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MVS/Extended Architecture Resource Measurement Facility (RMF) Monitor III Reference and User's Guide

Program Product

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Program Product

Program Number 5665-274

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| This is a major revision of LC28-1557-1. See the Summary of Changes following the Contents for a summary of the changes made to this manual. Technical changes or additions to the text and illustrations are indicated by a vertical line to the left of the change.

| This edition applies to Version 3, Release 5 of the program product RMF (Resource Measurement Facility) and to all subsequent releases until otherwise indicated in new editions or Technical Newsletters. The previous edition still applies to RMF Version 3 Release 4 and may now be ordered using the temporary order number LT00-1557. Changes are made periodically to the information herein; before using this publication in connection with the operation of IBM systems, consult the latest *IBM System/370 Bibliography,* GC20-0001, for editions that are applicable and current.

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Note to all users:

Expanded storage is also known as extended storage. The terms are used interchangeably throughout the RMF Library. This book uses the term extended storage.

Preface

The Resource Measurement Facility (RMF) is a measurement collection tool that is designed to measure selected areas of system activity and present the data collected in the form of SMF (System Management Facility) records, formatted printed reports, or formatted display reports. An installation can use the information in the RMF output to evaluate system performance and identify reasons for performance problems.

This book provides a description of what RMF is, what it can do, and how to use the RMF Monitor III session. For information on the Monitor I and II session, see *Resource Measurement Facility (RMF) Monitor I and II Reference and User's Guide.* For information on the System Availability Management (SAM) function of RMF see *MVS/XA Resource Measurement Facility (RMF) System Availability Management User's Guide.*

This book is intended for use by the system programmer responsible for installing or removing RMF and modifying its functions, for the system personnel responsible for measuring and improving system performance, and for the operator and terminal user. Because RMF is a tool for measuring system performance, this book assumes that the reader has extensive knowledge of the MVS system.

The book contains three types of information:

- A basic, conceptual description of what RMF is and how it can help you to measure system performance.
- Procedural information that describes step-by-step approaches to making RMF Monitor III work for you.
- Reference information for RMF Monitor III that enables you to locate a specific piece of required information.

The contents and suggestions for use of each chapter are:

Chapter 1. Introduction: presents basic, conceptual information about RMF. Everyone involved with installing, operating, modifying, and using RMF should read this chapter.

Chapter 2. Monitor III Data Gatherer Session: describes how to start, modify, and stop the Monitor III data gatherer session and the options used to control the data gatherer processing with and without data set support. It also presents the system commands, session commands, display commands, and JCL needed to run an RMF Monitor III data gatherer session.

Chapter 3. Monitor III Concepts and Usage: describes Monitor III reporter concepts like workflow, delay and using percentages and examples on how to use Monitor III reports.

Chapter 4. Monitor III Reports: describes the reports produced for a Monitor III reporter session. For each report, the chapter includes a description of each field, and a sample tabular report. It also includes sample of color graphic versions of selected reports. Note that each field in the report also appears in the index to help you locate the description for a specific field as rapidly as possible.

Chapter 5. Monitor III Options and Commands: describes the option panels and commands RMF provides to display information required during a reporter session.

Chapter 6. Reporting Data with Data Set Support: describes the data set index screen and how to handle preallocated data sets.

Chapter 7. Procedures For Adding User Reports: describes how to add a user report and modify existing reports with the use of report information utility panels.

Appendix A. Monitor III Data Set Support Records: describes the data set structure, content, and format of records used with Monitor III data set support. The complete format of each of the measurement records and tables Monitor III uses for data set support appears with a brief description of each field or entry.

Appendix B. Monitor III Tables: contains listing of the tables used in Monitor III data reporter processing.

Appendix C. CLISTs and Code for the Report Format Definition Utility: contains CLISTs that may be used with the RMF report format definition utility and modifications to set up your own RMF reports.

The prerequisite publication is:

Resource Measurement Facility (RMF) Version 3 General Information Manual, GC28-1115.

Other manuals contain information related to using RMF; these associated publications are:

Resource Measurement Facility (RMF) Monitor I and II Reference and User's Guide, LC28-1556.

Resource Measurement Facility (RMF) Messages and Codes, GC28-1382, contains messages and codes issued by RMF Monitor III and by the RMF System Availability Management function.

Resource Measurement Facility (RMF) Monitor III Messages and Codes, LC28-1382.

Resource Measurement Facility (RMF) Operating Procedures: Reference Summary for Monitor I and II, SX22-0009.

Resource Measurement Facility (RMF) Operating Procedures: Reference Summary for Monitor III, SX22-0010.

Resource Measurement Facility (RMF) System Availability Management User's Guide, SC28-1558.

Resource Measurement Facility (RMF) System Availability Management Diagnosis Guide, LC28-1559.

OS/VS System Modification Program (SMP) System Programmer's Guide, GC28-0673.

MVS/Extended Architecture System Programming Library: Initialization and Tuning, GC28-1149.

MVS/Extended Architecture System Programming Library: System Management Facilities (SMF), GC28-1153.

MVS/Extended Architecture Message Library: System Messages, Volume I, GC28-1376, and Volume II, GC28-1377, contains messages and codes issued by RMF Monitor I and Monitor II and System Availability Manager (SAM).

MVS/Extended Architecture Message Library: System Codes, GC38-1157.

MVS/Extended Architecture Message Library: Routing and Descriptor Codes, GC28-1194.

MVS/Extended Architecture Utilities, GC26-4018.

MVS/Extended Architecture System Programming Library: Service Aids, GC28-1159.

MVS/Extended Architecture System Programming Library: System Modifications, GC28-1152.

MVS/Extended Architecture TSO Guide to Writing a Terminal Monitor Program or a Command Processor, GC28-1295.

OS/VS2 System Programming Library: TSO, GC28-0629.

