IBM Merge Tool for z/OS and OS/390

User's Guide

Release 1

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Release 1

> **Note!**
>
> Before using this information and the product it supports, be sure to read the general information under "Notices" on page 65.

First Edition (June 2002)

This edition applies to Version 1 Release 1 Modification Level 0 of IBM Merge Tool for z/OS and OS/390 (program number 5697-H70) and to all subsequent releases and modifications until otherwise indicated in new editions.

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Contents

About this book

This book provides guidance and reference information for users of IBM Merge Tool for z/OS and OS/390.

In the rest of this book, the term Merge Tool refers to IBM Merge Tool for z/OS and OS/390.

Who should use this book

This book is for two kinds of Merge Tool users:

- Application programmers who need to test and debug programs
- Project Managers who need assistance with analysis for determining resources for consolidation efforts.

This book assumes that you are familiar with using ISPF.

To use Merge Tool functions in batch jobs, you must already be familiar with JCL.

Releases of Merge Tool supported

Merge Tool supports Version 1.

Required software

Merge Tool requires the following software:

- OS/390 Version 2 Release 10 or later
- z/OS Version 1 or later

What you can do with Merge Tool

The Merge Tool is a source code merging utility that automatically merges up to two versions of source code with the original or base version of source.

Merge Tool is an ISPF application. It uses panels to allow you to select options and to specify parameters, commands and program function (PF) keys to simplify requests for common functions, and full-screen format for information display and editing.

Prerequisite and related information

Merge Tool documentation supports the following tasks:

Planning for, installing, customizing, and maintaining Merge Tool
Refer to the *Program Directory* (shipped with the product tape) to carry out the SMP/E installation of this product. Then refer to Appendix B, "The Merge Tool CUSTOMIZATION Process" on page 53 for customizing information.

Using Merge Tool

This book, the *User's Guide*, is a guide to using Merge Tool. When using Merge Tool under ISPF, you can also refer to the online help.

For information about related products, see the "Bibliography" on page 67.

Chapter 1. Product Overview

Parallel Development

Definition

Parallel development is defined as multiple programmers actively working on the same application source concurrently.

Today's applications are complex and project management is challenged to meet objectives and deadlines. Programmers attempting to keep up with the pace will find themselves performing tasks against the same code in parallel with other programmers.

Parallel Development Basic Steps

The basic steps for parallel development follow. These steps are common in most parallel development scenarios.

- Identify what components have changed
- Analyze the complexity of the project
- Merge and review the changes
- Address conflicting changes
- Create merged source
- Test outputs from merged source

Parallel Development Scenarios

The types of parallel development are broken into four general types for this manual. They are described below.

Common parallel development: Programmer codes enhancement to the applications main program. While the enhancement is being coded a bug is found and fixed (in the current production source) by the maintenance team.

Basic parallel development: Two programmers are assigned to work on different bugs in the same program. Rather than one programmer waiting until the other programmer has completed their changes, and successfully tested the program, they begin development at the same time.

Release management parallel development: A Company must maintain an existing software release while developing a new release. The maintenance team must continue to support and code against an existing release, while the development team works on a new release of the product.

Vendor application customization: A Company uses a purchased application package (Version 1) from a software vendor. Consultants were hired to make modifications to the software. When the vendor releases a version upgrade (Version 2) the company must assess the resources required for retrofitting the

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customizations to the upgrade. Once analysis is complete the development team must incorporate their customizations into the upgraded vendor source.

The four scenarios above are very different yet cause many of the same problems.

What is the IBM Merge Tool for z/OS and OS/390?

Overview

The IBM Merge Tool for z/OS and OS/390 is a source code merging utility that automatically merges up to two versions of source code with the original or base version of source. The merge process produces three major outputs:

1. A marked-up (work) file member is created that shows the results of merging the two versions. It indicates inserted, deleted, moved, and conflicting lines.

2. A merged file member containing all modifications to the source module.

3. Statistics showing the number of modifications broken out by inserted, deleted and shifted lines. The statistics also show the number of conflicting modifications.

   Note: CONFLICTING modifications may require manual intervention.

The Merge Tool will enable both project management and programmers to address the common problems that originate with parallel development allowing both project management and developers to perform their tasks with the details required and in a timely and accurate manner.

Functionality

The Merge Tool provides the tools necessary to identify, analyze and consolidate independently coded changes that affected the same source.

Assist project management with analysis, providing the details required for accurately determining what resources are needed for the consolidation effort.

Assist programmers in identification and owner of changes being merged.

Assist programmers in isolating CONFLICTING changes and addressing the conflicts.

Assist programmers in the actual consolidation of several independently coded versions of source.

The Tools

The Merge Tool provides the tools required by both project management and developers to manage the task of consolidating parallel development. Whether the parallel development effort is of a simple or complex nature the tasks and tools are the same. What will change is who will use the tools and perform the tasks.

ISPF Workbench A simple-to-use ISPF front-end allowing for fast access to source members and programmer functions such as editing Work File members. Generated member lists can then be used as the object of the Merge Tool actions and reports in foreground or batch through a single ISPF panel.

Reports   The Merge Tool provides reports that will assist in the assessment of the effort required for merging the source members. Of particular significance are statistics for conflicting modifications for each member.

The Merge Tool Actions A variety of actions are available to perform the merge tasks. The user can determine the degree of the merge action based on the complexity of the changes.

Batch Utility A batch utility is available to perform most actions that are available in the ISPF Workbench.

Work File Output from the initial combination of source. Also known as the marked-up file. The first seven bytes of this file indicate the merge activity that will take place. This is the sole input to the Merge action.

Parallel Development Solutions with the Merge Tool

Using the Merge Tool the customer can solve many of the parallel development issues.

Common parallel development Production fix is coded to same program being upgraded for an enhancement.

Problem   The source for the enhancement does not contain the production fix. Promotion of the enhancement will reverse the production fix causing production failures to return.

Solution   Reconcile the fix into the enhanced version of the source. Prior to promotion the programmer must incorporate the fix into their code using the Merge Tool.

Basic parallel development Two programmers are assigned to work on different bugs in the same program. They begin their assignments concurrently.

Problem   Each version of the fixed program is missing the source for the 'other' fix. Independent promotion of the fixed code will cause source regression and production failures to return.

Solution   Programmers must incorporate the independently coded fixes, using the Merge Tool. Once incorporated, they must test for both conditions and promote to production.

Release management parallel development A Company must continue to support and code against an existing release, while the development team works on a new release of the product.

Problem   Because current production source was the base of the new release, eventually the maintenance changes must be incorporated in the next release. Promotion of the new release without incorporating the maintenance performed will reverse the production maintenance causing production failures to return.

Many of the details are unknown. Proper project management requires these details such as number of members, complexity of the changes, and occurrences of conflicting changes when forecasting the resources needed for the reconciliation effort.

Solution   Using the Merge Tool, Project Management can assess the development effort required to complete the consolidation of maintenance applied since coding of the new release began. The development team can then reconcile the maintenance into the new version of the source.

Vendor application customization A Company purchased and customizes a vendor application. The company must assess the resources required for retrofitting the customization to a new release of the application. Once analysis is complete the company must combine their customization with the upgraded vendor source.

Problem: The consultants are no longer on this project. With them went the detailed knowledge of the customization done to this application. The company must determine if there is a conflict between the customization and the changes of the new version and then the customization must be re-coded into the new release of the vendor software.

This scenario is complex. Many of the details are unknown. Accurate project management requires details such as number of members, complexity of the changes, and occurrences of conflicting changes when forecasting the resources needed for the incorporation effort. Additionally, it should not be necessary to entirely re-code the customization.

Solution   Using the Merge Tool, Project Management can accurately assess the development effort required to address conflicting code changes and complete the retrofitting of the customization with the new release. The development team can then easily reconcile the customization to the new version.

Detailed scenarios and steps are documented in Appendix A.

Terminology

The Files of the Merge Tool

Merge Tool uses several files as input and output in the merging process. The files are labeled for ease of identification.

The Work File
What is a Work File? The Work File is an intermediate file, also known as the marked-up file. It is the output from the initial combination of source. The merged source is marked-up in the first seven bytes indicating the final merge activity that will take place.

The Work File is a PDS and is the sole input to the Merge action.

Allocation The Merge Tool requires that the Work File be a PDS with an LRECL that is seven bytes larger than the source files used as input to the build Work File process. During foreground processing the user is prompted with the file allocation panel if the defined file does not exist. For batch

execution, this file is required if you wish to create it or if you wish to create a merged file.

The Base File

What is a Base File? The Base File is the PDS that contains the original version of source common to both versions of source. Both Version1 and Version2 should have used the source in this library as the base or starting point for their changes. If not entered it is set to File1.

The File1

What is File1? File1 is the first of two versions of source to be compared and merged with the Base File. This file is required if you wish to create a work file.

The File2

What is File2? File2 is the second of two versions of source to be compared and merged with the Base File. If not entered it is set to File1.

The Merge File

What is the Merge File? The Merge File is the output from the Merge step. The Merge step reads the Work File and based on the mark-up indicators, builds a combined source. This source can be reviewed and then added to the site Source Management Tool such as SCLM creating output that can be tested for the functions of both File1 and File2 modifications. This file is required for the final merge process.

The Log File

What is the Log File? The Merge Tool uses the Log File to reflect any parameters and statements in effect during any of the merge processes. If there is an error in the processing the reason is documented in this file. Additionally, if any tracing parameters are passed via the CIGIN DD statement the resulting trace data is written to this file.

This file may be a sequential dataset, SYSOUT, or a partitioned dataset.

The Statistics Files

What are the Statistics Files? The Merge Tool writes statistical data to two files.

Member statistics are written to the CIGSTATS DD statement. These statistics include number of lines inserted, deleted and any conflicting changes.

Summary statistics are written to the CIGSUMM DD statement. These statistics include totals related to number of members processed.

Other Terms

Conflict   The result of two programmers changing the same line or inserting different lines in exactly the same place in their particular versions of a program. Conflicting source is identified in the Work File and is reported on in the Member Statistics.

Overlap Area The location in the Work File source where conflicting changes occurred.

How the Merge Tool works

The Merge Process

As stated earlier the basic steps for parallel development are:

1. Identify what components have changed
2. Analyze the complexity of the project
3. Merge and review the changes
4. Address conflicting changes
5. Create merged source
6. Test outputs from merged source

All but one of these steps, 6.Test outputs, can be performed directly from within the Merge Tool. The steps are described below.

Identify what components have changed. Working with the Merge Tool the user will match up the Base File members with members from File1 and File 2. Based on the match up of members the components that require merging can be easily identified.

Analyze the complexity of the project. Using the Merge Tool the user can request a preliminary building of the Work File to obtain member statistics such as number of inserts, deletes and conflicting changes. Based on the statistics, the user can get a better understanding of the resources required for the merge process.

Merge and review the changes. The Merge Tool is invoked to build a marked-up work file by comparing the base program and one or two files that originated from the base file. The Merge Tool places merge directives in the first seven bytes of the Work File to document the insertions, deletions, and overlap areas. Merge directives are used to determine what action the merge step will take for that line of source.

Address conflicting changes. Via the Merge Tool the programmer can edit the Work File to resolve conflicting change issues. The programmer can try different scenarios by changing the merge directives.

Create merged source. In this step the Merge Tool is used to merge the Work File into a Merge File. The Merge File is source that can be stored in the site Source Management Tool such as SCLM, or used as input to a compiler. The Work File is the sole input to the merge step. The Merge Tool reads the input and performs the insertions and deletions indicated in the first seven bytes of the Work File.

Test Outputs from merged source. The final step is to add the merged source into the site source management repository such as SCLM creating outputs that can be tested for all functionality. If the testing is unsuccessful, the user can perform steps 3 through to 6 repeatedly until successful testing is achieved. At this time the Merge Tool does not interface with or automatically add the merged source into any source management tool.

Merge Tool Usage Notes

The member list is driven off the **File1** member list. Only members that match the member names in File1 or the pattern supplied in the Specify Members panel will be displayed in the list.

When the member being merged is not found in the base file then all the lines of File1 and File2 are merged. All lines are considered inserts.

Overview

Chapter 2. The Merge Tool ISPF Workbench

The Merge Tool ISPF panels enable the user to work with the Merge Tool interactively. You can work with all or some members that exist in the libraries with which you are working.

```
                       IBM Merge Tool for z/OS and OS/390
 Command ===> _____  Scroll ===> PAGE
                                              Enter "/" to select option.
 Member: _____ _ Append to list _ Set Libraries _ Source Type _ Preferences
 ------------------------------------------------------------ --------------------
 __ Group Action        _ View Reports   1 Exec Mode ( 1. Foreground 2. Batch)
    File1              File2   Base     Have  Have   Source
 "/" Member    Action   Member  Member   Work  Merge  Type
 ****************************** Bottom of data ********************************
```

Figure 1. Merge Tool Main Panel

The main panel is broken into three sections:

1. Session information

2. Action information

3. Member list section.

The panel fields are described in the following tables.

Panel Fields

Field	Description
Table 1. Description of Fields on Main Panel	
Member	Specify a member name or a member pattern to work with specific members or '*' for all members. You can use a "/" in the member field to access the **Specify Members** panel.
Append to List	Indicates if you want to add members to your current member list. Leave blank, if you want to create a new member list when specifying a member name or pattern. Enter a "/" to append multiple query requests to the displayed list of matching members.
Set Libraries	Specify libraries or change your current libraries settings.
Source Type	Source type is used by the Merge Tool to determine where line numbers are, so that they can be ignored. It is also needed in order for Merge Tool to be able to ignore COBOL, ASM, or JCL comments.
Preferences	Merge Tool preferences allows you to set preferences that will be in effect while you use Merge Tool.
Group Action	Enter "/" to see group action choices. A group action will apply to all non-excluded members in the current member list.
View Reports	View current report files.
Exec Mode	Enter to "1" to execute in foreground; enter "2" to execute in batch mode.

Column Headings for member lists

Table 2. Member List Section	
Heading	**Description**
File1 Member	The name of a member in the library specified for File1.
File2 Member	An entry indicates if there is a corresponding member in File2. If members are named the same and a corresponding member exists, it will show "YES". If a corresponding member does not exist, it will show "-------".
	If members are not named the same and a corresponding member exists, it will show the corresponding member name. If a corresponding member does not exist, it will show "-------".
Base Member	An entry indicates if there is a corresponding member in the Base file. If members are named the same and a corresponding member exists, it will show "YES". If a corresponding member does not exist, it will show "-------".
	If members are not named the same and a corresponding member exists, it will show the corresponding member name. If a corresponding member does not exist, it will show "-------".
Have Work	An entry indicates whether or not a marked-up file exists in the library specified as the work file. The member name would be the same as the member name of File1.
Have Merge	An entry indicates whether or not a merge file exists in the library specified as the merge file. The member name would be the same as the member name of File1.
Source Type	Indicates the source type of the file. If you have specified a source type on the "Source Type" pop-up panel, it will be carried to this column. You can over-type the source type for an individual member. You can also specify a start and end column to be used during the merge process instead of specifying a source type.

Set Libraries

The Set Libraries pop-up panel is used to specify the partitioned data sets that the user will use for the merge process.

```
                           Merge Tool Set Libraries _____
  C   | Command ===>                                                     PAGE
      |                                                                   ion.
  M   |               Input Libraries (File1, File2 and Base1 Required)   rence
  -   |   File1......... 'AZZ.SAZZSAM1'                                   -----
  _   |   File2......... 'AZZ.SAZZSAM2'                                   Batch
      |   Base1......... 'AZZ.SAZZSAMB'
  "   |    Base2........
  *   |     Base3.......                                                  *****
      |      Base4......
      |
      |               Output Libraries (Required)
      |   Work.......... 'AZZ.SAZZSAMW'
      |   Merge......... 'AZZ.SAZZSAMM'
      |
      |               Output Report Files (Optional)
      |   Member Stats.. 'AZZ.SAZZSAML'
      |                  Disp:    mod
      |   Summary Stats. 'AZZ.SAZZSAMS'
      |                  Disp:    mod
      |   Log.......... 'AZZ.SAZZSAMZ'
      |                  Disp:    mod
      |
      |   _____
```

Figure 2. Set Libraries

Input Libraries

The input libraries specify the partitioned data sets that contain the modules that you want to merge.

