be contacted. Available only for the Abend-AID Dataset Directory.
- **L:** Locks a report or source listing in the file. While locked, it cannot be automatically deleted when the file becomes full. The most current listing is automatically locked.
- **U:** Unlocks a previously locked report or source listing.
- **D:** Deletes a report or source listing from a file.
- **P:** Prints a report or source listing. Presents Hardcopy Options if Show print setup is active on the Entry Panel.
- **I:** Displays additional information showing full name (for longname) and the Source Listing Database/Source Listing Shared Directory name(s) and VOLSER(s). Available only for the Source Listing Dataset Directory.

You can enter multiple line commands, which are executed from top to bottom.

**Notes:**

1. Depending on how the file was formatted, locking of source listings may not be permanent.
2. If you choose to continue without source support or continue with the most recent available source listing, your selection remains in effect until you exit the Abend-AID report or enter the SOURCE command.

## Hardcopy Options

The Compuware/VF Hardcopy Options screen (Figure 13-5), shown with default settings, enables you to change specifications for printing reports and source listings. Obtain this screen by specifying **YES** in the Show print setup field on the Entry Panel and then entering the **P** (Print) line command in the report or source listing directory.

**Figure 13-5.** Compuware/VF Hardcopy Options Screen

```

COMPUWARE/VF HARDCOPY OPTIONS
COMMAND INPUT ==>

Current DDIO file: AA.REPORTS
                  Member: SBL60LN3
Report/List Number: 118

Enter/verify options below:
Line size          ==> NARROW                (NARROW or WIDE)
Page size          ==> 60                   (20 to 99)
Sysout class       ==>                     (class,writer-name,format)
Destination        ==>                     (nodename,userid)

Route              ==> SYSOUT               (SYSOUT or BATCH)
Max number of pages ==>                     (for Route=BATCH)
Unit               ==> SYSDA               (for Route=BATCH)

```

Make the following entries on the Compuware/VF Hardcopy Options screen:

**Current DDIO file**

The file name from which you are printing a member.

**Member**

The member you selected to print.

**Report/List Number**

The report or list number of the member you selected to print.

**Line size**

Specify the width of the printed report or source listing.

<b>NARROW</b>	Default. Prints optional 80-column output.
<b>WIDE</b>	Prints standard 133-column output.

**Page size**

Enter the number of lines per page for printed output.

**Sysout class**

Specify the JES spool class where the output is printed.

**Destination**

Enter the JES destination code where the output is routed.

**Route**

Specify how the report or source listing is to be printed. Enter one of the following:

- |               |  |
|---------------|--|
| <b>SYSOUT</b> | TSO builds a SYSOUT file. Job information is obtained from the security profile attached to your TSO account. Your user ID is used as the JOBNAME. |
| <b>BATCH</b>  | TSO allocates a work file into which the member is copied. A print job is submitted to JES using the default job card from your ISPF0.2 screen.    |

**Max number of pages**

Determine the size of the work file when the BATCH route value is specified.

**Unit**

Enter the device type for the work file when the BATCH route value is specified. It can be any valid physical address, device type, generic name, or VIO. (For example, use 2BF, 3380, SYSDA, or VIO).

## Output Selection Menu

After you select an Abend-AID report for viewing, the Output Selection Menu is displayed. Figure 13-6 shows the Output Selection Menu.

**Figure 13-6.** Output Selection Menu

```

COMPUWARE/VF ----- OUTPUT SELECTION MENU -----
SELECT SECTION ==>

'AA.SHDRRPT' REPT.122 AA950P92 J788317

0 HEADER   System and job information
1 DIAGS    Analysis
2 NSI      Location (next sequential instruction)
3 TRACE    Program flow and program attributes
5 REGS     Register contents and PSWs
6 PROG     Program Storage
7 PLIST    Program Listing
8 FILES    Open files information
9 IMS      IMS information and PCBs
10 IDMS    CA-IDMS information
11 DB2     DB2 information
12 SORT    COBOL sort information
13 DATALOC COBOL Data Locator
14 MQ      Websphere MQ information
15 LE      LE information
20 EPILOG  Abend-AID termination information

Key section number or name and press ENTER.
Or press ENTER to view the diagnostic summary of sections 1 through 5.