Interactive Chart Utility User's Guide, SC33-0111.

Interactive System Productivity Facility (ISPF) General Information Manual, GC34-4036.

Interactive System Productivity Facility (ISPF) Dialog Management Services, SC34-2137.

Interactive System Productivity Facility (ISPF) and ISPF/ Program Development Facility Installation and Customization, SC34-4015.

Graphic Data Display Manager (GDDM) General Information Manual, GC33-0100.

Graphic Data Display Manager (GDDM) Application Programming Guide, SC33-0148.

Contents

Figures

Summary of Changes

Summary of Changes
for LC28-1557-1
for RMF Version 3 Release 5

This major revision, which supports Version 3 Release 5 of the program product Resource Measurement Facility (RMF), describes changes in RMF for MVS/System Product Version 2 Release 2.

The changes include the following:

- The Monitor III data reporter is now an Interactive System Productivity Facility (ISPF) dialog.
- Color graphic reports are available for most alphanumeric reports.
- An online help facility is available.
- The user has the ability to install new reports and customize existing ones according to their needs.

For more information on how this manual is structured, see "Preface." Editorial and technical changes are also included.

Chapter 1. Introduction to RMF

The MVS/XA Resource Measurement Facility (RMF) is a powerful and flexible tool for measuring the performance of your system and helping you to pinpoint the sources of performance problems. Effective system tuning requires a measurement tool that is easy to use, has little impact itself on system performance, and is capable of reporting required data at various levels of detail. RMF is such a measurement tool; using it enables you to take a structured, disciplined approach to managing the performance of your system.

Experience has taught us that a haphazard approach to system tuning seldom results in performance improvements. As a result, a methodology — a series of steps — has emerged; this effective approach to system tuning has much in common with true experimentation. It includes the following processes:

1. Use RMF to measure the current performance of your system in concrete terms, such as service provided, transaction rate, TSO response time, or hardware and software availability.
2. Define the objectives for your system in the same concrete, measurable context.
3. Use the measurements obtained during the first step to determine the general areas, such as I/O, processor, or real storage, where constraints are occurring, or when system or application outages are occurring. Based on these high-level measurements, use RMF to take more detailed measurements to determine the reasons for the constraints, enabling you to direct your tuning efforts toward specific problem areas.
4. Once these areas are identified, determine what steps to take to improve performance. Take these steps one at a time to isolate the effect of each improvement. To determine the effectiveness of the step you have taken, evaluate the result and compare the measurement to the earlier measurements and the concrete objectives you have set. Repeat the process until your objectives are met.
5. Continue to measure and evaluate your system's performance to enable you to spot performance problems before they become critical.

The common factor in all of these steps is constant measurement of the system's performance and availability, and RMF provides you with both the ability to constantly measure the high-level performance indicators and the ability to take detailed measurements of many problem areas indicated by the high-level measurements. The data obtained can help you to:

- Identify system components that show patterns of exceptional utilization.
- Identify periods of system activity during which the utilization of particular resources is exceptional.
- Relate the service different classes of users are receiving to the specification provided in the IPS.
- Identify bottlenecks of resource contention.
- Locate excessive users of particular system services.
- Identify periods of system and application failure (outages).

One way to use RMF is to constantly measure key areas of **system activity** (such as processor activity, paging activity, virtual storage activity, workload activity, channel path activity, I/O queuing activity, and direct access device activity) through a Monitor I session and record the data gathered in SMF records. These records, when archived, provide machine readable performance data over an extended period of time. You can run the RMF post processor at regular intervals to report the performance data. You can limit the volume of printed reports by requesting **duration** or **summary reports**, which summarize system activity, or by using exception reporting, which produces reports only when an exceptional condition occurs.

Note: Monitor I sessions and the post processor functions that make use of the information Monitor I provides are described in *Resource Measurement Facility (RMF) Monitor I and II Reference and User's Guide*, LC28-1556.

A second way to use RMF is at a display station to constantly measure the **workflow**, or speed, with which jobs move through the system and note any exceptions to conditions you specify. RMF gathers data about system performance and reports the data while the system is running. The reports present the data in a format that simplifies the process of identifying a potential performance problem.

Note: There are two kinds of report sessions that can display sampled data: Monitor II and Monitor III sessions. Monitor II sessions are described in *Resource Measurement Facility (RMF) Monitor I and II Reference and User's Guide* LC28-1556.

A third way to use RMF is through means of the System Availability Management (SAM) function. RMF SAM provides the means to record, track, and report software and hardware availability. SAM identifies and then automatically records problems in the Information/Management data base that involve systems or application failures (outages) and generate user-defined reports. You can tailor reports to present information about various hardware and software problems through ISPF panels. This information can be used by the SAM report writer to produce reports.

Note: For information about RMF SAM, see *RMF System Availability Management User's Guide*, LC28-1558.

Measurement Activities of a Monitor III Session

RMF Monitor III can measure system activity in terms of workflow and delay. RMF calculates workflow and delay measurements from sampled data:

- Workflow measures how jobs use system resources and the speed with which jobs or job groups move through the system in relation to the maximum average speed at which they could move through the system. Workflow can also measure how efficiently resources are serving job requests.

  A low workflow percentage indicates that a job has few of the resources it needs and is contending with other jobs for system resources. A high workflow percentage indicates that a job has the resources it needs to execute, and that it is moving through the system at a relatively high speed. For example, a job that could execute in one minute if all the resources it needed were available, would have a workflow of 25% if it took four minutes to execute.

- Delay measures the delays that jobs incur while waiting for resources. A job is not productive when it is delayed because of contention for or unavailability of some resource in the system.

For example, a job that did not have to wait for any resources during the interval experienced 0% delay. If a job had to wait for one or more resources, there would be some percentage of delay during that interval. RMF can measure delay for a single job or for a group of jobs (such as TSO or BATCH).