Library	Description
Table 3. Input Libraries	
Library	**Description**
File1	Specify the name of a library that contains modified source modules.
File2	Specify the name of another library that contains modified source modules. If not specified this file will default to File1.
Base	Specify the name of the library that contains the original source modules that has the basis for the source modules contained in "File1" and "File2". Up to four libraries can be specified. The libraries will be searched in the order as specified on the panel. If not specified this file will default to File1.

Output Libraries

The output libraries are needed for the marked-up (Work) file and the merged source modules.

Library	Description
Table 4. Output Libraries	
Library	**Description**
Work	Specify the name of the partitioned data set. This is where the intermediate merged file members reside. If it does not exist, you can let the Merge Tool automatically allocate it. You will be prompted, if it does not exist.
Merge	Specify the name of a partitioned data set. If it does not exist, you can let the Merge Tool automatically allocate it. You will be prompted, if it does not exist.

Output Report Files

The output report files are optional. You specify flat files or partitioned datasets if you want to route the reports produced by the Merge Tool to files.

When you execute the Merge Tool in foreground, you will need to specify files in order to view the member statistics and the summary statistics.

When you are running the batch utility, the reports will be routed to SYSOUT if you do not specify a file.

Report File	Description
Table 5. Output Report Files	
Report File	**Description**
Member Statistics	Number of modifications for each source module processed. Statistics showing conflicting modifications are of particular significance. If there are conflicting changes, you will probably need to manually intervene making sure the merged source module will function as intended.
Summary Statistics	Totals related to number of members processed.
Log	Parameters and statements in effect during the merge process. If processing does not complete successfully, the reason is reported here. If this is left blank and processing is performed in foreground then the log file is not produced.

If the file you specify does not exist, the user can let the Merge Tool automatically allocate it.

Below is an example of the Allocate panel the user will be prompted with if a report dataset does not exist.

```
                           IBM Merge Tool for z/OS and OS/390
C _____ Allocate Dataset for Report _____   PAGE
  | Command ===> _____              ion.
M |                                                                       ences
- |    File for CIGLOG  report does not exist:                            -----
_ |                                                                       Batch)
  |         'AZZ.SAZZSAML'
" |
* |    Optional, specify space:                                           ******
  |       Tracks _ or Cylinders _
  |       Primary Space _____   Secondary Space _____
  |
  |    Optional, select another volume:
  |       Volume _____
  |
  |    To automatically allocate it, Press Enter or PF3 to Cancel
  |
  |
  | _____
```

Figure 3. Allocate Dataset for Report

Below is an example of the Allocate panel the user will be prompted with if a merge dataset does not exist.

```
                           IBM Merge Tool for z/OS and OS/390
C _____ Allocate Library _____   PAGE
  | Command ===> _____              ion.
M |                                                                       ences
- |    File for MERGE library does not exist:                             -----
_ |                                                                       Batch)
  |         'AZZ.SAZZSAMM'
" |
* |    To allocate it with same characteristics of                        ******
  |
  |         'AZZ.SAZZSAM1'
  |
  |    Optional, specify space:
  |       Tracks _ or Cylinders _
  |       Primary Space _____   Secondary Space _____
  |       Directory Blocks ____
  |
  |    Optional, select another volume:
  |       Volume _____
  |
  |        Press Enter to Allocate or PF3 to cancel.
  |
  | _____
```

Figure 4. Allocate Library

Source Type

Enter "/" to specify or change the current source type setting (COBOL, ASM, JCL, DATA, PL1). Source type is used by the Merge Tool to determine where line numbers are, so that they can be ignored. Additionally, you can specify the actual start and end columns to be compared.

```
                         IBM Merge Tool for z/OS and OS/390                    11 ===> PAGE
  C _____ Specify Source Type _____               ect option.
                                                                              Preferences
  M | Command ===> _____                 ------------
  - |                                                                        und 2. Batch)
  _ |      Specify Type:   COBOL__ (COBOL, ASM, JCL, DATA, PL1)
  " |             COLUMNS FOR COBOL ARE  7:72
  * |                                                                        *************
    |         or
    |
    |    Specify compare column start  ____   and end  ____
    |
    |
    |
    | _____
```

Figure 5. Specify Source Type

Preferences

The Merge Tool preferences allows you to set preferences that will be in effect while you use the Merge Tool.

```
                       Merge Tool Option Default Settings
   OPTION  ==>

   This panel displays the current setting for each of the Merge Tool options.
   Users can modify values on this panel.

   Panel Options:
    View or Browse           ==> V (V or B)
    Member Names the Same    ==> N (Y or N)
```

Figure 6. Option Default Settings

Preference Panel Options

Table 6. Option Default Settings	
Option	**Description**
View or Browse	Enter "V" if you want to use ISPF VIEW when looking at files or "B" if you want to use ISPF BROWSE. The default is "B".
Member Names the Same	If the member names that correspond to each other are not exact matches, enter "N" to indicate that member names are not the same. **Note:** When you specify the same library for File1, File2, or Base, the Merge Tool knows that the members' name cannot be the same. Conversely, if you have specified three unique libraries, the Merge Tool assumes that your member names will match. You override this assumption by specifying "N" after "Member Names the Same".

Member Actions

Enter "/" (across from a member) to see member actions choices. A member action will apply only to the member on that line.

```
                        IBM Merge Tool for z/OS and OS/390      Row 1 to 5 of 5
 C  _____  Merge Tool Member Actions _____   ll ===> PAGE
   |  Command ===> _____         | ect option.
 M |                                                            |  Preferences
 - |  Member Action for member  AZZCBLA1                         | ------------
   |                                                            | und 2. Batch)
 _ |  __ 1.  GW-Generate Work File                               |
 " |     2.  GB-Generate Work and Merge File                     |
 / |     3.  GM-Generate Merge File from Work File               |
 _ |     4.  SS-Generate Work and Show Statistics for Member     |
 _ |     5.  E (EB, E1, E2, EW, EM) -  Edit Member               |
 _ |     6.  B (BB, B1, B2, BW, BM) -  Browse Member             |
 _ |     7.  X - Exclude Member                                  |
 * |     8.  I - Include Excluded Member                         | *************
   |                                                            |
   |  Select a choice and press ENTER to process member action. |
   |                                                            |
   |_____|
```

Figure 7. Member Actions

For description of these member actions refer to Table 7 on page 19.

Error messages.

The Merge Tool supplies a short message in the upper right hand corner of the panel if an error is detected. The user can request a more detailed message by pressing PF1. A long message is then displayed in a pop-up window.

```
                        IBM Merge Tool for z/OS and OS/390      Row 1 to 5 of 5
 C  _____  Merge Tool Member Actions _____   ll ===> PAGE
   |  Command ===> _____   Invalid value    | ect option.
 M |                                                            |  Preferences
 - |  Member Action for member  AZZCBLA1                         | ------------
   |                                                            | und 2. Batch)
 _ |  H_ 1.  GW-Generate Work File                               |
 " |     2.  GB-Generate Work and Merge File                     |
 / |     3.  GM-Generate Merge File from Work File               |
 _ |     4.  SS-Generate Work and Show Statistics for Member     |
 _ |     5.  E (EB, E1, E2, EW, EM) -  Edit Member               |
 _ |     6.  B (BB, B1, B2, BW, BM) -  Browse Member             |
 _ |     7.  X - Exclude Member                                  |
 * |     8.  I - Include Excluded Member                         | *************
   |                                                            |
   |  Select a choice and press ENTER to process member action. |
   |                                                            |
   |_____|
```

Figure 8. Error Messages

Merge Tool ISPF HELP Facility

The Merge Tool ISPF Workbench has a full suite of Tutorial Panels to assist the user. The user can press PF1 or enter "HELP" at the command line on any panel or pop-up to get information about how to use that particular panel.

Building member lists

Once the preferences and libraries have been set for the query, the user is ready to build a list of members for the merge process.

If there is a specific member that the user is working on they should enter the entire member name in the member field of the main panel. Additionally, if there is a common prefix to the member names a name mask can be used (i.e. AZZCBL* will request a list of members whose names begin with AZZCBL). For a full member list the member name should be set to **.

Based on the information on the Merge Tool main panel and from the Libraries panel a list of members is displayed when the user hits enter.

```
                         IBM Merge Tool for z/OS and OS/390      Row 1 to 6 of 6
   Command ===> _____        Scroll ===> PAGE
                                                          Enter "/" to select option.
   Member: _____  _ Append to list _ Set Libraries _ Source Type _ Preferences
   ------------------------------------------------------------ --------------------
   __  Group Action        _ View Reports    2 Exec Mode ( 1. Foreground 2. Batch)
        File1            File2    Base      Have  Have    Source
   "/" Member    Action  Member   Member    Work  Merge   Type
   __   AZZCBLA1          YES      YES       YES           COBOL__
   __   AZZCBLA2          YES      YES       YES           COBOL__
   __   AZZCBL01          YES      YES       YES           COBOL__
   __   AZZCBL02          YES      ------    YES           COBOL__
   __   AZZCBL11          YES      YES       YES           COBOL__
   __   AZZCBY01          ------   YES       YES           COBOL__
   ***************************** Bottom of data ********************************
```

Figure 9. Member List

See Column Headings in the previous section for more detail about each column.

When attempting to merge entire libraries the Merge Tool assists in identifying what libraries have a matched member to the Base File at a glance.

The member list is driven off the File1 member list. Only members that match the member names in File1 or the pattern supplied in the Specify Members panel will be displayed in the list.

```
                         IBM Merge Tool for z/OS and OS/390      Row 1 to 9 of 9
   Command ===> _____        Scroll ===> PAGE
                                                          Enter "/" to select option.
   Member: _____  _ Append to list _ Set Libraries _ Source Type _ Preferences
   ------------------------------------------------------------ --------------------
   __  Group Action        _ View Reports    2 Exec Mode ( 1. Foreground 2. Batch)
        File1            File2    Base      Have  Have    Source
   "/" Member    Action  Member   Member    Work  Merge   Type
   __   AZZASM01          YES      YES       YES   YES     COBOL__
   __   AZZCBLA1          YES      YES       YES           COBOL__
   __   AZZCBLA2          YES      YES       YES   YES     COBOL__
   __   AZZCBL01          YES      YES       YES           COBOL__
   __   AZZCBL02          YES      ------    YES           COBOL__
   __   AZZCBL11          YES      YES       YES           COBOL__
   __   AZZCBY01          ------   YES       YES           COBOL__
   __   AZZEOFCD          ------   ------                  COBOL__
   __   AZZSWTCH          ------   ------                  COBOL__
   ***************************** Bottom of data ********************************
```

Figure 10. Member List

When the member being merged is not found in the base file then all the lines of File1 and File2 are merged. All lines are considered inserts.

Member lists when the member names are different

If the user has specified on the Preferences Panel that member names in the libraries may not be the same; the user will be prompted with the Specify Members panel. This is the panel where the user can specify a member name mask. The Merge Tool will use the patterns to determine if there are any member names that match.

The panel below is telling the Merge Tool that the members in File2 and the Base file will begin with AZZCBL and the members in File1 will be prefixed with AZZCBY, perhaps the programmer's initials.

```
                        IBM Merge Tool for z/OS and OS/390      Row 1 to 9 of 9
 C _____ Specify Members _____    ll ===> PAGE
                                                                ect option.
 M │ Command ===> _____      Preferences
 - │                                                            ------------
 _ │      File1 Member:  AZZCBY*_                                und 2. Batch)
   │      File2 Member:  AZZCBL*_
 " │      Base Member:   AZZCBL*_
   │
 _ │
 _ │
 _ │    Please specify member name or pattern for File2 library
 _ │    and your Base Library.  Leave it blank to use same name
 _ │    as File1 member.
 _ │
 _ │              Current Libraries
 _ │
 * │    File1:  'AZZ.SAZZSAM1'                                   *************
   │    File2:  'AZZ.SAZZSAM2'
   │    Base:   'AZZ.SAZZSAMB'
   │
   │
   │    _____
```

Figure 11. Specify members

The Merge Tool will match the member names based on the pattern supplied and then display the resulting member list.

```
                        IBM Merge Tool for z/OS and OS/390       Row 1 to 1 of 1
 Command ===> _____        Scroll ===> PAGE
                                                      Enter "/" to select option.
 Member: _____  _ Append to list _ Set Libraries _ Source Type _ Preferences
 -------------------------------------------------- --------------------
 __ Group Action       _ View Reports    2 Exec Mode ( 1. Foreground 2. Batch)
    File1              File2    Base     Have  Have   Source
 "/" Member    Action  Member   Member   Work  Merge  Type
 __  AZZCBY01          AZZCBL01 AZZCBL01 YES          COBOL__
 ***************************** Bottom of data ******************************
```

Figure 12. Resulting Member List

Note: that the 'different member name' replaces the YES indicator, informing you that there is a matched member with a different name.

Interpreting the member list

In the following example there are four members that have a File1, File2 and Base member match.

```
                         IBM Merge Tool for z/OS and OS/390      Row 1 to 5 of 5
 Command ===> _____      Scroll ===> PAGE
                                                 Enter "/" to select option.
 Member: _____  _ Append to list _ Set Libraries _ Source Type _ Preferences
 ------------------------------------------------------------ --------------------
 __  Group Action        _ View Reports    2 Exec Mode ( 1. Foreground 2. Batch)
     File1              File2   Base     Have  Have   Source
 "/" Member    Action   Member  Member   Work  Merge  Type
 __  AZZCBLA1           YES     YES      YES          COBOL__
 __  AZZCBLA2           YES     YES      YES   YES    COBOL__
 __  AZZCBL01           YES     YES      YES          COBOL__
 __  AZZCBL02           YES     ------   YES          COBOL__
 __  AZZCBL11           YES     YES      YES          COBOL__
 ****************************** Bottom of data ******************************
```

Figure 13. Member Match

Based on the type of research the user is performing the missing members might indicate that out of all the members in File1 only four need to be merged with File2 and the Base File member.

Appending to the member list

When the user changes the content of the member field and presses enter the Merge Tool assumes that a new list is being driven. The Merge Tool will replace the contents of the current member list with the results of the new query.

When the user wants to create a new member list but wishes to keep the current list he must request that the Merge Tool append the new results to the current list. This is done via the "Append to list" field.