```

The menu lists all report sections. All sections will not be applicable to all faults. If you select an inapplicable section, a SECTION NOT FOUND message is displayed.

In the SELECT SECTION field at the top of the screen, enter the section number or the abbreviation for the section name. Alternatively, you can use the cursor point-and-shoot method by pressing the Tab key to position the cursor on a highlighted section identification name, and then pressing the Enter key.

Two new primary commands, SCALE1 or SCALE0, enable you to display vertical-hex storage relative to one or zero, respectively. You can enter these commands on the command line of the Output Selection Menu or on any subsection's command line. The command entered remains in your TSO user's profile and displays vertical-hex storage as specified until you execute the alternative command.

If you select any section number from 0 through 5, all existing sections with numbers 0 through 5 can be viewed. If you select any section number greater than 5, only the selected section can be viewed. You can use standard ISPF scroll commands to scroll within the viewable portion of the Abend-AID report.

To view section 0 through section 5, press the Enter key. The Error Analysis section is displayed. Use scrolling to view other sections. The sections provide the following information:

**0 or Header**

Top of output, including the header information and available help information.

**1 or DIAGS**

Error Analysis information.

**2 or NSI**

Error Location section.

**3 or TRACE**

Call Trace Summary and Application Program Attributes.

**5 or REGS**

Register contents and PSW.

**6 or PROG**

Program storage for each program. If more than one program is present, a selection list is displayed. Enter an **S** next to the program storage to be viewed.

**7 or PLIST**

XLS only. Displays the Procedure Divisions for COBOL programs on the calling chain and source listings for PL/I and Assembler programs on the calling chain with the current statement indicated.

**8 or FILES**

File and current data management control block information. If more than one file is present, a selection list is displayed. Enter one of the commands shown to access a file through Compuware/VF or through File-AID. To display a specific file, enter **FILE(ddname)** in the COMMAND INPUT field.

**9 or IMS**

Abend-AID for IMS information.

**10 or IDMS**

Abend-AID for IDMS information.

**11 or DB2**

Abend-AID for DB2 information.

**12 or SORT**

Current sort record for internal COBOL sorts.

**13 or DATALOC**

Identifies data strings in COBOL programs.

**14 or Abend-AID for WebSphere MQ**

Displays either WebSphere MQ batch or WebSphere MQ IMS information created by Abend-AID for WebSphere MQ.

**15 or LE**

Displays the following LE information:

- LE run-time options at the time of the error
- Indicates how the option was set and from where it was set
- Provides a complete validation and analysis of LE heap storage.

## 20 or EPILOG

Abend-AID termination information.

---

## Source Warnings

You receive one of the notification screens shown below if Abend-AID cannot find a suitable source listing for the report and the site is licensed for XLS.

You activate the notification when you try to view one of the report sections that present source information. All except Figure 13-10 on page 13-13 can also be obtained with the SOURCE MISMATCH command. The warnings are specific to the language being diagnosed, as noted.

Explanations of the screen choices follow the figures.

**Figure 13-7.** COBOL Mismatched Date and Time Warning

```

COMPUWARE/VF -----
COMMAND INPUT ==>

'TSOUSER3.CSS80.QA.REPTFILE' REPT.4 EFHRIPOC J31098

* * * * * W A R N I N G * * * * *
*      Program                Most recent listing      *
* -----*
* Name: COBSAMP                COBSAMP                  *
* Load: COBSAMP                *
* Date: 07 DEC 2002            27 DEC 2002              *
* Time: 11:22:20                08:07:38                *
*
* The program date and time stamp does not match a source listing.*
* * * * *

Type an S next to the desired option and press ENTER.

_ Use the MOST RECENT source listing shown above.
_ Display available source listings.
_ Retrieve a source listing by submitting background JCL.
_ Provide BASIC support without a source listing.

Enter END command to exit.