Monitor III also provides a summary of workflow activity and delay for the measured system; that is, information collected on one system can be summarized, displayed in a report, and analyzed on another system. In that way, you can plan the needs of a remote system by analyzing its workflow and delay problems at a central location.

Monitor III

Monitor III collects information about the activities of users (units of work) and the delays they encounter when accessing system resources. Monitor III also measures the workflow of users and resources, which reflects the speed at which users move through the system. Monitor III allows quick and automatic detection of potential delays and might help the operator or system programmer locate and react to problems that otherwise might require a re-IPL.

Monitor III reports information about the workflow of one or more address spaces, the workflow of hardware resources, the delay of one or more address spaces for a particular resource, and the state of an address space (whether it is active or idling, for example).

RMF Monitor III samples system data over time and summarizes the data it has measured. Then it formats the data, and reports it during a display session. You can request that the reports be printed. User exits allow you to gather and report data relevant to your installation.

Obtaining Monitor III reports requires two sessions: the Monitor III **data gatherer** session and the Monitor III **data reporter** session. The data gatherer collects data, formats the data into a set of samples, and stores the set of samples in a local storage buffer and, optionally, in user-defined data sets. Only one Monitor III data gatherer session can be active at any one time. The data reporter display session subsequently retrieves the gathered data, communicates with the Monitor III data gatherer via cross memory functions, and issues reports on the display screen.

During the data gatherer session, RMF obtains data in two ways: by measurement and by sampling. RMF obtains measured data by checking the appropriate system indicators at the beginning and the end of the interval and computing the difference.

RMF obtains sampled data by checking the appropriate system indicators at each cycle within a interval. (A cycle is a unit of time within an interval, usually relatively small in comparison to the length of the interval.) RMF samples the data at each cycle time. At the end of the interval, the mass of data collected at each cycle is summarized for reporting—for example, to present average values for a field or to present data as a percentage.

Note: When the sampling technique is used, a random independent distribution of events is assumed.

You control the length of the interval and the length of the cycle for each Monitor III session. You can also synchronize the interval to any time within the hour to allow easy comparison of data from different days or different systems.

During a Monitor III display session, you can view the collected data in reports that show workflow and delay. RMF uses the Interactive System Productivity Facility (ISPF) to show reports at a display terminal. You can modify reports by means of option panels during an RMF display session. You can also preallocate data sets with information gathered on one system and display the information during a session on another system. During the session, RMF provides an online help facility that explains reports, options, screens, and commands.

Monitor III Data Gatherer Session: RMF must be initialized before the Monitor III data gatherer session is started. An operator command starts the data gatherer session, and specified options control and modify the session. You can also specify data sets to record sampled data during the session. The Monitor III data gatherer session runs in its own address space. The session can be stopped by the system STOP command, the STOP option, or a STOP session command.

Monitor III Data Reporter Session: You can start a data reporter session by issuing the RMFWDM command from TSO ready mode or from the TSO command option on the ISPF Selection Menu. Once the session is started, you control the session by modifying options on ISPF panels. If you have preallocated data sets with data collected from another system or from earlier data gathering sessions, you can display data without an active data gatherer session; otherwise, you require an active Monitor III data gatherer session to obtain meaningful data.

Your installation can measure other areas of system activity by replacing the user exit routines RMF provides with your own routines that measure and report on an activity that your installation requires.

System Requirements

The approximate auxiliary storage required for RMF (Monitors I, II, III, and the SAM function) on the system libraries is:

SYS1.LPALIB 65,000 bytes
SYS1.LINKLIB 1,350,000 bytes

Fixed storage requirements include temporarily fixed PLPA code space, temporarily fixed private area space, and SQA global fixed space (SP245). The amount of storage used depends on the set of options that are requested when RMF processing begins.

RMF Version 3.5.0 runs on the hardware supported by Version 2.2.0 of the MVS/System Product and has only the following additional hardware requirements:

- Display session output is formatted specifically for all terminals supported by ISPF.
- Printed reports are formatted with a line length of 80 characters; therefore, your printer must have a line length of at least 80 characters.

Syntax Notation

This book uses the the "brackets and braces" syntax language to describe the commands, options, and menu items. The set of symbols listed below define the format of each item; you should never enter these symbols in the actual command, option, or menu item.

Underscore: The underscore (_) indicates a default option. If you want to select an underscored alternative, you need not actually specify it when you enter the command, option, or menu item, although, of course, you can.

Braces: Braces { } group related items, such as alternatives, and indicate that you must choose **one** of the items enclosed within the braces, unless you are accepting a default value.

Brackets: Brackets [ ] can also group related items; however, everything within the brackets is optional and can be omitted.

You should use uppercase letters, commas, and parentheses exactly as shown. Lower case letters represent variables for which you should substitute specific information. Stacked items, enclosed in either braces or brackets, indicate alternatives. One or more of the alternatives can be selected.

Chapter 2. Monitor III Data Gatherer Session

The Monitor III data gatherer collects data, formats the data into a set of samples, and stores the set of samples in RMF's wrap-around storage. Optionally, the data gatherer can store the samples in user-defined data sets. The data gatherer samples data at the end of each CYCLE (a short time period) and then combines these samples at the end of a relatively longer MINTIME period. You specify the CYCLE and MINTIME values at the start of the data gatherer session.