In the following example the user has requested that any members that begin with AZZCLB* from these files be added to the already generated list. Note that the two members AZZCBLA1 and AZZCBLA2 have been added to the previous member list.

```
                         IBM Merge Tool for z/OS and OS/390        Row 1 to 2 of 2
 Command ===> _____          Scroll ===> PAGE
                                                         Enter "/" to select option.
 Member: _____  _ Append to list _ Set Libraries _ Source Type _ Preferences
 ------------------------------------------------------- --------------------
 __ Group Action        _ View Reports    2 Exec Mode ( 1. Foreground 2. Batch)
    File1              File2    Base     Have  Have   Source
 "/" Member   Action   Member   Member   Work  Merge  Type
 __  AZZCBL01          YES      YES      YES          COBOL__
 __  AZZCBL02          YES      ------   YES          COBOL__
 ***************************** Bottom of data ******************************
```

```
                         IBM Merge Tool for z/OS and OS/390        Row 1 to 4 of 4
 Command ===> _____          Scroll ===> PAGE
                                                         Enter "/" to select option.
 Member: _____  / Append to list _ Set Libraries _ Source Type _ Preferences
 ------------------------------------------------------- --------------------
 __ Group Action        _ View Reports    2 Exec Mode ( 1. Foreground 2. Batch)
    File1              File2    Base     Have  Have   Source
 "/" Member   Action   Member   Member   Work  Merge  Type
 __  AZZCBLA1          YES      YES      YES          COBOL__
 __  AZZCBLA2          YES      YES      YES   YES    COBOL__
 __  AZZCBL01          YES      YES      YES          COBOL__
 __  AZZCBL02          YES      ------   YES          COBOL__
 ***************************** Bottom of data ******************************
```

Figure 14. Append to List

You can also specify a different set of libraries and source types for the appended
members. In the following example we will mix ASM and COBOL source types.

```
                         IBM Merge Tool for z/OS and OS/390        Row 1 to 1 of 1
 Command ===> _____          Scroll ===> PAGE
                                                         Enter "/" to select option.
 Member: _____  _ Append to list _ Set Libraries _ Source Type _ Preferences
 ------------------------------------------------------- --------------------
 __ Group Action        _ View Reports    1 Exec Mode ( 1. Foreground 2. Batch)
    File1              File2    Base     Have  Have   Source
 "/" Member   Action   Member   Member   Work  Merge  Type
 __  AZZASM01          YES      YES                   ASM___
 ***************************** Bottom of data ******************************
```

Figure 15. Append to List Example part 1

We now have one assembler part in our member list. The following screen is
depicted prior to pressing the ENTER key. It shows

- Append to List selected

- Set Libraries selected

- Source Type selected

```
                           IBM Merge Tool for z/OS and OS/390      Row 1 to 1 of 1
            Command ===> _____   Scroll ===> PAGE
                                                            Enter "/" to select option.
            Member: AZZCBL*_  / Append to list / Set Libraries / Source Type _ Preferences
            ------------------------------------------------------- --------------------
            __ Group Action         _ View Reports    1 Exec Mode ( 1. Foreground 2. Batch)
               File1              File2   Base      Have Have  Source
            "/" Member   Action   Member  Member    Work Merge Type
            __ AZZASM01           YES     YES                  ASM____
            ***************************** Bottom of data ******************************
```

Figure 16. Append to List Example Part 2

Make your changes to the SET LIBRARIES and SOURCE TYPE panels as they are displayed. Then Figure 17 is displayed.

```
                           IBM Merge Tool for z/OS and OS/390       Row 1 to 6 of 6
            Command ===> _____   Scroll ===> PAGE
                                                            Enter "/" to select option.
            Member: _____   / Append to list _ Set Libraries _ Source Type _ Preferences
            ------------------------------------------------------- --------------------
            __ Group Action         _ View Reports    1 Exec Mode ( 1. Foreground 2. Batch)
               File1              File2   Base      Have Have  Source
            "/" Member   Action   Member  Member    Work Merge Type
            __ AZZASM01           YES     YES                  ASM____
            __ AZZCBLA1           YES     YES                  COBOL__
            __ AZZCBLA2           YES     YES                  COBOL__
            __ AZZCBL01           YES     YES                  COBOL__
            __ AZZCBL02           YES     ------                COBOL__
            __ AZZCBL11           YES     YES                  COBOL__
            ***************************** Bottom of data ******************************
```

Figure 17. Append to List Example Part 3

Merge Tool Actions

Member Actions

The Merge Tool uses a set of line commands or actions that can be executed against any member within the member list. The action is executed for that member only. Below is a list of actions and their descriptions.

Action	Description	Notes
Table 7 (Page 1 of 2). Member Actions		
GW	Generate Work File	
GB	Generate Work and Merge File	
GM	Generate Merge File from Work File	
SS	Generate Work file and Show Statistics for Member	
E (EB, E1, E2, EW, EM)	Edit Member	Foreground only (see note)
B (BB, B1, B2, BW, BM)	Browse Member	Foreground only (see note)
X	Exclude Member	Foreground only

Table 7 (Page 2 of 2). Member Actions		
Action	**Description**	**Notes**
I	Include Excluded Member	Foreground only

Note: When the action "E" or "B" is entered a panel is displayed prompting the user to select the library from which to perform that action. The library selection list will be based on the entries defined in the Set Libraries panel.

```
                            IBM Merge Tool for z/OS and OS/390        Row 1 to 4 of 4
 C  _____ Specify Members _____        ll ===> PAGE
    | Command ===> _____     ect option.
 M  |                                                                   Preferences
 -  |    Select desired library: _    Member: AZZCBLA1                 ------------
    |                                                                  und 2. Batch)
 _  |    1. File1  'AZZ.SAZZSAM1'
    |    2. File2  'AZZ.SAZZSAM2'
 "  |    3. Base   'AZZ.SAZZSAMB'
 E  |    4. Work   'AZZ.SAZZSAMW'
    |    5. Merge  'AZZ.SAZZSAMM'
 _  |
 _  |    Select library and press ENTER to  EDIT                       *************
 _  |
 *  |
    |
    |
    |
    |_____
```

Figure 18. Desired Library

This panel can be bypassed by entering the extended Edit or Browse action on the main panel (EB, BB, E1, BW etc.). The following describes the edit and browse actions:

- EB - edit base file member
- E1 - edit file1 member
- E2 - edit file2 member
- EW - edit work file member
- EM - edit merge file member
- BB - browse base file member
- B1 - browse file1 member
- B2 - browse file2 member
- BW - browse work file member
- BM - browse merge file member

To generate a list of valid commands the user can enter "/" next to the member. A Prompt panel will be returned.

```
                        IBM Merge Tool for z/OS and OS/390     Row 1 to 4 of 4
 C _____ Merge Tool Member Actions _____ ll ===> PAGE
   | Command ===> _____ |  ect option.
 M |                                                        |    Preferences
 - |   Member Action for member  AZZCBLA1                   |  ------------
   |                                                        |  und 2. Batch)
 _ | __  1.  GW-Generate Work File                          |
 " |     2.  GB-Generate Work and Merge File                |
 / |     3.  GM-Generate Merge File from Work File          |
   |     4.  SS-Generate Work and Show Statistics for Member|
 _ |     5.  E (EB, E1, E2, EW, EM) - Edit Member           |
 _ |     6.  B (BB, B1, B2, BW, BM) - Browse Member         |
 * |     7.  X - Exclude Member                             | *************
   |     8.  I - Include Excluded Member                    |
   |                                                        |
   |   Select a choice and press ENTER to process member action. |
   |                                                        |
   |_____|
```

Figure 19. Valid Commands

The user must enter the number (1 through 8) for the corresponding action they
wish to invoke. By entering a 5 or 6, the panel shown in Figure 19 will be
displayed for the user to select the required file.

Include eXclude Actions

The exclude action (X) will remove the member from any group action processing
performed against the list. The **EXCLUDED** note is placed to the far right of the
member who has been excluded. The note will remain in this place until the list is
rebuilt or the member is the object of the include (I) action.

```
                        IBM Merge Tool for z/OS and OS/390      Row 1 to 9 of 9
 Command ===> _____        Scroll ===> PAGE
                                                     Enter "/" to select option.
 Member: _____  / Append to list _ Set Libraries _ Source Type _ Preferences
 ----------------------------------------------------- --------------------
 __  Group Action         _ View Reports    2 Exec Mode ( 1. Foreground 2. Batch)
     File1                File2   Base     Have  Have  Source
 "/" Member    Action    Member  Member    Work  Merge Type
 __  AZZASM01             YES     YES       YES   YES   COBOL__
 __  AZZCBLA1             YES     YES       YES         COBOL__
 __  AZZCBLA2             YES     YES       YES   YES   COBOL__
 __  AZZCBL01             YES     YES       YES         COBOL__
 __  AZZCBL02             YES     ------    YES         COBOL__
 __  AZZCBL11             YES     YES       YES         COBOL__
 __  AZZCBY01             ------  YES       YES         COBOL__  EXCLUDED
 __  AZZEOFCD             ------  ------                COBOL__  EXCLUDED
 __  AZZSWTCH             ------  ------                COBOL__  EXCLUDED
 ***************************** Bottom of data ******************************
```

Figure 20. Member Exclude

Command Line

There are several commands that can be entered on the command line. These
commands will impact the list of members the user has driven.

Table 8 (Page 1 of 2). Command Line	
Command	**Function**
RESET or RES	Clear the "Action" column

Table 8 (Page 2 of 2). Command Line	
Command	**Function**
X ALL	Exclude all members
CLEAR	Remove the member list
LOCATE or L	Locate member in the member list

Group Actions

In addition to command line actions that are performed against the individual members, the Merge Tool provides a set of actions that can be performed against the member list.

The action will be performed against all members in the list that have not been excluded via the eXclude line command ("X").

The user may enter the action (GW, GB, GM or SS) at the Group Action field or enter "/" to see group action choices. A group action will apply to all non-excluded members in the current member list.

```
                          IBM Merge Tool for z/OS and OS/390      Row 1 to 9 of 9
       C  _____ Merge Tool Group Action _____  ll ===> PAGE
          | Command ===> _____ |     ect option.
       M  |                                                       |      Preferences
       -  |   Group Action                                        |     ------------
       /  | _  1.  GW-Generate Work File                          |     und 2. Batch)
          |    2.  GB-Generate Work and Merge File                |
       "  |    3.  GM-Generate Merge File from Work File          |
          |    4.  SS-Generate Statistics for Members             |
       _  |                                                       |
       _  |   Select a choice and press ENTER to process group action. |
       _  |                                                       |
       _  |                                                       |
       _  |                                                       |
       _  |_____|     LUDED
       __    AZZEOFCD          ------   ------            COBOL__ EXCLUDED
       __    AZZSWTCH          ------   ------            COBOL__ EXCLUDED
          ***************************** Bottom of data ******************************
```

Figure 21. Group Action

Action Initiation

The Exec Mode field value controls the execution mode that the user can initiate.

When the user specified "1", the Merge Tool behavior is based on the action supplied. In the example below a Generate Work file was requested. A progress indicator pop-up panel is displayed. The Function field is continually updated during the foreground processing.

```
                        IBM Merge Tool for z/OS and OS/390       Row 1 to 9 of 9
 C  _____  Progress Indicator _____          Scroll ===> PAGE
   |                                                   |          "/" to select option.
 M |    Program : AZZASM01                             |  urce Type _ Preferences
 - |    Request : Build work file                      |  -- --------------------
 _ |    Function: Invoking AZZMERGE                    |   1. Foreground 2. Batch)
   |                                                   |  Source
 " |_____|  Type
 GW  AZZASM01            YES     YES                      COBOL__
 __  AZZCBLA1            YES     YES      YES             COBOL__
 __  AZZCBLA2            YES     YES      YES    YES      COBOL__
 __  AZZCBL01            YES     YES      YES             COBOL__
 __  AZZCBL02            YES     ------   YES             COBOL__
 __  AZZCBL11            YES     YES      YES             COBOL__
 __  AZZCBY01            ------  YES      YES             COBOL__  EXCLUDED
 __  AZZEOFCD            ------  ------                   COBOL__  EXCLUDED
 __  AZZSWTCH            ------  ------                   COBOL__  EXCLUDED
 ****************************** Bottom of data ********************************
```

Figure 22. Progress Indicator

Once the action is completed successfully, the note 'PROCESSED' is placed in the
Action column across from the member. Note also a YES appears in the Have
Work column.

```
                        IBM Merge Tool for z/OS and OS/390       Row 1 to 9 of 9
 Command ===> _____          Scroll ===> PAGE
                                                  Enter "/" to select option.
 Member: _____  / Append to list _ Set Libraries _ Source Type _ Preferences
 ------------------------------------------------------------- --------------------
 __  Group Action         _ View Reports     1 Exec Mode ( 1. Foreground 2. Batch)
       File1            File2    Base      Have  Have  Source
 "/"  Member   Action   Member   Member    Work  Merge Type
 __  AZZASM01 PROCESSED YES      YES       YES   YES   COBOL__
 __  AZZCBLA1           YES      YES       YES         COBOL__
 __  AZZCBLA2           YES      YES       YES   YES   COBOL__
 __  AZZCBL01           YES      YES       YES         COBOL__
 __  AZZCBL02           YES      ------    YES         COBOL__
 __  AZZCBL11           YES      YES       YES         COBOL__
 __  AZZCBY01           ------   YES       YES         COBOL__ EXCLUDED
 __  AZZEOFCD           ------   ------                COBOL__ EXCLUDED
 __  AZZSWTCH           ------   ------                COBOL__ EXCLUDED
 ****************************** Bottom of data ********************************
```

Figure 23. Finished Action

When the user specifies "2" in the Exec Mode, an Edit and Submit JCL panel is
displayed. Note that the member being merged is displayed under the option line.

```
                          Merge Tool Edit and Submit JCL
  Option ===>

  PROGRAM: AZZCBLA2

  Select one of the following options and press enter:

                          1    Edit JCL
                          2    Submit JCL

Job cards:
======> //JOBID  JOB (YOURACCT),'NAME',
======> //    CLASS=?,REGION=2M,
======> //    MSGCLASS=H,MSGLEVEL=(1,1),NOTIFY=&SYSUID

Additional JCL:
======> _____
======> _____
======> _____
======> _____
======> _____


                       END =  Exit    PF1 =  Help
```

Figure 24. Edit and Submit JCL

From the Edit and Submit panel the user may edit or submit the generated JCL.
Additionally, the user has the opportunity to add additional JCL to the built job.

When the user selects Submit JCL (2) the generated JCL is submitted and the user
is returned to the Merge Tool Main panel. A note "SUBMITTED" is displayed in the
Action column across from the member.

```
                     IBM Merge Tool for z/OS and OS/390      Row 1 to 5 of 5
 Command ===> _____          Scroll ===> PAGE
                                                      Enter "/" to select option.
 Member: _____  _ Append to list _ Set Libraries _ Source Type _ Preferences
 ------------------------------------------------------- --------------------
 __  Group Action        _ View Reports    2 Exec Mode ( 1. Foreground 2. Batch)
     File1            File2    Base     Have  Have   Source
 "/" Member   Action   Member   Member   Work  Merge  Type
 __  AZZCBLA1  SUBMITTED YES      YES      YES          COBOL__
 __  AZZCBLA2           YES      YES      YES   YES    COBOL__
 __  AZZCBL01           YES      YES      YES          COBOL__
 __  AZZCBL02           YES      ------   YES          COBOL__
 __  AZZCBL11           YES      YES      YES          COBOL__
 ****************************** Bottom of data *********************************
```

Figure 25. Submitted JCL

When the user selects Edit JCL (1) the generated JCL is displayed in an edit panel.
The user can modify the JCL and submit it from this panel.

```
  File  Edit  Edit_Settings  Menu  Utilities  Compilers  Test  Help
--------------------------------------------------------------------------------
EDIT       MERGE01.SPFTEMP1.CNTL                            Columns 00001 00080
Command ===>                                                 Scroll ===> PAGE
****** ****************************** Top of Data **************************
000001 //AZZCLBA1 JOB  (@TS2,MVS6),'MERGETL',USER=MERGE01,NOTIFY=MERGE01,
000002 //  TIME=(5),CLASS=A,MSGLEVEL=(1,1),REGION=128M
000003 //*-----------------------------------------------------------------*
000004 //*  IBM MERGE TOOL FOR Z/OS AND OS/390                             *
000005 //*-----------------------------------------------------------------*
000006 //STEP1  EXEC PGM=IKJEFT01
000007 //STEPLIB  DD  DSN=AZZ.SAZZLOAD,DISP=SHR
000008 //SYSPROC  DD  DSN=AZZ.SAZZCLIB,DISP=SHR
000009 //SYSTSIN  DD  *
000010   EXEC 'AZZ.SAZZCLIB(AZZMERGE)'
000011 //SYSTSPRT DD  SYSOUT=*
000012 //*
000013 //*  TO BUILD A WORK FILE,
000014 //*  ALLOCATE CIGBASE, CIGDD01, CIGDD02, AND CIGWORK DD STATEMENTS
000015 //*
000016 //*  TO BUILD A MERGE FILE FROM A WORK FILE,
000017 //*  ALLOCATE CIGMERGE.
000018 //*
   ⋮
```

Figure 26. Generated JCL

To complete the edit session the user will PF3. The JCL has been updated and cannot be submitted using Submit JCL (2).