```

**Figure 13-8. PL/I Mismatched Source Listing Warning**

```

COMPUWARE/VF -----
COMMAND INPUT ==>

'TSOUSER3.CSS80.QA.REPTFILE' REPT.1 EFHRIPOC J20788

* * * * * W A R N I N G * * * * *
*
*      An appropriate source listing could not be found.
*      Either:
*      1. a source listing for program PLIA5 does not
*         exist, or
*      2. a source listing exists, but it does not match
*         the compiler language and release of the program
*         in the Abend-AID report.
* * * * *

Type an S next to the desired option and press ENTER.
_ Retrieve a source listing by submitting background JCL.
_ Provide BASIC support without a source listing.
    
```

**Figure 13-9. Assembler Mismatch Warning**

```

COMPUWARE/VF ----- ROW 1 TO 28 OF 31
COMMAND INPUT ==> SCROLL ==> CSR

CSECT Name: EUR001
Wildcard Mask: *****
Assembled: 16 AUG 2003 Load module: EUR001

The CSECT name and date do not uniquely match a source listing.

_ Retrieve a source listing by submitting background JCL.
_ Provide BASIC support without a source listing.

Type an S next to the correct source listing below and press the ENTER key.
ASSEMBLER SOURCE LISTING DATASET DIRECTORY
PROGRAM LIST NUMBER ASMB DATE TIME RC LANGUAGE SIZE(K)
----- 'EFHAXSO.TEST.DDIO' -----
X80102B (L) 3537 09 NOV 2002 12.20 00 HLASM R4 399
TEMPNAME (L) 3344 10 SEP 2002 13.33 00 HLASM R4 160
TEST1 (L) 3179 22 JUN 2002 11.35 00 HLASM R4 160
VIBAIITF (L) 3046 28 MAR 2002 13.07 00 HLASM R4 559
CWDEMASM (L) 2612 14 JUN 2001 20.08 04 HLASM R3 240
ASM03T (L) 2651 08 JUN 2001 15.47 00 HLASM R3 80
ASMPRG1 (L) 2330 13 MAR 2001 12.14 00 HLASM R3 80
AIBHLP00 (L) 1023 T PAGO N 10.51 00 HLASM R2 719
    
```

**Figure 13-10.** Source-Not-Found Warning

```

COMPUWARE/VF -----
COMMAND INPUT ==>

'EFHRIP0.RPTFILE' REPT.92 EFHRIP0C J20788

* * * * * W A R N I N G * * * * *
*
*      An appropriate source listing could not be found.
*      Either:
*      1. a source listing for program COMP5 does not
*         exist, or
*      2. a source listing exists, but it does not match
*         the compiler language and release of the program
*         in the Abend-AID report.
*
* * * * *

Type an S next to the desired option and press ENTER.
_ Retrieve a source listing by submitting background JCL
_ Provide BASIC support without a source listing

```

From these screens, choose as applicable:

**Use the most recent source listing shown above**

Abend-AID will use the source listing that has a time stamp closest to that of the report.

**Display available source listings**

Abend-AID presents a source listing directory, similar to Figure 13-9, that shows all members in the source datasets specified on the Entry Panel. All directory commands are valid.

**Provide basic support without a source listing**

Opens the specified report section, which will contain no source information.

Retrieve a source listing by submitting background JCL

Presents a dialog box that facilitates the retrieval of the source listing using the Language Processor.

The END command presents the Output Selection menu.



## Chapter 14. Printing & Utilities

### Change Printing Options

Print a report or source listing by entering the P (Print) line command in a Compuware/VF dataset directory. You cannot print from within a report or source listing.

Change printing specifications on the Hardcopy Options screen. Access Hardcopy Options by having Yes specified at the Show print setup field of the Compuware/VF Entry Panel when you enter the Print command.

1. At the Compuware/VF Entry Panel, in the Show print setup field, specify YES.
2. On a Dataset Directory screen, enter P next to the job that you want to print.
3. At the resulting Hardcopy Options screen, change or check the printing specifications as necessary. Press Enter to print. New specifications will remain in effect until changed.