Monitor III Data Gatherer Session Control

This section includes the following:

- How to initialize RMF
- How to control a Monitor III data gatherer session
- How to define and use VSAM data sets for recording data during the session
- What options to use during the session
- How RMF merges a final set of options
- How to modify options during the session
- How to end the session
- What RMF supplied options are contained in the Monitor III data gatherer parmlib member
- How to use the RMF Monitor III JCL

Initializing RMF

The START system command initializes RMF. The syntax of the START system command is:

```
{START}  RMF[.id],[ddd],[ser],[parm],[keyword=option]
{  S  }
```

id

A one- to eight-character identifier to be assigned to this initialization of RMF. This is an optional field, but it **must** be specified in order to stop or modify RMF processing through subsequent operator commands.

ddd

The device number or device type (such as 3330) used when you are overriding any corresponding unit specifications on the IEFRDER DD statement in the RMF cataloged procedure. This is a positional parameter; the preceding comma can be omitted only when you are omitting this field and all of the following fields. (See "RMF Monitor III JCL" later in the chapter.)

ser
The volume serial number used when you are overriding the corresponding volume serial specifications on the IEFRDER DD statement in the RMF cataloged procedure. This is a positional parameter; the preceding comma can be omitted only when you are omitting this field and the following field.

keyword = option
Any keywords required when you are overriding the data set specifications on the IEFRDER DD statement in the RMF cataloged procedure. The keywords specified must be keywords that are valid on a DD statement. If you have replaced the RMF cataloged procedure supplied by IBM with a procedure that contains symbolic parameters, you can specify in this field any symbolic parameters defined in your procedure. Normally, this field is not used.

Before you can start a data gatherer session, RMF must already be initialized. To initialize RMF, issue the following command:

```
START RMF.A,,,NOZZ
```

Controlling an RMF Data Gatherer Session

Session commands can start, stop, and modify options for an active Monitor III data gatherer session.

To enable RMF to identify a particular session, each session must be assigned a unique session identifier. You use this identifier on all session commands for that particular session; it also appears in all RMF messages that pertain to that session.

For a Monitor III session, you assign the identifier when you start the session. The format required for the session identifier of the Monitor III data gatherer session is **III**.

Session commands are passed to RMF through use of the system MODIFY command. The syntax of the MODIFY command is:

```
{MODIFY}[RMF.]id  input
{ F    }
```

id
The identifier assigned to RMF when it was initialized

input
A session command that starts, stops, or modifies the options of a data gatherer session.

Starting the Data Gatherer Session with the START Session Command

The Monitor III data gatherer session is started after RMF initialization by issuing the START session command. You pass this command to RMF through the input field of the MODIFY system command. The required syntax is:

```
{MODIFY}[RMF.]id,{START} III[,parm]
{  F   }         {  S  }
```

id
The identifier assigned to RMF when it was initialized.

III
The data gatherer session identifier that appears in all RMF messages pertaining to the session being started.

parm
The options for the session. Each option has the form:

```
option[(value)]
```

You must separate each option from the other options by a comma. If you specify the MEMBER option, RMF uses any members identified in the **value** field during input merge to produce the list of options for the session. Options specified in the **parm** field of the START command have a higher priority than options in a library member (normally SYS1.PARMLIB). See "Input Merge for a Monitor III Data Gatherer Session."

The START command generates an address space for the data gatherer session. RMF issues a message indicating that the Monitor III data gatherer is active.

Examples

- To start a Monitor III data gatherer session when all options are to be taken from parmlib member ERBRMF04 and the program defaults, issue the command:

  ```
  MODIFY  RMF.A,START III
  ```

- To start a Monitor III data gatherer session that is to sample data at a 200 millisecond cycle, combine samples after a 500 second interval, and run for 12 hours, issue the command:

  ```
  MODIFY RMF.A,START III,CYCLE(200),MINTIME(500),STOP(12H)
  ```

Modifying the Data Gatherer Session with the MODIFY Session Command

The MODIFY session command changes the options currently in effect for an active Monitor III data gatherer session. This command causes RMF to end the current MINTIME. Changed options take effect immediately.

See the sections later in this chapter for more information about modifying an RMF data gatherer session.

Using the Display Session Command

The DISPLAY session command displays status information for active RMF data gatherer sessions.

The following example shows the console output produced for a particular data gatherer session for which OPTIONS is in effect and seven data sets are specified for data set recording:

```
ERB305I  III : PARAMETERS
ERB305I  III :  CYCLE (1000) -- DEFAULT
ERB305I  III :  DATASET(STOP) -- DEFAULT
ERB305I  III :  DATASET(SWITCH) -- COMMAND
ERB305I  III :  DATASET(WHOLD(7)) -- DEFAULT
ERB305I  III :  DATASET(ADD(any.ds.name1)) -- MEMBER
ERB305I  III :  DATASET(ADD(any.ds.name2)) -- MEMBER
ERB305I  III :  DATASET(ADD(any.ds.name3)) -- MEMBER
ERB305I  III :  DATASET(ADD(any.ds.name4)) -- MEMBER
ERB305I  III :  DATASET(ADD(any.ds.name5)) -- MEMBER
ERB305I  III :  DATASET(ADD(any.ds.name6)) -- MEMBER
ERB305I  III :  DATASET(ADD(any.ds.name7)) -- MEMBER
ERB305I  III :  DATASET(WHOLD(7) -- DEFAULT
ERB305I  III :  WSTOR(999) -- DEFAULT
ERB305I  III :  MINTIME (100) -- DEFAULT
ERB305I  III :  NOSTOP -- DEFAULT
ERB305I  III :  SYNC(0) -- DEFAULT
ERB305I  III :  OPTIONS -- COMMAND
ERB305I  III :  RESOURCE(*JES2,JES2) -- MEMBER
ERB305I  III :  SYSOUT(A) -- DEFAULT
ERB305I  III :  MEMBER (04) -- COMMAND
```

Monitor III Data Set Support

You can use data sets during a Monitor III data gatherer session to hold large amounts of sampled data. RMF copies sampled data from the wrap-around storage buffer to the data sets you specify. These data sets allow you to save large amounts of information, and you can reuse them as RMF continuously records data over time. If you want, you can keep old data by unloading it to tapes before you begin to reuse the data sets. Thus, you have a way to archive data collected over long periods for performance analysis and system planning. You control the recording of data to the data sets through the DATASET option.