If the user has an appended list using different libraries then they will be presented with a number of submit occurrences.

Other Invocation Considerations

When the action is SS, Exec Mode of 1 (foreground) the result will first be a foreground display of the member statistics.

```
  File  Edit  Edit_Settings  Menu  Utilities  Compilers  Test  Help
--------------------------------------------------------------------------------
EDIT       AZZ.SAZZSAMS                                     Columns 00001 00080
Command ===>                                                 Scroll ===> CSR
****** ****************************** Top of Data **************************
==MSG> -Warning- The UNDO command is not available until you change
==MSG>          your edit profile using the command RECOVERY ON.
000001 15:38:39 ------ WORK FILE STATISTICS ------
000002 15:38:39 File1 name............ AZZ.SAZZSAM1(AZZCBLA1)
000003 15:38:39 File2 name............ AZZ.SAZZSAM2(AZZCBLA1)
000004 15:38:39 Baseline name........ AZZ.SAZZSAMB(AZZCBLA1)
000005 15:38:39 # of lines in base.... 96
000006 15:38:39 # of lines in file1... 117
000007 15:38:39 # of lines in file2... 101
000008 15:38:39 # of unchanged lines.. 85
000009 15:38:39 # of inserts both..... 0
000010 15:38:39 # of inserts file1.... 27
000011 15:38:39 # of inserts file2.... 12
000012 15:38:39 # of deletes both..... 2
000013 15:38:39 # of deletes file1.... 4
000014 15:38:39 # of deletes file2.... 5
000015 15:38:39 # of conflicts both... 2
000016 15:38:39 # of conflicts file1.. 2
000017 15:38:39 # of conflicts file2.. 3
000018 15:38:39 --------------------------------
****** ****************************** Bottom of Data ************************
```

Figure 27. Member Statistics

When the user exits the Statistics display the 'PROCESSED' note is displayed in the Action column across from the members.

When the user specifies Exec Mode 1 and an action of SS but has not defined the Statistics Files in the Set Libraries, they will receive the "NEED DSN" message in the action column across from the member.

```
 .   .   .   .   .   .   .   .   .   .   .   .   .   .   .   .   .   .   .   .   .   .   .   .   .
                        IBM Merge Tool for z/OS and OS/390        Row 1 to 9 of 9
 Command ===> _____          Scroll ===> PAGE
                                                        Enter "/" to select option.
 Member: _____ _ Append to list _ Set Libraries _ Source Type _ Preferences
 ------------------------------------------------------------ --------------------
 __ Group Action         _ View Reports    2 Exec Mode ( 1. Foreground 2. Batch)
    File1               File2   Base       Have  Have   Source
 "/" Member   Action    Member  Member     Work  Merge  Type
 __  AZZASM01  VIEWED    YES     YES        YES   YES    COBOL__
 __  AZZCBLA1  NEED DSN  YES     YES        YES          COBOL__
 __  AZZCBLA2  EDITED    YES     YES        YES   YES    COBOL__
 __  AZZCBL01            YES     YES        YES          COBOL__
 __  AZZCBL02            YES     ------     YES          COBOL__
 __  AZZCBL11            YES     YES        YES          COBOL__
 __  AZZCBY01  NOT FOUND ------  YES        YES          COBOL__
 __  AZZEOFCD            ------  ------                   COBOL__
 __  AZZSWTCH            ------  ------                   COBOL__
 ***************************** Bottom of data ********************************
```

Figure 28. Check Messages

Note that all messages in the action column are accompanied by a short message in the upper right hand corner of the panel. For example if the SS foreground action fails because the Statistics Files are not defined to the session "Stats DSN Needed" will appear in the upper right hand corner of the main panel.

If the action is "E?" or" B?" where "?" is B, 1, 2, W or M the Merge Tool will display the appropriate message "VIEWED" or "EDITED" in the Action column across from the member(s).

If the user specifies an invalid combination for the Edit and Browse actions the appropriate message will display in the action column across from the member.

An example of an invalid action would be specifying the E2 action for AZZCBY01 in the panel above. The "------" in the File2-Member column indicates no member named AZZCBY01 resides in File2. In this case E2 an invalid action for the member and the "NOT FOUND" message is displayed in the Action column.

Viewing statistics and log messages

The Merge Tool ISPF Workbench gives users the ability to review the statistics files as well as log messages file from the main panel. Enter "/" in the View Reports field.

```
                            IBM Merge Tool for z/OS and OS/390     Row 1 to 5 of 5
   Command ===> _____    Scroll ===> PAGE
                                                         Enter "/" to select option.
   Member: _____  _ Append to list _ Set Libraries _ Source Type _ Preferences
   ----------------------------------------------------------- --------------------
   __ Group Action        / View Reports    2 Exec Mode ( 1. Foreground 2. Batch)
      File1            File2    Base     Have  Have   Source
   "/" Member   Action  Member   Member   Work  Merge  Type
   __ AZZCBLA1           YES      YES      YES          COBOL__
   __ AZZCBLA2           YES      YES      YES    YES   COBOL__
   __ AZZCBL01           YES      YES      YES          COBOL__
   __ AZZCBL02           YES      ------   YES          COBOL__
   __ AZZCBL11           YES      YES      YES          COBOL__
   **************************** Bottom of data *****************************
```

Figure 29. Select View Reports

Merge Tool will display a View Reports panel. The user selects one of the three
choices by placing the corresponding number in the choice field and pressing enter.

```
                            IBM Merge Tool for z/OS and OS/390     Row 1 to 5 of 5
   C _____ VIEW REPORTS _____    PAGE
     | Command ===> _____ |  ion.
   M |                                                               |  ences
   - |                                                               |  -----
   _ |   _  1.   Member Statistics                                   |  Batch)
     |      2.   Summary Statistics                                  |
   " |      3.   Log Messages                                        |
     |                                                               |
   _ |   Select a choice and press ENTER to view.                    |
   _ |                                                               |
   _ |                                                               |
   _ |                                                               |
   _ |                                                               |
   * |                                                               |  ******
     |                                                               |
     |_____|
```

Figure 30. Choose Reports

The types of reports are described in the following table.

Table 9. Report Types		
#	**File**	**Description**
1	Member Statistics	The Member Statistics documents the number of modifications for each source module processed. Conflicting modifications are of particular significance. If there are conflicting changes, you will probably need to manually intervene making sure the merged source module will function as intended.
2	Summary Statistics	The Summary Statistics documents the totals related to number of members processed.
3	Log	The Log displays the parameters and statements in effect during the merge process. If processing does not complete successfully, the reason is reported here. If this is left blank and processing is performed in foreground then the log file is not produced.

Please refer to Chapter 5, "Merge Tool Reports and Statistics" for more detailed
information about the Merge Tool reports.

When the user specifies 1, member statistics, the result will be a panel displaying the member statistics.

```
   File  Edit  Edit_Settings  Menu  Utilities  Compilers  Test  Help
─────────────────────────────────────────────────────────────────────────
VIEW       AZZ.SAZZSAMS                              Columns 00001 00080
Command ===>                                            Scroll ===> PAGE
****** ******************************* Top of Data ****************************
000001 10:54:10 ------ WORK FILE STATISTICS ------
000002 10:54:10 File1 name............ AZZ.SAZZSAM1(AZZCBLA1)
000003 10:54:10 File2 name............ AZZ.SAZZSAM2(AZZCBLA1)
000004 10:54:10 Baseline name......... AZZ.SAZZSAMB(AZZCBLA1)
000005 10:54:10 # of lines in base.... 96
000006 10:54:10 # of lines in file1... 117
000007 10:54:10 # of lines in file2... 101
000008 10:54:10 # of unchanged lines.. 85
000009 10:54:10 # of inserts both..... 0
000010 10:54:10 # of inserts file1.... 27
000011 10:54:10 # of inserts file2.... 12
000012 10:54:10 # of deletes both..... 2
000013 10:54:10 # of deletes file1.... 4
000014 10:54:10 # of deletes file2.... 5
000015 10:54:10 # of conflicts both... 2
000016 10:54:10 # of conflicts file1.. 2
000017 10:54:10 # of conflicts file2.. 3
000018 10:54:10 --------------------------------
```

Figure 31. Member Statistics

When the user specifies 2, summary statistics, the result will be a panel displaying the summary statistics.

```
   File  Edit  Edit_Settings  Menu  Utilities  Compilers  Test  Help
─────────────────────────────────────────────────────────────────────────
VIEW       AZZ.SAZZSAMZ                              Columns 00001 00080
Command ===>                                            Scroll ===> PAGE
****** ******************************* Top of Data ****************************
000001 10:54:10 ------ SUMMARY STATISTICS ------
000002 10:54:10 # of files existing in F1, F2, and Baseline.. 1
000003 10:54:10 # of files existing in F1 and F2 only........ 0
000004 10:54:10 # of files existing in F1 only............... 0
000005 10:54:10 # of files existing in F1 and Baseline only.. 0
000006 10:54:10 # of files existing in F2 and Baseline only.. 0
000007 10:54:10 # of files existing in F2 only............... 0
000008 10:54:10 # of files existing in Baseline only......... 0
000009 10:54:10 # of files not found in any library.......... 0
000010 10:54:10 --------------------------------
****** ***************************** Bottom of Data **************************
```

Figure 32. Summary Statistics

When the user specifies 3, log messages, the result will be a panel displaying the log messages.

```
   File  Edit  Edit_Settings  Menu  Utilities  Compilers  Test  Help
─────────────────────────────────────────────────────────────────────────────
VIEW       AZZ.SAZZSAML                                    Columns 00001 00080
Command ===>                                               Scroll ===> PAGE
****** ****************************** Top of Data **************************
000001 10:54:05 -------------------------------------------------
000002 10:54:05 - IBM MERGE TOOL FOR z/OS AND OS/390
000003 10:54:05 - Log file - 17 May 2002
000004 10:54:05 -------------------------------------------------
000005 10:54:10 ------ SUMMARY STATISTICS ------
000006 10:54:10 # of files existing in F1, F2, and Baseline.. 1
000007 10:54:10 # of files existing in F1 and F2 only........ 0
000008 10:54:10 # of files existing in F1 only............... 0
000009 10:54:10 # of files existing in F1 and Baseline only.. 0
000010 10:54:10 # of files existing in F2 and Baseline only.. 0
000011 10:54:10 # of files existing in F2 only............... 0
000012 10:54:10 # of files existing in Baseline only......... 0
000013 10:54:10 # of files not found in any library.......... 0
000014 10:54:10 ---------------------------------
****** ****************************** Bottom of Data ************************
```

Figure 33. Log Messages

Chapter 3. The Merge Tool steps

Identify the merge components

The libraries where source versions are held

In order to properly merge the original source with the two independently modified versions of source or obtain statistical data to assist in the project management the user must first identify the merge components.

Table 10. Merge Components	
File	**Description**
Base File	The original or base source. This would be a PDS with the original version of the source used for both sets of modifications.
File 1	The first of up to two PDS' containing the modified source. In the case of an emergency fix it might be the location of the fixed production source.
File 2	The second, and optional, PDS containing the modified source. In the case of an emergency fix, it might be the location of the new release or enhanced source.
Work File	A PDS that will hold the intermediate merged source. It must be seven bytes larger than the source being analyzed or merged.
Merge File	A PDS that will hold the result of the final merge action.

The member names

The user must determine if the PDS member names are the same between the three files. If the Base, File1 and File2 are the same dataset the will most likely be a member name mask, such as programmer initials, that prefixes the actual member name.

This information is important for the next step: Setting Merge Tool session Preferences as well as the Set Library panel.

Constructing the Work File member

Once the user has identified the files and member names the next step is to construct the Work File members.

Merging the changes into a Work File

To construct the work file via the Merge Tool ISPF interface the user should review and update the Set Libraries Panel to reflect the Base, File1, File2, Work and Merge files to reflect the PDS dataset names identified in the previous step.

Once the libraries are updated the member list can be driven. Using the Line Command or Group Action the user specifies GW (Generate Work File). Based on the Exec Mode field either a batch job is submitted (option 2) or the action is performed in foreground (option 1).

Note: To create a merged file in batch the user must specify both the work file and merged file.

Build Work Outputs

Upon successful completion of the Generate Work action the resulting member is placed in the Work File. If the member already exists it is replaced with the new Work File member. This output is an intermediate merge file. It contains the base (i.e. original) source with both sets of changes incorporated into the base. The member name will be the same as the File1 member name.

Statistical reports are also produced as output of the Build Work process. These reports identify number of members matched as well as reporting on number of lines inserted, deleted and conflicting changes.

Editing the Work File member

Upon successful creation of a Work File member the user now must determine if there are any conflicting changes between the member in File1 and the member in File2.

Any conflicting changes must be reviewed. If it is determined that there is a conflict in overlapping changes the user must address these conflicts prior to merging the source into a combined member. Conflicting changes are indicated in the statistics reports as well as in the Work File members.

Interpreting the work file

The marked-up file shows how modifications in the first version of the source module are merged with modifications in the second version. Columns one through five of the marked-up file indicate whether or not a line was modified.

Column one indicates if a line was modified. Modified lines are shown with a "." in column one.

Column two indicates conflicting lines. Conflicting lines are shown with a "?" in column two.

Column three indicates how the line was modified. Inserts are shown with a "+" while deletes are shown with a "-" in column three. A "+" also indicates if the line was a replacement as opposed to a new line being added.

Column four and five indicate the origin of the modification (##): "1" indicating file1, "2" indicating file2, and "12" indicating that both files contain the same modification.

A simple example of conflicting source changes follows.

```
    Menu  Utilities  Compilers  Help
 ─────────────────────────────────────────────────────────────────────
  BROWSE    AZZ.SAZZSAMW(AZZCBLA1)                    Line 00000000 Col 001 087
  Command ===>                                              Scroll ===> PAGE
 ******************************** Top of Data ********************************
 .---- **** IBM MERGE TOOL FOR z/OS AND OS/390       WORKFILE ****
 .---- BASELINE: AZZ.SAZZSAMB(AZZCBLA1)
 .---- FILE 1  : AZZ.SAZZSAM1(AZZCBLA1)
 .---- FILE 2  : AZZ.SAZZSAM2(AZZCBLA1)
 .---- ....+....1....+....2....+....3....+....4....+....5....+....6....+....7..
             IDENTIFICATION DIVISION.
             PROGRAM-ID.    AZZCBLA1.
 .?+1        AUTHOR.        ARTHUR MILLER.
 .?+2        AUTHOR.        ARTHUR MURRAY.
 .?-12       AUTHOR.        ARTHUR AUTHOR.
             *****************************************************************
             *
             * THIS IS A SAMPLE PROGRAM USED FOR THE MERGE TOOL.
             *
             *****************************************************************
             ENVIRONMENT DIVISION.
             CONFIGURATION SECTION.
             INPUT-OUTPUT SECTION.
             FILE-CONTROL.
```

Figure 34. Conflicting Source Changes

Creating the Merge File

Once the Work File has been reviewed and optionally modified for conflicting changes it is ready for the final merge. The result of the final merge will be one member with the combined changes, ready to add to the site source management tool such as SCLM.

Merging the Work File

Using the Line Command or Group Action the user specifies GM (i.e., Generate Merge File). Based on the Exec Mode field either a batch job is submitted (option 2) or the action is performed in foreground (option 1).

Note: In batch, to create a merge file directly from a work file specify the ddnames CIGWORK and CIGMERGE only, CIGBASE, CIGDD01, and CIGDD02 will be omitted. If CIGBASE, CIGDD01, and CIGDD02 are specified then the work file specified in CIGWORK will be replaced prior to the creation of the final merged file.