**Figure 14-1.** Compuware/VF Hardcopy Options Screen

```

COMPUWARE/VF HARDCOPY OPTIONS
COMMAND INPUT ==>

Current DDIO file: AA.REPORTS
Member: SBL60LN3
Report/List Number: 118

Enter/verify options below:
Line size          ==> NARROW          (NARROW or WIDE)
Page size          ==> 60              (20 to 99)
Sysout class       ==>                (class,writer-name,format)
Destination        ==>                (nodename,userid)

Route              ==> SYSOUT          (SYSOUT or BATCH)
Max number of pages ==>                (for Route=BATCH)
Unit               ==> SYSDA          (for Route=BATCH)

```

4. You may change or leave as is the specification on the Show print setup field of the Compuware/VF Entry Panel. Continue as usual.

## Utilities

Abend-AID's utilities provide both support and operational capabilities.

Support utilities consist of installation and servicing functions. If you need information about those functions, refer to the utilities chapter of the *Abend-AID Installation and Customization Guide*. The operational utilities are used for report dataset and source listing dataset management as well as to prepare or change the processing for Extended Language Support.

These are the operational utilities:

- The online file management commands of Abend-AID's Compuware/VF are available in the Compuware/VF dataset directories, which are explained in this manual.

- The online Compuware Language Processor management functions of the CSS Utilities enable applications or systems programmers to quickly prepare or modify a Compuware Language Processor operation without manually changing JCL. Access the CSS Utilities on the Abend-AID Primary Menu.
- The batch file management commands of Compuware Shared Services's CWDDSUTL utility provides complete management functions, including a file comparison program.

Refer to the *Compuware Shared Services User/Reference Guide* if you need information about the CSS Utilities or the batch file management utility.

## Appendix A.

# Testing Samples

This table lists sample programs (IVPs) containing faults. The programs may be used in Abend-AID testing and training. They are kept in the Abend-AID installation library (TPAASAMP).

**Note:** Any permanent datasets created by Abend-AID IVPs are allocated using the installer's TSO ID as the high-level qualifier.

In some member names provided below, v represents the DB2 version number and xxxx is the DB2 subsystem ID.

**Table A-1.** Testing Samples

Program name	Tests	Language	Fault/Purpose
\$71ABTST	Base report	Assembler	B37, D37, 0C7, 0C4
\$74ABSPF	Compuware/VF	Assembler	B37, D37, 0C7, 0C4
\$72LECOB	Compuware/VF	COBOL LE	0C7
\$73LEPLI	Compuware/VF	PL/I LE	Oncode 0320
\$75XLSC1	XLS report	COBOL	0C7
\$75XLSC2	XLS report	COBOL	0C7
\$75XLSC3	XLS report	COBOL	0C7
\$75XLSC4	XLS report	COBOL	0C7
\$75XLSP1	XLS report	PL/I	Oncode 0320
\$75XLSP2	XLS report	PL/I	Oncode 0320
\$75XLSP3	XLS report	PL/I	Oncode 0320
\$75XLSPA	XLS report	PL/I	U3020
\$75XLSPB	XLS report	PL/I	U3020
\$75XLSA1	XLS report	Assembler	0C7
\$75XLSA2	XLS report	Assembler	0CB
\$75XLSA3	XLS report	Assembler	U0200
\$75XLSA4	XLS report	Assembler	0C7
\$81vxxxx	DB2	COBOL	DB2, Plan, -302 or -310
\$82vxxxx	DB2	COBOL	DB2, Package, -302 or -310
\$83vxxxx	DB2	COBOL	DB2 V4, Stored Procedures, -407
\$84vxxxx	DB2	COBOL	DB2 V5, Stored Procedures, -407
\$85vxxxx	DB2	COBOL	DB2 V6, Stored Procedures, -407
\$86vxxxx	DB2	COBOL	DB2 V7, Stored Procedures, -407
\$91vxxxx	DB2	PL/I	DB2, Plan, -302 or -310
\$92vxxxx	DB2	PL/I	DB2, Package, -302 or -310
\$93vxxxx	DB2	PL/I	DB2 V4, Stored Procedures, -407
\$94vxxxx	DB2	PL/I	DB2 V5, Stored Procedures, -407
\$95vxxxx	DB2	PL/I	DB2 V6, Stored Procedures, -407
\$96vxxxx	DB2	PL/I	DB2 V7, Stored Procedures, -407
\$52FORTS	DB2	FORTRAN	FORTRAN, FORTRAN in LE
\$42PLI02	DB2	PL/I	U3020



# Glossary

**abend.** ABnormal END of task. The termination of a job, prior to normal completion, caused by an unresolved error condition.