Defining VSAM Data Sets For a Monitor III Data Gatherer Session

Before a Monitor III data gatherer session can store data in a data set, you must name and define the VSAM data sets you want to use. (When you specify data sets on the DATASET option during a session, you must use the same names you define here. RMF then knows that these VSAM data sets are for its use during data set recording. Also note that if you use VSAM data sets for data set recording, I/O tuning would be beneficial for performance purposes.) The following is an example of a control statement needed to define a VSAM data set for use during the Monitor III data gatherer session:

```
DEFINE CLUSTER -
       ( NAME(dsname) -
       VOLUMES(volser)
       CYLINDERS(primary secondary) -
       NUMBERED -
       REUSE -
       SHAREOPTIONS( 2 3 ) -
       CONTROLINTERVALSIZE(32768) -
       BUFFERSPACE (65536) -
       RECORDSIZE (32752 32752) )
```

The example shows how to continue a statement; use a blank and a dash after the last word and continue on a new line.

The following briefly describes each parameter:

NAME(anyname)
the name of the data set. If the data set is in a user catalog, you can use the user catalog name as the first level qualifier of the data set name. Thus, you need not use a JOBCAT or STEPCAT DD JCL statement to define the data set. To help you keep track of which data sets relate to a particular system, it is a good idea to indicate the system id as part of the data set name.

CYLINDERS(primary secondary)
The number of cylinders for the data set. If you use physical extents with RMF data sets, be sure to observe the restrictions for the REUSE parameter described later. For more information on the use of extents for VSAM data sets, see *VSAM Catalog Administration: Access Method Services Reference* and *Integrated Catalog Administration: Access Service Method Reference*.

NUMBERED
Specifies that the data set is a relative record data set. When the data gatherer records sets of samples on the data set, the sets of samples are stored one after the other and cross logical record boundaries. You must use this parameter; if you omit it, RMF will not use the data set.

REUSE
Specifies that the data set can be opened and cleared for reuse. If you want to reuse the data set, you must specify this parameter. If you omit it, RMF only uses the data set once; if it tries to reuse the data set, data set recording stops. You must specify REUSE if you specify secondary space on the CYLINDERS parameter.

SHAREOPTIONS(2 3)
Cross-region and cross-system share options. The first number (2) is the cross-region share option. It indicates that any number of users can read the data set, but only one authorized user can write to it.

The second number (3) is the cross-system option and indicates that different systems can share the data set. You should use this parameter as specified; if you omit it or specify other values, the results are unpredictable.

CONTROLINTERVAL SIZE(32768)
The control interval size includes the record size, the record description field (RDF) and the control interval description field (CIDF). You should use this parameter as specified; if you omit it or specify other values, the results are unpredictable.

BUFFERSPACE(65536)
Use this parameter with the value specified. (If you do change BUFFERSPACE, you must use a multiple of the CONTROLINTERVAL SIZE.)

RECORDSIZE(32752 32752)
The logical record size of the data set. The first value is the average, the second the maximum for the logical record size. You must use this parameter as specified; if you omit it or specify other values, RMF will not use the data set.

You can define up to 100 data sets to use during a Monitor III data gatherer session; however, you must use one DEFINE statement for each data set you define.

Controlling Data Set Recording

You control the recording of samples to the data sets through the Monitor III data gatherer session DATASET option. The format of the option follows:

```
[DATASET](suboption,suboption . . . )
[DS     ]
```

If you specify DATASET or DS without suboptions, RMF issues an error message. You can abbreviate DATASET as DS.

The suboptions you can specify are:

ADD(data-set-name[,data-set-name])/DEL(data-set-name[,data-set-name])
Allows you to specify the name of the data set on which you want RMF to record data or to stop recording data during a session. A data set name must match the previously defined VSAM data set name in the DEFINE CLUSTER statement. If you use a name that has not been defined, RMF issues an error message.

ADD(data-set-name) makes the data set known to RMF; it lets RMF record sampled data on the predefined VSAM data set. DEL(data-set-name) removes the data set from the list of data sets known to RMF and prevents RMF from using the data set to record sampled data. Thus, these suboptions enable you to control how RMF records samples on the predefined data sets during a session; as necessary, you can add more data sets for RMF to use or prevent RMF from reusing data sets that contain data you want to save.

When you specify more than one **data-set-name**, use a comma as a separator. The maximum number of data sets you can specify is 100. If you specify more than 100 data sets, RMF issues an error message. RMF also ignores the latest ADD or DEL suboption that identifies a duplicate data set name.

The following example specifies two data sets for data set recording (listed as part of the RMF option MEMBER list for the session):

```
DATASET(ADD(RMF01))
DATASET(ADD(RMF02))
```

RMF uses the empty data sets in the order they are defined for the session. During data set recording, RMF writes the samples from its local storage buffer to the data sets. When all the data sets are full and RMF cannot find an empty data set, RMF reuses the data sets, starting with the data set that contains the oldest data.

If you want to save data already recorded on the data set and make sure RMF does not reuse it, you use the DEL suboption. The DEL suboption prevents RMF from writing over data in the data set. For example, if you want to save data contained in RMF01 in the earlier example, you specify:

```
DATASET(DEL(RMF01))
```

RMF does not reuse the data set during data set recording, giving you a copy of the samples contained on the data set.

You can specify the DATASET(ADD/DEL) options in the parmlib MEMBER. You can also explicitly code the DATASET(ADD/DEL) option in the parm field of the START or MODIFY session commands for the Monitor III data gatherer.