Merge Outputs

Upon successful completion of the Generate Merge action the resulting member is placed in the Merge File. If the member already exists it is replaced with the new Work File member. The member name will be the same as the Merge File member name.

The output is the combined merge file. It contains the base (i.e., original) source with both sets of changes incorporated into the base, based on the merge directives in columns one through 5 of the Work File.

When addressing conflicts in the Work File the user may determine that the change, although in the same section of code, do not overlap. It may be determined that all the changes should be merged, even lines in conflict.

The example below shows what the merge process will do if conflicts are not
resolved. Note that both author statements were included in the Merge File source.

```
  File  Edit  Edit_Settings  Menu  Utilities  Compilers  Test  Help
 ─────────────────────────────────────────────────────────────────────
 EDIT       AZZ.SAZZSAMM(AZZCBLA1) - 01.00             Columns 00001 00080
 Command ===>                                          Scroll ===> CSR
 ****** ****************************** Top of Data **************************
 000001         IDENTIFICATION DIVISION.
 000002         PROGRAM-ID.   AZZCBLA1.
 000003         AUTHOR.       ARTHUR MILLER.
 000004         AUTHOR.       ARTHUR MURRAY.
 000005         ****************************************************************
 000006         *
 000007         * THIS IS A SAMPLE PROGRAM USED FOR THE MERGE TOOL.
 000008         *
 000009         ****************************************************************
 000010         ENVIRONMENT DIVISION.
 000011         CONFIGURATION SECTION.
 000012         INPUT-OUTPUT SECTION.
 000013         FILE-CONTROL.
 000014
 000015             SELECT REC-IN ASSIGN TO OUTFILE
 000016             FILE STATUS IS SF-STAT.
 000017
 000018             SELECT NAME-IN ASSIGN TO NAMEFILE
```

Figure 35. Unresolved Conflicts

The Merge File members can then be added to the site source management tool
and compiled and linked, if appropriate.

Test Outputs

Although the Merge Tool cannot assist in the testing of the merge output it is
important to note that if the user determines that the testing is unsuccessful, they
may perform the Work File edit, or even creation, and subsequent steps over and
over until testing is successful.

Chapter 4. The IBM Merge Tool for z/OS and OS/390 Batch Utility

The JCL

The Merge Tool can be executed via a batch job. Three sample JCL members can be found in the **hlq.**SAZZJCL library created during the installation procedure. **hlq** denotes the high level qualifier of the product's target library. The batch process works out what action it is going to perform based on the files that are allocated in the JCL.

AZZMRKUP - Build a Mark-up (Work) File

The following JCL is a sample of the AZZMRKUP member. Note the exclusion of the CIGMERGE DD statement in this sample JCL.

Include the CIGMERGE DD statement only if you wish to have the final merged file created.

```
        ⋮
//STEP1  EXEC PGM=IKJEFT01
//STEPLIB DD  DSN=AZZ.SAZZLOAD,DISP=SHR
//SYSTSIN DD  *
  EXEC 'AZZ.SAZZCLIB(AZZMERGE)'
//SYSTSPRT DD  SYSOUT=*
//*
//*  TO BUILD A WORK FILE,
//*  ALLOCATE CIGBASE, CIGDD01, CIGDD02, AND CIGWORK DD STATEMENTS
//*
//*  NOTE: CIGWORK MUST HAVE A LRECL 7 LARGER THAN CIGDD01
//*
//CIGBASE  DD  DISP=SHR,DSN=AZZ.SAZZSAMB
//CIGDD01  DD  DISP=SHR,DSN=AZZ.SAZZSAM1
//CIGDD02  DD  DISP=SHR,DSN=AZZ.SAZZSAM2
//CIGWORK  DD  DISP=SHR,DSN=AZZ.SAZZSAMW
//*
//*  IF BASE OR FILE 2 IS OMITTED THEN FILE1 NAME IS USED
//*  IF FILE 1 IS OMITTED THEN BASE NAME WILL BE USED
//*  IF FILE 1 AND BASE IS OMITTED THEN FILE 2 WILL BE USED
//*  IF NO SELECT STATEMENT SPECIFIED THEN '*' WILL BE USED.
//*
//*  TYPE CAN BE JCL, DATA, ASM, COBOL, PL1 OR XX:XX
//*  DEFAULT TYPE IS DATA (ALL COLUMNS)
//*
//CIGIN    DD  *
SELECT FILE1 XXXXXXXX FILE2 XXXXXXXX WORK XXXXXXXX TYPE XXXXX
/*
//CIGLOG   DD  SYSOUT=*
//*
//*  PRESENCE OF CIGSUMM WILL CAUSE SUMMARY STATISTICS
//*  TO BE WRITTEN.
//*
//*  PRESENCE OF CIGSTATS WILL CAUSE MEMBER LEVEL STATISTICS
//*  TO BE WRITTEN.
//*
//CIGSUMM  DD  SYSOUT=*
//CIGSTATS DD  SYSOUT=*
```

Figure 36. Build Mark-up File

AZZMERG0 - Build the Final Merge File from the Work File

The following JCL is a sample of the AZZMERG0 member. Note the exclusion of the CIGBASE, CIGDD01 AND CIGDD02 DD statements.

Include the aforementioned DD statements only if you wish to create a new work file.

```
        ⋮
//STEP1  EXEC PGM=IKJEFT01
//STEPLIB  DD  DSN=AZZ.SAZZLOAD,DISP=SHR
//SYSTSIN  DD  *
  EXEC 'AZZ.SAZZCLIB(AZZMERGE)'
//SYSTSPRT DD  SYSOUT=*
//*
//*  TO BUILD A MERGE FILE FROM A WORK FILE,
//*  ALLOCATE CIGMERGE.
//*
//*  NOTE: CIGWORK MUST HAVE A LRECL 8 LARGER THAN CIGDD01
//*
//CIGWORK  DD  DISP=SHR,DSN=AZZ.SAZZSAMW
//CIGMERGE DD  DISP=SHR,DSN=AZZ.SAZZSAMM
//*
//*
//*  IF BASE OR FILE 2 IS OMITTED THEN FILE1 NAME IS USED
//*  IF FILE 1 IS OMITTED THEN BASE NAME WILL BE USED
//*  IF FILE 1 AND BASE IS OMITTED THEN FILE 2 WILL BE USED
//*  IF NO SELECT STATEMENT SPECIFIED THEN '*' WILL BE USED.
//*
//*  TYPE CAN BE JCL, DATA, ASM, COBOL, PL1 OR XX:XX
//*  DEFAULT TYPE IS DATA (ALL COLUMNS)
//*
//CIGIN    DD  *
SELECT FILE1 XXXXXXXX FILE2 XXXXXXXX BASE XXXXXXXX TYPE XXXXX
/*
//CIGLOG   DD  SYSOUT=*
//*
//*  PRESENCE OF CIGSUMM WILL CAUSE SUMMARY STATISTICS
//*  TO BE WRITTEN.
//*
//*  PRESENCE OF CIGSTATS WILL CAUSE MEMBER LEVEL STATISTICS
//*  TO BE WRITTEN.
//*
//CIGSUMM  DD  SYSOUT=*
//CIGSTATS DD  SYSOUT=*
```

Figure 37. Build Final Merge File

AZZMRGIT - Build a Mark-up (Work) File and Final Merge File

The following JCL is a sample of the AZZMRGIT member. Note the inclusion of the CIGBASE, CIGDD01, CIGDD02, CIGWORK and CIGMERGE DD statements in this sample JCL.

This JCL will create a Work File and immediately interpret the Work File, creating a Merged File with both sets of changes incorporated, including conflicting changes.

```
       ⋮
//STEP1  EXEC PGM=IKJEFT01
//STEPLIB  DD  DSN=AZZ.SAZZLOAD,DISP=SHR
//SYSTSIN  DD  *
  EXEC 'AZZ.SAZZCLIB(AZZMERGE)'
//SYSTSPRT DD  SYSOUT=*
//*
//*  TO BUILD A WORK FILE,
//*  ALLOCATE CIGBASE, CIGDD01, CIGDD02, AND CIGWORK
//*   AND COMMENT OUT CIGMERGE
//*
//*  TO BUILD A MERGE FILE FROM A WORK FILE,
//*  ALLOCATE CIGMERGE.
//*    AND COMMENT OUT CIGBASE, CIGDD01 AND CIGDD02
//*
//*  NOTE: CIGWORK MUST HAVE A LRECL 7 LARGER THAN CIGDD01
//*
//CIGBASE  DD  DISP=SHR,DSN=AZZ.SAZZSAMB
//CIGDD01  DD  DISP=SHR,DSN=AZZ.SAZZSAM1
//CIGDD02  DD  DISP=SHR,DSN=AZZ.SAZZSAM2
//CIGWORK  DD  DISP=SHR,DSN=AZZ.SAZZSAMW
//CIGMERGE DD  DISP=SHR,DSN=AZZ.SAZZSAMM
//*
//*  IF BASE OR FILE 2 IS OMITTED THEN FILE1 NAME IS USED
//*  IF FILE 1 IS OMITTED THEN BASE NAME WILL BE USED
//*  IF FILE 1 AND BASE IS OMITTED THEN FILE 2 WILL BE USED
//*  IF NO SELECT STATEMENT SPECIFIED THEN '*' WILL BE USED.
//*
//*  TYPE CAN BE JCL, DATA, ASM, COBOL, PL1 OR XX:XX
//*  DEFAULT TYPE IS DATA (ALL COLUMNS)
//*
//CIGIN    DD  *
SELECT FILE1 XXXXXXXX FILE2 XXXXXXXX WORK XXXXXXXX TYPE XXXXX
/*
//CIGLOG   DD  SYSOUT=*
//*
//*  PRESENCE OF CIGSUMM WILL CAUSE SUMMARY STATISTICS
//*  TO BE WRITTEN.
//*
//*  PRESENCE OF CIGSTATS WILL CAUSE MEMBER LEVEL STATISTICS
//*  TO BE WRITTEN.
//*
//CIGSUMM  DD  SYSOUT=*
//CIGSTATS DD  SYSOUT=*
```

Figure 38. Create Merged File

Utility DD statements

The DD statements used in the previous three examples are documented below.

Table 11 (Page 1 of 2). Utility DD Statements	
DDNAME	**Description**
CIGBASE	The Base File or original source used for modifications. This DD is required for the GW and GB actions.
CIGDD01	File1 source library. The first of up to two files containing the modified source. In the case of an emergency fix it might be the location of the fixed production source. This DD is required for the GW and GB actions.
CIGDD02	File2 source library. The second, and optional, PDS containing the modified source. In the case of an emergency fix, it might be the location of the new release or enhanced source. This DD is required for the GW and GB actions.
CIGWORK	The Work File library. This is where the Merge Tool puts the output from the Generate Work action or where the Merge Tool gets the input for the Generate Merge action. This DD is required for the GW, GM and GB actions.

Table 11 (Page 2 of 2). Utility DD Statements	
DDNAME	**Description**
CIGMERGE	The Merge File library. This is where the Merge Tool puts the output from the final merge step (i.e., Generate Merge). This DD is required for the GM and GB actions.
CIGSTATS	Number of modifications for each source module processed. Conflicting modification are of particular significance. This DD is required for statistical reporting and may be a dataset or SYSOUT.
CIGSUMM	Totals related to number of members processed. This DD is required for summary reporting and may be a dataset or SYSOUT.
CIGLOG	Parameters and statements in effect during the merge process. If processing fails, the reason is reported here. Traces are also written to this DD when requested and may be a dataset or SYSOUT.
CIGIN	Specifies members to be acted upon

The Merge Tool Syntax

The Merge Tool syntax allows the user to specify the members to be acted upon. The following Tables document the parameters and syntax for the build Work File and build Merge File actions.

```
For AZZMRGIT and AZZMRKUP the SELECT statement is as follows:

SELECT FILE1 XXXXXXXX FILE2 XXXXXXXX WORK XXXXXXXX TYPE XXXXX

For AZZMERG0 the SELECT statement is as follows:

SELECT FILE1 XXXXXXXX FILE2 XXXXXXXX BASE XXXXXXXX TYPE XXXXX
```

Figure 39. Syntax of Member Select Statements

The SELECT parameter identifies the objects of the merge process. The sub-parameters and their values are documented in the following table. There must be at least one SELECT statement contained within the CIGIN DD statement.

The syntax for the Merge Tool requests is defined in the following table.

Table 12. Syntax for Merge Tool Requests	
Parameter	**Value/Default**
FILE1	The name or name pattern of the members in File1 to be object of the action. This parameter is required.
FILE2	The name or name pattern of the members in File2 to be object of the action. This parameter is optional. Default is same member name as File1.
BASE	The name or name pattern of the members in the Base File to be the object of the action. This parameter is optional. Default is same member name as File1.
TYPE	JCL, DATA, ASM, COBOL, PL1, SS:EE indicates the type of source being merged. This will override the default merge compare columns (all source columns) to ones specific to the type. Example: COBOL will direct the Merge Tool to compare source columns 7 through to 72. This parameter is optional. Default is all columns.
	Note: If a specific type is not specified then start and end columns can be specified. For example 1:72
WORK	Intermediate merged file member(s)

SYNTAX EXAMPLES

Example 1:

```
SELECT FILE1 *
```

Example1 requests all members that match the member names of FILE1 as objects to the action.

Example 2:

```
SELECT FILE1 AZZCBY*  FILE2 AZZCBZ*  BASE AZZCBL* TYPE COBOL
```

Example2 requests to use the member name pattern to match the member names of FILE1 that begin with AZZCBY and members in FILE2 that begin with AZZCBZ with BASE members that begin with AZZCBL. Additionally, the COLUMN TYPE was specified as COBOL so only columns 7 to 72 will be compared.

Example 3:

```
SELECT FILE1 AZZCBL01
```

Example 3 requests that the Merge Tool use the member name specified in the FILE1 parameter for the FILE2 and BASE files as object for the action.

Chapter 5. Merge Tool Reports and Statistics

Types of reports available

There are a total of three different types of reporting the Merge Tool performs. The types of reports and descriptions follow.

Report Type	Description
Table 13. Reports Available	
CIGSTATS	Number of modifications for each source module processed. Conflicting changes are of particular significance. This DD is required for Mark-up statistical reporting and may be a dataset or SYSOUT.
CIGSUMM	Totals related to number of members processed. This DD is required for Mark-up summary reporting and may be a dataset or SYSOUT.
CIGLOG	Parameters and statements in effect during the merge process. If processing fails, the reason is reported here. Traces are also written to this DD when requested and may be a dataset or SYSOUT.