**abend code.** A three-digit, hexadecimal system completion code or a four-digit, decimal user completion code for an abnormal end.

**ACB.** VSAM access method control block.

**ATE.** Language Environment's Abnormal Termination Exit. LEAID is the Abend-AID provided exit.

**Abnormal Termination Exit (ATE).** Language Environment's Abnormal Termination Exit. LEAID is the Abend-AID provided exit.

**basic direct access method (BDAM).** File access method that directly retrieves or updates specified blocks of data on a direct access storage device.

**basic language support.** Abend-AID reports without source information. Compare to extended language support. Abend-AID Release 9.4 and more current require Extended Language Support.

**batch.** Processing in which jobs are grouped (batched). The jobs are executed sequentially, and each job must be processed to completion before the following job can begin execution.

**batch file utility (CWDDSUTL).** A utility used for the preparation of report and source listing files.

**BDAM.** Basic direct access method.

**BL cell.** Base locator cell. Contains the base address used by the computer to reference data within storage. These cells are used by COBOL programs to provide addressability to data within the working storage section of a program.

**BLL cell.** Base linkage locator cell. These cells are used by COBOL programs to provide addressability to data within the linkage section of a program.

**CAA.** Language Environment's Common Anchor Area.

**CA-IDMS.** Computer Associates' Integrated Data Management System that runs on IBM computers and provides a natural language query language.

**CEEDOPT.** Language Environment's default batch option control table.

**CEEROPT.** Language Environment's option control table for IMS regions.

**CEEUOPT.** Language Environment's user option control table.

**CIB.** Language Environment's Condition Information Block.

**CLIST.** Condensed listing of the Procedure Division for a COBOL program.

**COBOL.** Common business-oriented language. A high-level programming language, based on English, that is used primarily for business applications.

**Compuware language processor.** A component that accepts COBOL, PL/I, and Assembler compiler output, builds sort work records, sorts and merges the records, and merges the records with the output listings to produce processor control blocks for use as input to Abend-AID.

**Compuware Shared Services (CSS).** Storage, retrieval, and maintenance capabilities provided for reports and source listings by components shared among mainframe Compuware products.

**Compuware Viewing Facility (Compuware/VF).** A menu-driven, online viewing facility used by Abend-AID.

**Compuware/VF.** Compuware Viewing Facility.

**CSECT.** Control section.

**CSS.** Compuware Shared Services

**CWDDSUTL.** The main program for the batch file utility and Compuware/VF.

**data name.** The name of a data item in the Data Division of a COBOL program.

**DB2.** DATABASE 2. IBM's database management system that provides a relational model of data. DB2 runs as a subsystem of MVS.

**Distributed Viewing Support.** A means of accessing Abend-AID report and source listing files on remote MVS systems that do not share DASD.

**DL/I.** Data language one. IBM's database management facility provided by the IMS/VS database program products.

**DMAP.** Data Division map for a COBOL program.

**DSECT.** Dummy control section. A control section that an assembler can use to format an area of storage without producing any object code.

**dump.** Hexadecimal representation of storage that may contain data useful for diagnosing an error.

**EDB.** Language Environment's Enclave Data Block.

**enhanced compiler listing.** A convenient source of quick reference information and program documentation that merges MAP/DMAP and OFF-SET/CLIST information, in addition to error and diagnostic messages, with a source listing.

**Enterprise Common Components (ECC).** The shared components of mainframe Compuware products, that provide Compuware Shared Services.

**entry-sequenced dataset (ESDS).** VSAM dataset whose records are loaded in sequence. Unlike a normal sequential dataset, ESDS records can be accessed randomly by their addresses.

**ESDS.** Entry-sequenced dataset.

**Extended Language Support (XLS).** An Abend-AID facility that utilizes a language processor and Compuware/VF components to provide source information in the Abend-AID report.

**Heap Segment.** LE heap storage is comprised of one or more segments. A heap segment contains both allocated and free storage elements.