START/<u>STOP</u>
Allows you to start or stop Monitor III data set recording. You can issue START/STOP at the beginning of a session through the START Monitor III gatherer session command or, during a session, through the MODIFY Monitor III gatherer session command. If you do not want data set support for the Monitor III gatherer session, use the default DATASET(STOP).

RMF handles the START/STOP suboptions only at the end of a MINTIME. (MINTIME indicates that RMF has collected a set of samples and represents the smallest sample time that the Monitor III data reporter can display on the screen. To avoid recording partial sets of samples to the data sets, RMF waits until the end of the MINTIME to handle the START/STOP suboptions.)

SWITCH/<u>NOSWITCH</u>
Controls RMF's selection of a data set for recording sampled data.

If you specify SWITCH, RMF chooses the active data set as follows:

1. RMF searches for an empty data set to record samples.
2. If there are no empty data sets, RMF clears the data set with the oldest data and begins to record samples on it.

If you specify NOSWITCH, RMF chooses the active data set as follows:

1. RMF searches for the data set with the most recent data and records samples if the data set is not full
2. If the data set with the most recent data is full, RMF searches for an empty data set to record samples.
3. If there are no empty data sets, RMF clears the data set with the oldest data and begins to record samples on it.

SWITCH allows you to continuously reuse the data sets you specify, overlaying the oldest data once all the data sets are full. If you start a session and want to continue writing samples on a currently active data set that is not full, use NOSWITCH; however, note that NOSWITCH is effective only if specified at the beginning of each Monitor III data gatherer session. It has no effect if you use it in a MODIFY session command.

NOSWITCH is the default.

WHOLD(value)

Allows you to specify, in megabytes, a storage value (an amount of RMF's local storage buffer) that controls page releases in the buffer. When the data in the local storage buffer has been copied to the data set and the storage amount exceeds the WHOLD value, the storage with duplicate data in the buffer becomes eligible for page release. (A page release discards the current and former copies of a page that are on real, extended, or auxiliary storage, so that the page will not be read in before it is reused for new data.)

Page releases in RMF's local storage buffer are possible because RMF copies data in the storage buffer to the data sets during data set recording. WHOLD works with the WSTOR option to control the page space needed for the storage buffer (see WSTOR described in "Monitor III Data Gatherer Session Options"). The WSTOR value represents the total amount of storage in RMF's local storage buffer. If the WHOLD value is smaller than the WSTOR value, page releases can occur before RMF uses all the storage in the local storage buffer. If the WHOLD value is equal to or greater than the WSTOR value, page releases occur once RMF begins to wrap around the buffer when the WSTOR value is exceeded.

The valid range of values for WHOLD is 2 to 999 megabytes. RMF uses a default of 7 if you do not specify a value. If you specify a value outside the valid range (2 to 999), RMF uses 999 megabytes for values above the range and 2 for values below the range.

When you turn data set recording off (and the WHOLD value is smaller than WSTOR), the local storage buffer size increases from the WHOLD value to the WSTOR value. When you activate data set recording, the local storage buffer size decreases from the WSTOR value to the WHOLD value only when the buffer contains data that the gatherer has already copied to the data set.

Using the START Session Command with Data Set Support

Assume that before the Monitor III data gatherer session you have defined six VSAM data sets for data set recording. You issue the following START command to begin a Monitor III data gatherer session. (Remember you must identify the VSAM data set names to RMF through the DATASET option. The VSAM data set names must be identical to the names you use in the option; otherwise, RMF cannot use the data sets.):

```
MODIFY  RMF.A,START III,MEMBER(08),DS(DEL(RMF.DS05)ADD(RMF.DS06),SWITCH)
```

Because MEMBER(08) is specified in the START command, RMF generates the member name ERBRMF08 and locates the member (normally found in SYS1. PARMLIB). Assume that ERBRMF08 contains the following DATASET options:

```
DATASET(START)
DATASET(ADD(RMF.DS01))
DATASET(ADD(RMF.DS02))
DATASET(ADD(RMF.DS03))
DATASET(ADD(RMF.DS04))
DATASET(ADD(RMF.DS05))
```

The default NOSWITCH at the beginning of this session permits RMF to continue writing on the active data set of the previous session (in this case, RMF.DS05).

Assume the following is true about the data sets at the beginning of this session:

- Data sets RMF.DS01 through RMF.DS04 are full.
- RMF.DS05 is the active data set for this session
- RMF.DS06 is an empty data set.

With the DS options specified as parameters on the START session command, you modify the options as follows:

- make a new data set available (ADD(RMF.DS06))
- prevent RMF from writing on the currently active data set (DEL(RMF.DS05))
- switch the recording of data to another data set (SWITCH)

START initiates data set recording, and RMF can use all the data sets listed with the ADD suboption.

As a result, RMF produces the following list of options following the rules of the input-merge overrides (see "Input Merge for the Monitor III Data Gatherer Session."):

```
ERB305I  III : PARAMETERS
ERB305I  III : DATASET(WHOLD(7)) -- DEFAULT
ERB305I  III : DATASET(ADD(RMF.DS01)) -- MEMBER
ERB305I  III : DATASET(ADD(RMF.DS02)) -- MEMBER
ERB305I  III : DATASET(ADD(RMF.DS03)) -- MEMBER
ERB305I  III : DATASET(ADD(RMF.DS04)) -- MEMBER
ERB305I  III : DATASET(DEL(RMF.DS05)) -- COMMAND
ERB305I  III : DATASET(ADD(RMF.DS06)) -- COMMAND
ERB305I  III : DATASET(SWITCH) -- COMMAND
ERB305I  III : DATASET(START) -- MEMBER
ERB305I  III : MEMBER(08) -- COMMAND
ERB305I  III : WSTOR(999) -- DEFAULT
```

RMF.DS06 is now available for data set recording. RMF.DS05 cannot be used for recording during the session. (RMF.DS05 can be preallocated at the beginning of a TSO III reporter session and the data on it displayed and analyzed. For more information, see "Preallocating Data Sets for a Monitor III Data Reporter Session.")