Samples of the Reports

Sample Report Output for Single Member

```
000001 09:48:39 ------ SUMMARY STATISTICS ------
000002 09:48:39 # of files existing in F1, F2, and Baseline.. 1
000003 09:48:39 # of files existing in F1 and F2 only........ 0
000004 09:48:39 # of files existing in F1 only............... 0
000005 09:48:39 # of files existing in F1 and Baseline only.. 0
000006 09:48:39 # of files existing in F2 and Baseline only.. 0
000007 09:48:39 # of files existing in F2 only............... 0
000008 09:48:39 # of files existing in Baseline only......... 0
000009 09:48:39 # of files not found in any library.......... 0
000010 09:48:39 --------------------------------
```

Figure 40. Summary Statistics report for single member Mark-up Request

```
09:48:39 ------ WORK FILE STATISTICS ------
09:48:39 File1 name............ AZZ.SAZZSAM1(AZZCBLA2)
09:48:39 File2 name............ AZZ.SAZZSAM2(AZZCBLA2)
09:48:39 Baseline name......... AZZ.SAZZSAMB(AZZCBLA2)
09:48:39 # of lines in base.... 97
09:48:39 # of lines in file1... 92
09:48:39 # of lines in file2... 97
09:48:39 # of unchanged lines.. 88
09:48:39 # of inserts both..... 0
09:48:39 # of inserts file1.... 2
09:48:39 # of inserts file2.... 0
09:48:39 # of deletes both..... 0
09:48:39 # of deletes file1.... 7
09:48:39 # of deletes file2.... 0
09:48:39 # of conflicts both... 0
09:48:39 # of conflicts file1.. 0
09:48:39 # of conflicts file2.. 2
09:48:39 --------------------------------
```

Figure 41. Member Statistics report for single member Mark-up Request

```
09:48:26 ----------------------------------------------
09:48:26 - IBM MERGE TOOL FOR OS/390 AND Z/OS
09:48:26 - Log file - 18 Feb 2002
09:48:26 ----------------------------------------------
09:48:38 Work file written: AZZ.SAZZSAMW(AZZCBLA2)
09:48:38 Lines written....: 104
09:48:39 ------ SUMMARY STATISTICS ------
09:48:39 # of files existing in F1, F2, and Baseline.. 1
09:48:39 # of files existing in F1 and F2 only........ 0
09:48:39 # of files existing in F1 only............... 0
09:48:39 # of files existing in F1 and Baseline only.. 0
09:48:39 # of files existing in F2 and Baseline only.. 0
09:48:39 # of files existing in F2 only............... 0
09:48:39 # of files existing in Baseline only......... 0
09:48:39 # of files not found in any library.......... 0
09:48:39 --------------------------------
```

Figure 42. Log activity report for single member Mark-up Request

Sample Report Output for Full Library Request

```
------ SUMMARY STATISTICS ------
# of files existing in F1, F2, and Baseline.. 4
# of files existing in F1 and F2 only........ 1
# of files existing in F1 only............... 2
# of files existing in F1 and Baseline only.. 1
# of files existing in F2 and Baseline only.. 1
# of files existing in F2 only............... 0
# of files existing in Baseline only......... 1
# of files not found in any library.......... 0
```

Figure 43. Summary Statistics for full library Mark-up Request

```
12:43:51 ------------------------------------------------
12:43:51 - IBM MERGE TOOL FOR Z/OS AND OS/390
12:43:51 - Log file - 13 Feb 2002
12:43:51 ------------------------------------------------
12:44:03 Work file written: AZZ.SAZZSAMW(AZZCBLA1)
12:44:03 Lines written....: 106
12:44:03 Lines written....: 110
12:44:03 ------ SUMMARY STATISTICS ------
12:44:03 # of files existing in F1, F2, and Baseline.. 4
12:44:03 # of files existing in F1 and F2 only........ 1
12:44:03 # of files existing in F1 only............... 2
12:44:03 # of files existing in F1 and Baseline only.. 1
12:44:03 # of files existing in F2 and Baseline only.. 1
12:44:03 # of files existing in F2 only............... 0
12:44:03 # of files existing in Baseline only......... 1
12:44:03 # of files not found in any library.......... 0
```

Figure 44. Log Activity Report for full library Mark-up Request

```
15:13:06 ------ WORK FILE STATISTICS ------
15:13:06 File1 name............ AZZ.SAZZSAM1(AZZCBLA1)
15:13:06 File2 name............ AZZ.SAZZSAM2(AZZCBLA1)
15:13:06 Baseline name........ AZZ.SAZZSAMB(AZZCBLA1)
15:13:06 # of lines in base.... 96
15:13:06 # of lines in file1... 117
15:13:06 # of lines in file2... 101
15:13:06 # of unchanged lines.. 85
15:13:06 # of inserts both..... 0
15:13:06 # of inserts file1.... 29
15:13:06 # of inserts file2.... 9
15:13:06 # of deletes both..... 2
15:13:06 # of deletes file1.... 4
15:13:06 # of deletes file2.... 3
15:13:06 # of conflicts both... 0
15:13:06 # of conflicts file1.. 0
15:13:06 # of conflicts file2.. 2
15:13:06 --------------------------------
15:13:07 ------ WORK FILE STATISTICS ------
15:13:07 File1 name............ AZZ.SAZZSAM1(AZZCBLA2)
15:13:07 File2 name............ AZZ.SAZZSAM2(AZZCBLA2)
15:13:07 Baseline name........ AZZ.SAZZSAMB(AZZCBLA2)
15:13:07 # of lines in base.... 97
15:13:07 # of lines in file1... 92
15:13:07 # of lines in file2... 97
15:13:07 # of unchanged lines.. 88
15:13:07 # of inserts both..... 0
15:13:07 # of inserts file1.... 2
15:13:07 # of inserts file2.... 0
15:13:07 # of deletes both..... 0
15:13:07 # of deletes file1.... 7
15:13:07 # of deletes file2.... 0
15:13:07 # of conflicts both... 0
15:13:07 # of conflicts file1.. 0
15:13:07 # of conflicts file2.. 2
15:13:07 --------------------------------
15:13:08 ------ WORK FILE STATISTICS ------
15:13:08 File1 name............ AZZ.SAZZSAM1(AZZCBL01)
15:13:08 File2 name............ AZZ.SAZZSAM2(AZZCBL01)
15:13:08 Baseline name........ AZZ.SAZZSAMB(AZZCBL01)
   ⋮
```

Figure 45. Member Statistics for full library Mark-up Request

This report will continue with an entry for each member that was used as object to
the action.

Appendix A. Sample IBM Merge Tool for z/OS and OS/390 Scenarios

The following usage scenarios are used to illustrate, from a programmer's perspective, the possible situations in which the Merge Tool can facilitate application maintenance. An example application called "Online Ordering" will be used in the usage scenarios. In all scenarios, the customer must install and configure the Merge Tool.

Note: For this and other scenarios that follow, all ISPF actions are also available in a batch utility. It is up to the user to determine if foreground execution of the Merge Tool is a viable option for the project, based on resources and the scope of the merge effort.   When attempting to merge the contents of entire libraries, it is recommended that the batch utility be used.

Scenario #1 " Basic Parallel Development " The Emergency Production Fix

Programmer codes enhancement to the "Online Ordering" system main program. While the enhancement is being coded a bug is found and fixed in the current production source by the maintenance team.

Problem The source for the enhancement does not contain the production fix. Promotion of the enhancement will reverse the production fix causing production failures to return.

Solution Reconcile the fix into the enhanced version of the source. Prior to promotion the programmer must incorporate the fix into their code using the Merge Tool.

Assumption The Merge Tool has been installed at the customer site into a set of ISPF libraries. User has created the statistic and log data sets required for reporting.

1. Identify the location of the:

   Original or base source This would be the common version of the source used for the enhancement as well as the production fix.

   Fixed production source (File1) This would be the version of the source currently running in production with the bug fix applied.

   Enhanced source with new functionality (File2) This would be the version of the source that contains the required enhancement to the application.

2. Invoke the Merge Tool and configure the tool for the session:

   a. Review the session preferences for the marked-up work file.

   b. Update the Library data sets for the session based on 1.

3. Specify member name and build member list by pressing Enter.

4. Select member with "/" for action list and "1" to generate the Work file

   - This can also be accomplished by typing GW across from the member on the main Merge Tool panel.

- If the changes are of a simple nature, the programmer can use the GB action to generate the Work file and the Merge file, in one step, skipping the next three steps.

5. At this point the user can review the member statistics or immediately view the work file for conflicting changes.

6. The programmer now edits the Work file to address any conflicting changes made to both versions of the code. The edit session is invoked with the EW action or "/" for the action list and **5** followed by **4** on the next two panels.

   a. Source lines can be inserted into or deleted from the work file.

   b. Merge directives can be changed (i.e., within columns 1 through 5 of the work file).

   c. All conflicting lines can remain and be included in Merge output.

7. Once the programmer is finished reviewing and addressing any conflicting changes, the Work file is used to build a consolidated member in the Merge file. The merge is invoked with the GM action or "/" for the action list and "3" for Generate Merge file from Work file.

8. Once the source is consolidated, the programmer will access their site source management tool (such as SCLM), and introduce the consolidated member, building new output to test.

   a. Source is added from the Merge file and outputs are built.

   b. Outputs are tested for both the production fix and the enhancement.

   Note: If any of the tests fail the Work file may be edited and merged again, creating new output to test (steps 6, 7 and 8). These steps are repeated until successful testing is accomplished.

9. Once the programmer has successfully tested the source for both the fix and enhancement the code may be safely promoted through the life cycle and ultimately to production.

Scenario #2 " Common Parallel Development " Two programmers, one source

Two programmers are assigned to work on different bugs in the same program. Rather than one programmer waiting until the other programmer has completed their changes, and successfully tested the program, they begin development at the same time.

Problem Each version of the fixed program is missing the source for the 'other' fix. Independent promotion of the fixed code will cause source regression and production failures to return.

Solution Programmers must incorporate the independently coded fixes, using the Merge Tool. Once incorporated, they must test for both conditions and promote to production.

Assumption The Merge Tool has been installed at the customer site into a set of ISPF libraries. User has created the statistic and log data sets required for reporting.

1. Programmers must determine what source will be identified as File1 and what source will be identified as File2. Identify the location of the:

> **Original or base source** This would be the common version of the program both programmers used for their source.
>
> **Source with first fix (File1)** This would be the version of the source with one of the fixes for the source currently running in production.
>
> **Source with second fix (File2)** This would be the version of the source with the other fix for the source currently running in production.

2. Invoke the Merge Tool and configure the tool for the session:

   a. Review the session preferences for the marked-up work file.

   b. Update the Library data sets for the session based on 1.

3. Specify member name and build member list by pressing Enter.

4. Select member with "/" for action list and "1" to generate the Work file

   - This can also be accomplished by typing GW across from the member on the main Merge Tool panel.

   - If the changes are of a simple nature, the programmers can use the GB action to generate the Work file and the Merge file, in one step, skipping the next three steps.

5. At this point the programmers would review the member statistics to determine the complexity of the consolidation of development efforts, or immediately view the work file for conflicting changes (i.e., see the next step).

6. The programmer now edits the Work file to address any conflicting changes made to both versions of the code. The edit session is invoked with the EW action or "/" for the action list and **5** followed by **4** on the next two panels.

   a. Source lines can be inserted into or deleted from the work file.

   b. Merge directives can be changed (i.e., within columns 1 through 5 of the work file).

   c. All conflicting lines can remain and be included in Merge output.

7. Once the programmer is finished reviewing and addressing any conflicting changes, the Work file is used to build a consolidated member in the Merge file. The merge is invoked with the GM action or "/" for the action list and "3" for Generate Merge file from Work file.

8. Once the source is consolidated, the programmers will access the site source management tool (such as SCLM) and introduce the consolidated member, building new output to test.

   a. Source is added from the Merge file and outputs are built.

   b. Outputs are tested for both the production fix and the enhancement.

   Note: If any of the tests fail the Work file may be edited and merged again, creating new output to test (steps 6, 7 and 8). These steps are repeated until successful testing is accomplished.

9. Once the programmers have successfully tested the source for both conditions the code may be safely promoted through the life cycle and ultimately to production.

Scenario #3 " Complex Parallel Development " Release management in-house

A Company must maintain an existing software release while developing a new release. The maintenance team must continue to support and code against an existing release, while the development team works on a new release of the product.

Problem   Because current production source was the base of the new release, eventually the maintenance changes must be incorporated in the next release. Promotion of the new release without incorporating the maintenance will reverse the production maintenance causing production failures to return.

This scenario is more complex than the others are because many of the details are unknown.   Proper project management requires these details such as number of members, complexity of the changes, and conflicting changes when forecasting the resources needed for the reconciliation effort.

Solution   Using the Merge Tool, Project Management can assess the development effort required to complete the consolidation of maintenance applied since coding of the new release began. The development team can then reconcile the maintenance into the new version of the source using the Merge Tool.

Assumption The Merge Tool has been installed at the customer site into a set of ISPF libraries. User has created the statistic and log data sets required for reporting.

Project Management actions follow:

1. Identify the location of the:

   Original or base source This would be the common version of the source used for the enhancement as well as the production fix.

   Maintained production source (File1) This would be the version of the source currently running in production with the bug fix applied.

   New release of product (File2) This would be the version of the source that contains the required changes to the application, creating the next release.

2. Invoke the Merge Tool and configure the tool for the session

   a. Review the session preferences for the marked-up work file.

   b. Update the Library data sets for the session based on 1.

3. Enter "*" in member name, build member list by pressing Enter.

4. Run member statistics, and summary statistics against the appropriate files. This is shown in "Merge Tool Actions" on page 19.

   Note: For foreground this will require Library data set updates between each submit if the members are spread across several data set types (i.e. COBOL and Copybooks in one set of libraries, JCL and PROC source in another set of libraries, etc.). In Batch JCL this is a change to the CIGDD01, CIGDD02 and CIGWORK DD statements of the Merge Tool JCL.

5. Analyze the output of the reports to determine the following information:

   a. Number of members requiring consolidation

   b. Complexity of change conflict

   c. Complexity of changes to each version of source (i.e., inserts, deletes, and conflicting changes).

6. Based on analysis Project Management assigns merge tasks to programmers.

Programmer actions follow:

1. Obtain the location of the:

   Original or base source This would be the common version of the source used for the enhancement as well as the production fix.

   Maintained production source (File1) This would be the version of the source currently running in production with the bug fix applied.

   New release of application (File2) This would be the version of the source that contains the required changes to the application, creating the next release.

2. In TSO invoke the Merge Tool and configure the tool for the session:

   a. Review the session preferences for the marked-up work file.

   b. Update the Library data sets for the session based on 6.

3. Enter "*" in member name, build member list by pressing Enter.

4. Select GROUP ACTION with "/" for action list and "1" to generate the Work file

   • This can also be accomplished by typing GW in the Group Action field on the main Merge Tool panel.

   • If the changes are of a simple nature, the programmers can use the GB group action to generate the Work file and the Merge file, in one step, skipping the next three steps.

5. Programmer reviews member statistics and determines the complexity of the effort to consolidate the two versions and, which members require additional resources such as contact with the maintenance programmer for details. The programmer could choose to immediately view the work file for conflicting changes.

6. The programmer now edits the Work file to address any conflicting changes made to both versions of the code. The edit session is invoked with the EW action or "/" for the action list and **5** followed by **4** on the next two panels.

   a. Source lines can be inserted into or deleted from the work file.

   b. Merge directives can be changed (i.e., within columns 1 through 5 of the work file).

   c. All conflicting lines can remain and be included in Merge output; this may be done to test to see if both sets of changes can coexist.

7. Once the programmer is finished reviewing and addressing any conflicting changes, the Work file is used to build a consolidated member in the Merge file. The merge is invoked with the GM action or "/" for the action list and "3" for Generate Merge file from Work file.

8. Once the source is consolidated, the programmers will access the site source management tool (such as SCLM) and introduce the consolidated member, building new output to test.

   a. Source is added from the Merge file and outputs are built.

   b. Outputs are tested for both the production fix and the enhancement.

   Note: If any of the tests fail the Work file may be edited and merged again, creating new output to test (steps 6 on page 49, 7 on page 49 and 8). These steps are repeated until successful testing is accomplished.

9. Once the programmers have successfully tested the source for all conditions the code may be safely promoted with the rest of the new release through the life cycle and ultimately to production.

Scenario #4 " Complex Parallel Development " Vendor customized source

A Company purchased an application package (Version 1) from a software vendor. Consultants were hired to make modifications to the software. When the vendor releases a version upgrade (Version 2) the company must assess the resources required for retrofitting the customization to the upgrade. Once analysis is complete the company must incorporate their customization into the upgraded vendor source.

Problem   The consultants are no longer on this project. With them went the detailed knowledge of the customization done to this application. The company must determine if there is a conflict between the customization and the changes of the new version and then the customization must be re-coded into the new release of the vendor software.

This scenario is complex. Many of the details are unknown. Accurate project management requires these details such as number of members, complexity of the changes, and conflicting changes when forecasting the resources needed for the incorporation effort. Additionally, it should not be necessary to entirely re-code the customization.