**Heap Storage.** An internal storage structure used by LE storage management services.

**HELP.** Primary command that requests Abend-AID's interactive Help facility.

**HLASM.** High-level Assembler

**IAM.** Innovation Access Method

**IDMS.** See *CA-IDMS*.

**IMS.** Information Management System. IBM's DB and TM database systems capable of managing complex databases and networks.

**ISAM.** Indexed sequential access method.

**JCB.** Journal control block.

**JCL.** Job control language.

**key.** Code used to locate a record and establish its position in an index. The key can be part of a field, a full field, or multiple fields duplicated from the record.

**key-sequenced dataset (KSDS).** VSAM file type whose records are loaded in key sequence. Records are retrieved by key or address using an index. New records are inserted in key sequence by means of distributed free space.

**KSDS.** Key-sequenced dataset.

**Language Environment.** The run-time environment of IBM's z/OS operating system.

**LEAID.** The ATE provided by Abend-AID for Language Environment error handling.

**linkage section.** A section of a COBOL program used to describe data that is passed to it from MVS or another program.

**MCH.** Language Environment's Machine State Information Block.

**Multiple Virtual Storage (MVS).** Actual name is OS/VS2-MVS. Operating system for large IBM mainframe computers.

**MVS.** Multiple virtual storage.

**OCB.** Language Environment's runtime Option Control Block.

**offset.** A relative location or position within a data area.

**operating system.** Software that controls the execution of jobs. It may provide resource allocation and scheduling.

**paragraph.** A set of one or more COBOL sentences, making a logical processing entity, and preceded by a paragraph name or a paragraph header.

**PCB.** Language Environment's Process Control Block.

**PCB.** DL/I Program Communication Block.

**PL/I.** Programming language one. A programming language designed for numeric scientific computations, business data processing, systems programming, and other applications.

**Procedure Division.** The section of a COBOL program that contains executable instructions.

**program communication block (PCB).** A control block used by DL/I to define the databases that can be accessed by a particular PSB.

**program specification block (PSB).** DL/I control block that defines a set of DL/I databases that can be accessed from a program.

**program status word (PSW).** An operating system control block defining the current status and location of a program that is executing.

**program storage.** A class of storage used for application programs.

**PSB.** Program specification block.

**PSW.** Program status word.

**register save area.** A group of 72 contiguous bytes used for saving registers when one program calls another.

**relative record dataset (RRDS).** VSAM dataset whose record locations are specified by a number that represents a record's location in the dataset relative to the beginning of the dataset.

**report dataset.** A dataset used to route report output and referenced when viewing reports using Compuware/VF. Specifically, report datasets are report shared directories, report databases attached to a shared directory, and DDIO report files.

**RRDS.** Relative record dataset.

**RRSAF.** DB2 Recoverable Resource Manager Services Attachment Facility.

**RTLS.** LE Runtime Library Services.

**search segment argument (SSA).** A control block used by DL/I to access a segment within the hierarchy of a database.

**SNAP-AID.** Abend-AID facility that displays Abend-AID output during program execution without forcing the program to terminate.

**snap dump.** A dump that is taken at a specific point during execution of a program. Processing is generally continued after the dump has been taken.

**source listing.** A compiler listing and other information about a program stored in a source listing dataset and accessed by Abend-AID.

**source listing dataset.** A dataset used to store source listings and referenced when viewing reports using Compuware/VF. Specifically, source listing datasets are source listing shared directories, source listing databases attached to a shared directory, and DDIO source listing files.

**SQL.** Structured query language.

**SSA.** Search segment argument.

**statement numbers.** Sequence numbers provided by compilers and assemblers to give the programmer an easy means of identifying statements within a program.

**TGT.** A COBOL control block that is also known as the memory map. Contains information about COBOL internal operations and essential information for COBOL debugging.

**U4039-8.** The abend code issued by the Abend-AID ATE (LEAID) when a system dump is requested in addition to the Abend-AID report.

**virtual storage access method (VSAM).** File access method whereby the records in a file on a direct access storage device can be accessed in key sequence (KSDS), entry sequence (ESDS), or relative record sequence (RRDS).

**VSAM.** Virtual storage access method.

**Working-Storage Section.** A section of a COBOL program used to define the data items that are used in a program.

**XLS.** Extended Language Support.



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