SWITCH causes RMF to switch to the next available data set, in this case, RMF.DS06 because it is empty. RMF.DS06 becomes the new active data set for this session. (If you did not specify SWITCH in this example, data set recording would switch to an available data set anyway because RMF.DS05, the previously active data set, cannot be used. DATASET(DEL) has removed it from the list of data sets available for data set recording.)

Using the MODIFY Session Command with Data Set Support

You can also modify the DATASET options during a Monitor III data gatherer session through the MODIFY command (see "Modifying the Monitor III Data Gatherer Session.") Assume that you have started data set recording for a session and have already defined data sets RMF.DS01 through RMF.DS05. Data sets RMF.DS01, RMF.DS02, RMF.DS03, and RMF.DS05 are full. RMF.DS01 contains the oldest data. The currently active data set is RMF.DS04.

During the session you want to

- save the data on RMF.DS04
- switch the current writing of the sampled data to another data set.
- change the WHOLD value from the default of 7 to 5 megabytes

If you issue the command:

```
MODIFY  RMF.A,MODIFY III,DS(SWITCH),DS(DEL(RMF.DS04)),DS(WHOLD(5))
```

The options that control the data set recording will be modified as you want.

Once again the DEL suboption prevents RMF from overwriting data on RMF.DS04. RMF can no longer use the data set for data set recording during the session.

SWITCH causes RMF to begin writing in another data set. Because there is no empty data set, RMF chooses the data set with the oldest data, in this case RMF.DS01, and begins writing over the old data in it.

The WHOLD value lets RMF hold a copy in its buffer of five megabytes of storage containing data already copied to the data set. After it exceeds the value, it begins to page release the storage in the buffer containing the duplicate data. Thus, the WHOLD value of five megabytes permits page releasing to occur earlier than the seven megabytes specified at the start of the session.

Ending Data Set Support for the Monitor III Data Gatherer Session

You can stop the data gatherer from writing to any data set or never activate data set recording at all for a Monitor III session. If you do not want the data set support for a data gatherer session, you can do one of the following:

- Specify the DATASET(STOP) option in the PARM field of the START session command.
- Specify the DATASET(STOP) option in the parm field of the MODIFY session command.
- Specify the DATASET(STOP) option as an RMF partitioned data set member normally included in SYS1.PARMLIB.
- Use the default DATASET(STOP)

For example, START member ERBRMF04 may contain the following:

```
DATASET(STOP)
DATASET(ADD(RMF.DS01))
DATASET(ADD(RMF.DS02))
DATASET(ADD(RMF.DS03))
DATASET(ADD(RMF.DS04))
DATASET(ADD(RMF.DS05))
```

Specifying DS(STOP) in member ERBRMF04 indicates that no active active data set recording occurs when a Monitor III gatherer session is started.

To start data set recording later, you can explicitly specify DS(START) on the START or MODIFY session command. The DS(START) option overrides the DS(STOP) member option in ERBRMF04 and permits the recording of sampled data to the data sets defined by the DS(ADD) options. If you want, you can also change the data set names specified in the DS(ADD) options.

Monitor III Data Gatherer Session Options

This section describes, in alphabetical order, the options you can specify for a Monitor III data gatherer session.

CYCLE(value)
Specifies the length of a cycle (in milliseconds) at the end of which RMF samples data. The valid range of values is from 50 to 9999 milliseconds. RMF increases a specification of less than the minimum value (50 milliseconds) to 50 milliseconds; it decreases a specification of more than the maximum value (9999 milliseconds) to 9999 milliseconds.

The default value is 1000 milliseconds (one second). Decreasing the CYCLE value to less than one second has the following effects on system performance:

- increases the amount of processor time needed to sample data
- causes RMF to fill the wrap-around storage buffer more quickly
- uses more space in the user defined VSAM data set

DATASET(suboption,suboption . . .)
Controls the recording of samples to user-defined data sets. The suboptions are:

- ADD/DEL
- START/STOP
- SWITCH/NOSWITCH
- WHOLD

For more information on the DATASET option and its suboptions, see "Monitor III Data Set Support ", earlier in this chapter.

MEMBER(list)
Specifies the member or members of the RMF partitioned data set that contain the options to be used for the session. The list can contain from one to five entries, separated by commas, and each entry consists of a two-character alphameric value to be appended to ERBRMF to form the member name. When more than one member is specified, input merge takes the options from the members in left to right priority order.

The default is 04, indicating member ERBRMF04, which is normally in the partitioned data set SYS1.PARMLIB. If you want to place ERBRMF04 in a partitioned data set other than SYS1.PARMLIB, you must specify that data set name on the IEFRDER DD statement in the RMFGAT cataloged procedure. The MEMBER option must not be specified in the RMF partitioned data set member.

For a list of options specified in the partitioned data set members shipped with RMF, see "Monitor III Data Gatherer Parmlib Member" later in this chapter.

Each member specified must contain options appropriate for the Monitor III data gatherer session. A member containing Monitor I or Monitor II session options will cause syntax errors.

MINTIME(value)
Specifies the length of a time interval (in seconds); when this time expires, the Monitor III data gatherer combines all samples gathered into a set of samples. The samples combined at the end of each MINTIME interval can be subsequently summarized and reported in a Monitor III data reporter session.

Valid MINTIME values range from 10 to 999 seconds. RMF stores the set of samples collected during a MINTIME in its own local storage (the local storage buffer). If you specify data set recording during a session, RMF copies each set of samples from the local storage buffer to the currently active data set for the session. Common data items for a set of samples (such as jobname or device name) are held in tables to reduce the amount of local storage needed.