Resolution Using the Merge Tool, Project Management can accurately assess the development effort required to address conflicting code changes and complete the retrofitting of the customization with the new release. The development team can then easily reconcile the customization to the new version, using the Merge Tool.

Assumption The Merge Tool has been installed at the customer site into a set of ISPF libraries. User has created the statistic and log data sets required for reporting.

1. Unload all Vendor source to site libraries.

2. Determine which types of source libraries contain customized vendor source.

Note: The following steps should be done for each of the sets of libraries where customization has taken place. If the user prefers not to perform these steps multiple times, the ISPF part of the Merge Tool allows the user to append to lists of members and override member type (e.g., COBOL, Assembler etc.) indicating compare columns. Keep in mind the reports could become quite large and unmanageable, making reporting library by library a more digestible quantity.

Project Management actions follow:

1. Identify the location of the:

   Original or base source This would be the previous version (Version 1) of the vendor source without the customization.

   Production source (File1) This would be the customized Version 1 source, currently running in production.

   New release of product (File2) This would be the source for Version 2 (the upgrade) the vendor shipped (requiring the retrofit of the customization).

2. Invoke the Merge Tool in TSO and configure the tool for the session:

   a. Review the session preferences for the marked-up work file.

   b. Update the Library data sets for the session based on 1.

3. Setting member value to "*", build member list by pressing Enter.

4. Run member statistics, and summary statistics against the appropriate files. This is shown in "Merge Tool Actions" on page 19.

   Note: For foreground this will require Library data set updates between each submit if the members are spread across several data set types (i.e. COBOL and Copybooks in one set of libraries, JCL and PROC source in another set of libraries, etc.). In Batch JCL this is a change to the CIGDD01, CIGDD02 and CIGWORK DD statements of the Merge Tool JCL.

5. Analyze the output of the reports to determine the following information

   a. Number of members requiring consolidation

   b. Complexity of change conflict

   c. Complexity of changes to each version of source (i.e., inserts, deletes, and conflicting changes).

6. Based on analysis Project Management assigns merge tasks to programmers.

Programmer actions follow:

1. Review the location of the following libraries:

   Original (base) source This would be the previous version (Version 1) of the vendor source without the customization.

   Production source (File1): This would be the customized Version 1 source, currently running in production.

   New release of product (File2) This would be the source for Version 2 (i.e., the upgrade) the vendor shipped requiring the retrofit of the customization.

2. Invoke the Merge Tool in TSO and configure the tool for the session

   a. Review the session preferences for the marked-up work file.

   b. Update the Library data sets for the session based on 6.

3. Setting member value to "*", build member list by pressing Enter.

4. Select GROUP ACTION with "/" for action list and "1" to generate the Work file.

- This can also be accomplished by typing GW in the Group Action field on the main Merge Tool panel.

- If the changes are of a simple nature, the programmers can use the GB group action to generate the Work file and the Merge file, in one step, skipping the next three steps.

5. Programmer reviews Work File and statistics and determines which members require retrofitting and the complexity of the effort to consolidate the two versions.

6. The programmer then edits the Work file members to address any conflicting changes made to both versions of the code. The edit session is invoked with the EW action or "/" for the action list and **5** followed by **4** on the next two panels.

   a. Source lines can be inserted into or deleted from the work file.

   b. Merge directives can be changed (i.e., within columns 1 through 5 of the work file).

   c. All conflicting lines can remain and be included in Merge output; this may be done to test to see if both sets of changes can coexist.

   Note: Changes indicated as made by File2 will be the changes for the new release and in most cases will remain. These changed should be ignored unless they overlap the customization (File1).

7. Once the programmer is finished reviewing and addressing any conflicting changes, the edited Work file members are used to build members into the Merge file. The merge action is invoked with the GM action or "/" for the action list and "3" for Generate Merge File from Work File.

8. Once the source is merged, the programmers will access the site source management tool (such as SCLM) and introduce the consolidated members, building new outputs to test.

   a. Source is added from the Merge file and outputs are built.

   b. Outputs are tested for both the customization and new release functionality.

   Note: If any of the testing fails, the Work file may be edited and merged again, creating the new outputs to test (steps 6, 7 and 8). These steps are repeated until successful testing is accomplished.

9. When the programmers have successfully tested the source for all functionality, the code may be safely promoted with the rest of the new release through the life cycle and ultimately to production.

Appendix B. The Merge Tool CUSTOMIZATION Process

These steps should be followed in the order that they are presented. Once you have successfully completed all of the steps and executed all IVP tasks, you will be ready to use the product. The value **hlq.** is used to denote the high level qualifier for the product's installed target libraries. In the samples supplied by the product a hlq of AZZ is used within the sample application.

1. Modify member AZZISPF in the **hlq.**SAZZCLIB (i.e., Clist library)

   Change the following dataset names based on your SMP/E installation:

   ```
   hlq.SAZZPENU  (ISPF panel library)
   hlq.SAZZMENU  (ISPF message library)
   hlq.SAZZSENU  (ISPF skeleton library)
   hlq.SAZZCLIB  (ISPF clist and rexx source library)
   hlq.SAZZLOAD  (load library)
   ```

2. Submit sample member AZZBLD1 in the **hlq.**SAZZJCL.

   This will create sequential datasets and partitioned data sets which are used with the sample application supplied with this product. It will use the following members from **hlq.**SAZZJCL to create the sequential data sets.

   - AZZSAM1
   - AZZSAM2
   - AZZSAMB
   - AZZSAMM
   - AZZSAMW
   - AZZSAML
   - AZZSAMS
   - AZZSAMZ

   Consult the instructions in the sample job for more information.

3. Modify member AZZFRS02 in the **hlq.**SAZZSENU (i.e., ISPF skeleton library)

   Change the following dataset names based on your SMP/E installation:

   ```
   hlq.SAZZCLIB  (ISPF clist and rexx source library)
   hlq.SAZZLOAD  (load library)
   ```

4. Add the SAZZLOAD library to your TSO logon proc or as a link listed library

   a. TSO Logon Procedures

      TSO logon procs are normally found in SYS1.TSOPROC.

      If you are going to provide access to the Merge Tool directly from an ISPF panel then you will need to add the **hlq.**SAZZCLIB (i.e., CLIST library) to the TSO logon SYSPROC DD name concatenation.

      If you do not link list the **hlq.**SAZZLOAD (i.e., load library) then you must add **hlq.**SAZZLOAD to the TSO logon proc STEPLIB.

      To activate a newly created logon proc use the RDEFINE TSOPROC AZZV1R0 UACC(READ) command where AZZV1R0 is the name of the

logon proc. In addition, the TSOPROC list must be refreshed using the following command: SETROPTS RACLIST(TSOPROC) REFRESH.

b. Link listed library

Link listed libraries are normally found in SYS1.PARMLIB as member PROG00. Add the library **hlq.**SAZZLOAD as a LNKLST statement. Issue the following commands to refresh the link list libraries:

```
SET PROG=00
```

```
F LLA,REFRESH
```

Note: PROG=00 would match the last two characters of the member name containing the LNKLST definition.

If you are going to provide access to the Merge Tool directly from an ISPF panel then you will need to add the **hlq.**SAZZCLIB (i.e., CLIST library) to the TSO logon SYSPROC DD name concatenation.

5. Update the main ISPF panel to include easy access to the Merge Tool

The primary ISPF panel is normally called ISR@PRIM, and is normally located in SYS1.LOCAL.ISPFPNLS or SISPPENU. This latter data set will have a high level qualifier of ISP.

The following illustrates the ISPF panel changes to add the IBM Merge Tool as selection item 12 on the primary ISPF panel:

```
)AREA SAREA39
 0  Settings      Terminal and user parameters
 1  View          Display source data or listings
 2  Edit          Create or change source data
 3  Utilities     Perform utility functions
 4  Foreground    Interactive language processing
 5  Batch         Submit job for language processing
 6  Command       Enter TSO or Workstation commands
 7  Dialog Test   Perform dialog testing
 8  LM Facility   Library administrator functions
 9  IBM Products  IBM program development products
10 SCLM           SW Configuration Library Manager
11 Workplace      ISPF Object/Action Workplace
12 Merge Tool     IBM Merge Tool for z/OS and OS/390
 M  More          Additional IBM Products
)INIT

IF (&ZSAR = 'CAL','UPS','SES') &ZCMD = 'SP'
&ZSEL = TRANS (TRUNC (&ZCMD,'.')
  0,'PGM(ISPISM) SCRNAME(SETTINGS)'
  1,'PGM(ISRBRO) PARM(ISRBRO01) SCRNAME(VIEW)'
  2,'PGM(ISREDIT) PARM(P,ISREDM01) SCRNAME(EDIT)'
  3,'PANEL(ISRUTIL) SCRNAME(UTIL)'
  4,'PANEL(ISRFPA) SCRNAME(FOREGRND)'
  5,'PGM(ISRJB1) PARM(ISRJPA) SCRNAME(BATCH) NOCHECK'
  6,'PGM(ISRPTC) SCRNAME(CMD)'
  7,'PGM(ISPYXDR) PARM(&ZTAPPLID) SCRNAME(DTEST) NOCHECK
  8,'PANEL(ISRLPRIM) SCRNAME(LMF)'
  9,'PANEL(ISRDIIS) ADDPOP'
 10,'PGM(ISRSCLM) SCRNAME(SCLM) NOCHECK'
 11,'PGM(ISRUDA) PARM(ISRWORK) SCRNAME(WORK)'
 12,'CMD(AZZISPF)'
  M,'PANEL(IBMPRODS)'
  X,EXIT
 SP,'PGM(ISPSAM) PARM(PNS)'
 ' ',' '
   *,'?' )
&ZTRAIL=.TRAIL
```

Figure 46. Primary ISPF Panel

Appendix C. IBM Merge Tool for z/OS and OS/390 Messages

Messages with a suffix of **I** are informational where a message with a **E** suffix is an error.

AZZF011E No member(s) found

Explanation: User specified a member name or member mask. No match was found for member or mask supplied.

User Response: Check libraries and member name (or mask) supplied.

AZZF012E Enter member mask

Explanation: Group action was specified with no members listed. No members selected for processing.

User Response: Build member list by specifying member name or mask and pressing enter. Then the user can specify a group action.

AZZF013E Invalid command

Explanation: User specified an invalid Merge Tool TSO command at the command line.

User Response: User must specify Clear, Reset, Exclude or Locate. These are the only Merge Tool commands recognized.

AZZF014E Stats DSN Needed

Explanation: User has specified SS to build a Work File member, however the member statistics file is not defined to the session.

User Response: Select "Set Libraries" and specify a data set for Member statistics.

AZZF015E Empty File

Explanation: User specified an empty file for File1, Merge Tool is unable to look at empty files.

User Response: Either put a dummy member in the offending data set or select "Set Libraries" and specify a data set with at least one member.

AZZF016E Locate what?

Explanation: User specified the LOCATE command but did not specify a full or partial member name to locate.

User Response: Specify the full member name or leading characters of member to locate.

AZZF017E &TBFUNC failure

Explanation: There was a failure during ISPF Table handling. RC= &TBRC, error occurred for &TBFUNC of &TBNAME.

User Response: Contact local administrator support.

AZZF018E Mutually exclusive

Explanation: User specified both source type and start/end columns.

User Response: User must supply either a valid Sort Type or start and end compare columns. The valid values are: COBOL, ASM, DATA, JCL, PL1 or start column, colon, end column.

AZZF019E Out of Range

Explanation: User specified an end column that is not greater than the start column. The end column must be greater than start column.

User Response: User must specify an end column that is greater than the start column. Only the bytes between (and including) start and end positions will be compared.

AZZF020E Invalid file1 dataset

Explanation: User specified a sequential dataset (DSORG=PS) as File1. File1 must be a PDS (DSORG=PO).

User Response: Specify correct dataset in set libraries panel and resubmit the request.

FST0003I   error-level = message-text

Explanation: Informational message: This message is written out when tracing is requested. The return code will be shown followed by a descriptive message following the equal sign.

User Response: none

FST0004I   error-level = message-text

Explanation: Informational message: This message is written out when tracing is requested. The return code will be shown followed by a descriptive message following the equal sign.

User Response: none

FST0022E READ ERROR OCCURRED DURING PARSING OF FILE file-name .

Explanation: An attempt to parse the syntax contained in the file shown in the message failed.

User Response: Ensure the file is defined as variable or fixed block (RECFM= parameter). Ensure the file is properly allocated to your session or to the JCL of the job being executed. Refer to the Merge Tool User's Guide for an explanation of the program being executed.

FST0023E DURING PARSING, UNABLE TO ACQUIRE REQUIRED STORAGE.

Explanation: Insufficient storage was available to complete the parsing operation.

User Response: First attempt to increase the REGION= parameter on your job card or on the step being executed. For requests involving very large amounts of data, it may be necessary to reduce the amount of data processed via selection criteria. Refer to Chapter 2, "The Merge Tool ISPF Workbench" for an explanation of selection criteria associated with the program being executed.

FST0024E EXPECTING KEYWORD: syntax-keyword

Explanation: A syntax error was encountered when parsing the input syntax file.

User Response: The syntax is described in "The Merge Tool Syntax" Correct the syntax in error and rerun the job.

FST0025E EXPECTING VARIABLE TO FOLLOW KEYWORD: syntax-variable

Explanation: A syntax error was encountered when parsing the input syntax file.

User Response: Review the syntax is described in "The Merge Tool Syntax." Correct the syntax in error and rerun the job.

FST0026I label-1 @ label-2 DATA=text

Explanation: Informational message: This is a tracing message which appears when parser tracing is in effect.

User Response: none

FST0100E NO STORAGE AVAILABLE TO ALLOCATE FILE HANDLE xxxxxxxx

Explanation: The application could not allocate an internal file block because of storage problems.

User Response: Increase the REGION= parameter on your jobcard or step and rerun job.

FST0101E FAILURE TO SET UP FILE HANDLE FOR file-name.

Explanation: The application could not complete the creation of an internal file block. This error could occur if the application could not allocate the dataset associated with the ddname shown in the message.

User Response: Ensure the dataset associated with the file shown in the message exists. If the file is a system generated ddname then ensure that the application database has been allocated and initialized. You may also need to increase your REGION= parameter on the jobcard or on the step being executed.

FST0110E INVALID FILE HANDLE PASSED TO $$QSAM.

Explanation: This message indicates an internal error occurred when the application was attempting to process a QSAM file.

User Response: Check log for other related messages. If problem persists, call IBM Technical Support.

FST0111E CLOSE FAILURE FOR FILE file-name.

Explanation: This message is issued from $$QSAM services. $$QSAM CLOSE request has failed.

User Response: Check log for other related messages. If problem persists, call IBM Technical Support.

FST0112E OPENO REQUESTED, BUT file-name IS ALREADY OPENED FOR OUTPUT.

Explanation: This message is issued from $$QSAM services. Attempting to open dataset that is already opened for output.

User Response: Check log for other related messages. Make sure you do not have the same file allocated as an output dataset for two different ddnames.

FST0113E OPENI REQUESTED, BUT file-name IS ALREADY OPENED FOR INPUT.

Explanation: This message is issued from $$QSAM services. Attempting to open dataset that is already opened for input.

User Response: Check log for other related messages.

FST0114E ATTEMPTING TO OPEN file-name , BUT UNABLE TO ACQUIRE A FILE HANDLE.

Explanation: This message is issued when attempting to acquire storage.

User Response: Check log for other related messages. You may also need to increase your REGION= parameter on the jobcard or on the step being executed.

FST0115E UNABLE TO ACQUIRE STORAGE TO HOLD THE DCB FOR file-name.

Explanation: This message is issued when attempting to acquire storage, but insufficient storage existed to perform the operation.

User Response: Check log for other related messages. You may also need to increase your REGION= parameter on the jobcard or on the step being executed.

FST0116E FILE file-name IS NEITHER SEQUENTIAL OR PARTITIONED.

Explanation: The file name shown should be sequential or partitioned, but was found to be some other type of DSORG.

User Response: Probable user error. Check your file allocations. This message means that a dataset with other than PS or PO DSORG has been allocated to a PS or PO type ddname. Ensure all files are properly allocated. Fix problem and rerun the job.

FST0117E ATTEMPTING TO OPEN PDS AS A SEQUENTIAL FILE FOR file-name.

Explanation: Merge Tool has encountered an output dataset that is partitioned but does not have member name.

User Response: Check your dataset allocation to ensure a member name is specified. Ensure all files are properly allocated. Fix allocations and rerun the job.

FST0118E UNABLE TO ACQUIRE BUFFER OF buff-len BYTES FOR FILE file-name.

Explanation: This message is issued when attempting to acquire storage, but insufficient storage existed to perform the operation.

User Response: Check log for other related messages. You may also need to increase your REGION= parameter on the jobcard or on the step being executed.

FST0119E OPEN ISSUED FOR FILE file-name , BUT REQUEST FAILED.

Explanation: Unable to open a QSAM file.

User Response: Check log for other related messages. Verify JCL is properly specified.

FST0120E AUTO-OPEN FOR file-name FAILED ON READ REQUEST.

Explanation: Unable to open a QSAM file.

User Response: Check log for other related messages. Verify JCL is properly specified.

FST0121E AN I/O ERROR OCCURRED DURING A READ ON FILE file-name .

Explanation: A read or write QSAM failure occurred.

User Response: Check log for other related messages. Verify JCL is properly specified. Check JES log for related errors on the DASD volume.

FST0122E BUFFER SIZE (buf-len) IS TOO SMALL TO HOLD RECORD (rec).

Explanation: Attempting to write a record to QSAM file with too small record size. The region may be too small to acquire a buffer needed to complete the request.

User Response: Check log for other related messages. Check dataset LRECL. Make sure data sets have the LRECL required as per the manual. Increase the REGION= parameter on the jobcard or step being executed.

FST0124E AUTO-OPEN FOR file-name FAILED ON WRITE REQUEST.

Explanation: Unable to open file shown in message.

User Response: Check log for other related messages. Make sure all required datasets are allocated as per the manual.

FST0125E WRITE TO file-name ISSUED, BUT FILE OPENED FOR INPUT.

Explanation: Attempting to write to a QSAM file that is already opened for input.

User Response: Check log for other related messages. Make sure you do not have the same dataset allocated as both an input and an output dataset.

FST0126E AN I/O ERROR OCCURRED DURING A WRITE ON FILE file-name .

Explanation: An I/O error occurred during a QSAM write operation.

User Response: Check log for other related messages. Verify JCL is properly specified. Check JES log for related errors on the DASD volume.

FST0127E NO STORAGE AVAILABLE TO PERFORM WRITE FUNCTION ON FILE file-name .

Explanation: Region size is probably too small.

User Response: Increase the REGION= parameter on the jobcard or step. If problem persists, it may be necessary to reduce the amount of data being processed via selection criteria as described in the Merge Tool User's Guide .

FST0128E READ ISSUED AGAINST file-name , BUT THE FILE ISN'T OWNED BY $$QSAM.

Explanation: Attempting to perform a QSAM read against a non-QSAM file.

FST0129E READ ISSUED AGAINST file-name , BUT THE FILE IS $CHAINED.

Explanation: This message is issued from $$QSAM services.

User Response: This is an internal error. Check log for other related messages. If problem persists, contact IBM Technical Support.

FST0130E ABEND abend-code OCCURRED WHEN OPENING DSN=dsn-name.

Explanation: An attempt to open the dataset shown in the message failed with an abend.

User Response: Check log for other related messages. Check your JCL and ensure all datasets are allocated an have the correct DCB attributes. Keep any supporting documentation. If problem persists, contact IBM Technical Support.

FST0140E FILE file-name IS NOT ALLOCATED TO THIS SESSION.

Explanation: The file shown in the message was not allocated to the session or to the JCL being executed.

User Response: Probable user error. Make sure that file name is allocated to your session. Rerun job. Check your JCL to ensure all files are properly specified.

FST0141E OBTAIN MACRO FAILED FOR FILE file-name (RC=rc-code).

Explanation: Unable to obtain DCB attributes of a file.

User Response: Check log for other related messages. Make sure that all required datasets are allocated, cataloged, and available to the session or JCL. Check your JCL to ensure all files are properly specified.

FST0144E UNABLE TO LOCATE DSNAME INFORMATION FOR dsn-name.

Explanation: The dataset shown in the message is invalid or is not properly allocated.

User Response: Probable user error. Check JCL or allocations. Make sure all dataset names are valid, allocated, cataloged, and available to the application.

FST0145E DEVICE TYPE FOR FILE file-name NOT SUPPORTED.

Explanation: The application does not support the device type for the file specified.

User Response: Probable user error. Check the file-name in message. If problem persists, contact IBM Technical Support.

FST0155E RESERVE FAILED WITH RC=rc.

Explanation: The application issued a RESERVE macro request, but the RESERVE failed.

User Response: Ensure the database is allocated and has been initialized.

FST0235I   text-1 dsn-name

Explanation: This is a tracing message created during dynamic dataset allocation.

User Response: none

FST0238E DDNAME=ddname DSN=dsn-name

Explanation: A dynamic allocation error was encountered when processing the file shown in the message.

User Response: Review other log messages. If the dataset name is a permanent file, ensure the file has not been deleted or archived. For temporary files, ensure the WORK UNIT and VIO UNIT specification in the INITIALIZATION MODULE file reference a valid UNIT name.

FST0239E DYNAMIC ALLOCATION REQUEST FAILED. RC return-code RE1(reason-code-1) RE2(reason-code-1).

Explanation: This message is issued from $$DYNAM services, the dynamic allocation manager. Allocation failed.

User Response: User, setup, or internal error. Check for other messages in the log. Check any IBM messages in the Messages and Codes manual. If unable to resolve, collect all documentation and contact IBM Technical Support.

FST0249E PRIMARY CIGINI MODULE NOT FOUND. INITIALIZATION FAILED.

Explanation: The load module CIGINI could not be found in the STEPLIB or link list.

User Response: Ensure the load module CIGINI is located in the STEPLIB, JOBLIB, LINKLIB, or LPALIB. Once the INITIALIZATION MODULE has been placed in the proper load library, retry the job.

FST0250E INVALID RECFM= PARAMETER PASSED TO $$DYNAM

Explanation: An internal call was made to dynamically allocate a file, but the file being allocated is of a record format which is not supported.

User Response: Look for other messages in the log, particularly messages which show the dataset name being allocated. Ensure that dataset name has the correct DCB characters as required by the utility that you are attempting to executed. Specify the correct dataset or correct DCB attributes, and restart the job.

FST0251I   PRODUCT LOAD LIBRARY.... dsname

Explanation: This message shows the library from which the products software will be loaded. This data set name is specified in the primary INITIALIZATION MODULE file.

User Response: none

FST0257I   WORK UNIT.......................unit-name

Explanation: Displays the work value coded in the primary INITIALIZATION MODULE file.

User Response: none

FST0259I   VIO UNIT unit-name

Explanation: This message displays the VIO unit value coded in the primary INITIALIZATION MODULE file.

User Response: none

FST0260E UNABLE TO COMPLETE REPORT SET-UP FOR FILE ddname

Explanation: Failure to open or allocate the ddname shown in the message.

User Response: Look for other messages shown in the log. The most likely cause of this error is that the REPORTER cannot open the report output file. Ensure the report file is a valid QSAM file, and resubmit the job.

FST0261E UNABLE TO ACQUIRE STORAGE FOR REPORT HEADINGS.

Explanation: An attempt was made to acquire storage to hold report headings, but storage was not available.

User Response: Increase the REGION parameter, and resubmit the job. If you are requesting reports against very large amounts of data, then selection criteria may be needed to reduce the amount of data processed.

FST0262E FAILURE TO WRITE REPORT HEADING TO FILE ddname

Explanation: An attempt was made to write a report header to the ddname shown in the message, but the write operation failed.

User Response: Ensure the dataset name associated with the ddname is a valid QSAM dataset. Correct the dataset or dataset attributes, and resubmit.

FST0270E UNABLE TO ACQUIRE STORAGE DURING PROGRAM LOADING.

Explanation: An attempt was made to acquire storage, but the GETMAIN operation failed.

User Response: Increase the REGION parameter, and resubmit the job.

FST0271I   PROGRAM LOAD NOTE: //ddname IS NOT ALLOCATED TO SESSION.

Explanation: An attempt was made to load a program from the ddname shown in the message, but the load attempt failed.

User Response: none

FST0272E UNABLE TO ALLOCATE DSNAME dataset

Explanation: An attempt was made to dynamically allocate the dataset shown in the message, but the allocation failed.

User Response: Ensure the dataset exists and is cataloged. Ensure the dataset is not in exclusive use by another application. Resubmit the job.

FST0273E UNABLE TO OPEN DSNAME ddname

Explanation: An attempt was made to open the dataset shown in the message, but the open failed.

User Response: The dataset is most likely not a partitioned dataset which contains load modules. Ensure the dataset shown in the message is a load library. Correct the error, and resubmit the job. Check your INITIALIZATION MODULE file to ensure the product load library is correct.

**FST0274E UNABLE TO LOAD PROGRAM
            program-name FROM dataset**

Explanation: An attempt was made to load the program shown in the message, but the program could not be found.

User Response: The dataset is most likely not a partitioned dataset which contains load modules. Ensure the dataset shown in the message is a load library. If the dataset is a load library then ensure the program shown exists in the dataset. Correct the error, and resubmit the job. Check your initialization module to ensure the product load library is correct.

**FST0275E FAILURE TO CLOSE DSNAME
            dataset-name**

Explanation: An attempt was made to close the load library name shown in the message, but the close was unsuccessful.

User Response: Retry the action. Contact IBM Technical Support if the problem persists.

**FST0276E DDNAME ddname IS ASSIGNED TO
            NULLFILE**

Explanation: This is a tracing message which shows a NULLFILE (DD DUMMY) is being associated with the ddname shown in the message.

User Response: Ensure the ddname shown in the message references a dataset name rather than a NULLFILE (DD DUMMY).

**FST0277E PROGRAM LOAD WILL NOT BE
            PERFORMED.**

Explanation: An attempt was made to load a program from a load library, but the load was unsuccessful.

User Response: Ensure the product load library specified in the initialization module references the correct version of the software product you are executing. Look for previous messages in the log for

more information. Correct the problem, and resubmit the job.

FST0299I   text

Explanation: This message contains descriptive text related to parameters specified in the initialization module.

User Response: NONE

FST0490E DDNAME ddname IS NOT ALLOCATED

Explanation: An attempt to extract directory information was made, but the requested ddname was not allocated to the session.

User Response: Increase the REGION= parameter on the jobcard or step and rerun the job. Contact IBM Technical Support if the problem persists.

**FST0491E dsn-name IS NOT A PARTITIONED DATA
            SET.**

Explanation: An attempt to extract directory information as made, but the requested dataset was not defined as DSORG=PO (partitioned).

User Response: Ensure the dataset being processed is a partitioned dataset.

FST0492E FAILURE TO OPEN dsn-name

Explanation: An open request was issued against the dataset shown in the message, but the open failed.

User Response: Ensure the dataset being processed is a partitioned dataset. Ensure the dataset has not been deleted or archived.

**FST0493E SYNAD FAILURE FOR OPEN FOR
            dsn-name**

Explanation: A SYNAD (error handling) exit was taken during open processing for the dataset shown in the message.

User Response: Ensure the dataset being processed is a partitioned dataset. Ensure the dataset has not been deleted or archived.

FST0495E UNABLE TO ACQUIRE STORAGE

Explanation: Insufficient storage is available to satisfy request.

User Response: Increase the REGION= parameter on the jobcard or step. Rerun the job. If problem persists, use selection criteria to limit the size of the directory list being processed.

FST1800E FAILURE TO ALLOCATE SORT MESSAGE FILE

Explanation: Unable to dynamically allocate the PGM=SORT message file.

User Response: Look for other messages in the log. There may be dynamic allocation error messages giving clues as to the possible cause of error. Ensure the WORK= and VIO= specification in the primary INITIALIZATION MODULE file point at valid units. Correct the error, and retry the job. If the problem persists, contact IBM Technical Support.

FST1801E SORT ERROR OCCURRED: SORT MESSAGE FOLLOWS

Explanation: An attempt to call PGM= SORT was made, but SORT encountered an error.

User Response: Look at the sort messages that follow this message for clues in problem resolution.

FST1802E END OF SORT MESSAGES

Explanation: An attempt to call PGM= SORT was made, but SORT encountered an error. Look at the previous sort messages for clues in problem resolution.

User Response: Correct the error, and retry the job. If the problem persists, contact IBM Technical Support.

FST1803E SORT WAS UNABLE TO WRITE MESSAGES TO SORT MESSAGE FILE

Explanation: The SORT message file internally allocated by $$ SORT may be too small or incorrectly allocated by $$ SORT. This error may be an environmental problem specific to your installation.

User Response: Look for other messages in the log. There may be dynamic allocation error messages giving clues as to the possible cause of error. Ensure the WORK= and VIO= specification in the primary INITIALIZATION MODULE file point at valid units. Correct the error, and retry the job. If the problem persists, contact IBM Technical Support.

FST1804E UNSUCCESSFUL EXTERNAL SORT: RC= return code

Explanation: This message follows previous SORT error messages.

User Response: Look for other messages in the log. Correct the error, and retry the job.

FST1805E UNSUCCESSFUL INTERNAL SORT: RC= return code

Explanation: This message follows previous SORT error messages.

User Response: Look for other messages in the log. Correct the error, and retry the job. You may need to increase the REGION= parameter.

FST1806E FAILURE TO READ SORT MESSAGE FILE. RC= return code

Explanation: A read error occurred by program $$ SORT when attempting to read the SORT message file.

User Response: Look for other messages in the log. Correct the error, and retry the job. If error persists, contact IBM Technical Support.

FST1807E FAILURE TO WRITE SORT MESSAGE TO MESSAGE QUEUE. RC=return code

Explanation: Most probable cause is insufficient REGION available to internally called SORT message routines.

User Response: Look for other messages in the log. Increase your REGION size. Correct the error, and retry the job.

FST1808E GETMAIN FAILURE FOR PROGRAM STACK IN $$ SORT2

Explanation: Most probable cause is insufficient REGION. Look for other messages in the log.

User Response: Increase your REGION size. Correct the error, and retry the job.

FST1809I STARTING INTERNAL SORT: RECORD COUNT= count

Explanation: The message is issued when $$ SORT is called and // CIGTRACE is allocated to NULLFILE.

User Response: none

FST1810I STARTING EXTERNAL SORT: RECORD COUNT= count

Explanation: The message is issued when $$ SORT is called and // CIGTRACE is allocated to NULLFILE.

FST1811I FINISHED WITH SORT

Explanation: The message is issued when $$ SORT completes calling either the internal or external sort.

User Response: none

FST1812I   USING EXTERNAL SORTWORK FILES

Explanation: The trace message indicates that the external SORT program will be invoked.

User Response: none

FST1813I   USING "DYNAM" OPTION WHEN CALLING EXTERNAL SORT

Explanation: The trace message indicates that the DYNAM option will be specified when invoking the external SORT program will be invoked.

User Response: To avoid using the DYNAM option, you can pre-allocate SORTWKxx files to the job and resubmit.

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OS/390 Collection, SK2T-6700

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User's Guide
Release 1

Publication No. SC27-1694-00

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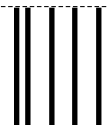

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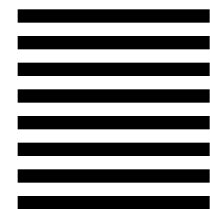
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