Note: Because a set of samples is the smallest quantity that the Monitor III data reporter can analyze, MINTIME is also the smallest time interval (the minimum time range) the Monitor III data reporter can report on.

RMF uses a default of 100 if you do not specify a value. If you specify a value outside the valid range (10 to 999), RMF uses 999 seconds for values above the range and 10 seconds for values below the range.

OPTIONS/NOOPTIONS

Specifies whether to display the list of options to be used for a session at the operator console. The input source from which RMF input merge obtained the option is also listed.

If you specify OPTIONS, the operator can modify the list with any desired changes. You can avoid unnecessary console output (and delay) by specifying NOOPTIONS. However, if the Monitor III data gatherer detects any syntax errors during input merge, OPTIONS is automatically in effect.

You may abbreviate OPTIONS as OPTN, and NOOPTIONS as NOOPTN at the operator console.

The following example shows the console output produced when OPTIONS is in effect and seven data sets are specified for data set recording:

```
ERB305I  III : PARAMETERS
ERB305I  III :  CYCLE (1000) -- DEFAULT
ERB305I  III :  DATASET(STOP) -- DEFAULT
ERB305I  III :  DATASET(SWITCH) -- COMMAND
ERB305I  III :  DATASET(WHOLD(7)) -- DEFAULT
ERB305I  III :  DATASET(ADD(any.ds.name1)) -- MEMBER
ERB305I  III :  DATASET(ADD(any.ds.name2)) -- MEMBER
ERB305I  III :  DATASET(ADD(any.ds.name3)) -- MEMBER
ERB305I  III :  DATASET(ADD(any.ds.name4)) -- MEMBER
ERB305I  III :  DATASET(ADD(any.ds.name5)) -- MEMBER
ERB305I  III :  DATASET(ADD(any.ds.name6)) -- MEMBER
ERB305I  III :  DATASET(ADD(any.ds.name7)) -- MEMBER
ERB305I  III :  DATASET(WHOLD(7) -- DEFAULT
ERB305I  III :  WSTOR(999) -- DEFAULT
ERB305I  III :  MINTIME (100) -- DEFAULT
ERB305I  III :  NOSTOP -- DEFAULT
ERB305I  III :  SYNC(0) -- DEFAULT
ERB305I  III :  OPTIONS -- COMMAND
ERB305I  III :  RESOURCE(*JES2,JES2) -- MEMBER
ERB305I  III :  SYSOUT(A) -- DEFAULT
ERB305I  III :  MEMBER (04) -- COMMAND
```


RESOURCE(*JES2[,parm])/RESOURCE(*JES3[,parm])

Specifies the job entry subsystem (JES) resource from which an address space requests service.

***JES2** Must be specified if the installed primary JES is JES2.

***JES3** Must be specified if the installed primary JES is JES3.

parm This is an optional parameter. If your installation chose at system generation time a name other than JES2 or JES3, then **parm** must be specified and must be identical to the chosen name.

The default is RESOURCE(*JES2,JES2).

STOP(value {<u>M</u> | H})/<u>NOSTOP</u>

STOP specifies the desired duration for the Monitor III data gatherer session in minutes (M) or hours (H). You specify a value from one minute (1M) to one week (168H or 10080M). For values outside this range, the Monitor III data gatherer uses 1M for values below the range and 168H for values above the range. RMF uses minutes (M) if you do not specify M or H. If you specify STOP without a value, then RMF uses the default value of 8 hours.

NOSTOP means that only a STOP session command or a STOP system command can end the session.

Note: The STOP option applies only to the Monitor III data gatherer session. If the session has an identifier, the operator STOP session command can end the session at any time, regardless of the value specified for this option. RMF remains active until the operator issues a STOP system command.

<u>SYNC(mm[M])</u>/NOSYNC

Specifies whether or not the start of the time interval during which RMF creates a set of samples (MINTIME) should be synchronized with the hour. If you desire synchronization, specify SYNC and the number of minutes (mm) after the hour (0 - 59) at which synchronization is to occur. Specifying any values other than 0 through 59 results in the use of the default 0, which synchronizes sets of samples on the hour. Specifying NOSYNC means that no synchronization will occur and all intervals will be the same size.

RMF synchronizes the starting time of a set of samples by calculating how many sets of samples will fit in the time range to be covered. This might mean that the MINTIME interval before the synchronization point is shortened. Subsequent sets of samples remain synchronized only when the MINTIME value can be evenly divided into 60. For example, if you specify a MINTIME of 600 seconds (10 minutes) synchronized on 10 minutes (SYNC(10M)), RMF creates a set of samples at 10, 20, 30, 40, 50 minutes past the hour and on the hour. Therefore, if you start your session at 9:05, the first MINTIME is shortened by 300 seconds (5 minutes) so that RMF collects a set of samples at 9:10. Similarly, if you start a session at 9:15, the first MINTIME is shortened so that the first set of samples is collected at 9:20.

SYNC(0) is the default value and specifies that intervals are to be synchronized on the hour.

SYSOUT(class)

Specifies the SYSOUT class for messages generated during the Monitor III data gatherer session. You cannot modify the SYSOUT option during the session.

The default value is A.

WSTOR(value)

Specifies, in megabytes, the maximum size of RMF's local storage buffer for the Monitor III data gatherer. The Monitor III data gatherer gets the size of its buffer from either the value specified in this option or the maximum GETMAIN size defined by the system, whichever is smaller.

The valid range for value is 10 to 999 megabytes. RMF uses a default of 999 if you do not specify a value. If you specify a value outside the valid range (10 to 999), RMF uses 999 megabytes for values above the range and 10 megabytes for values below the range.

Note: This option cannot be modified by the data gatherer MODIFY command.

RMF Options

While system and session commands essentially control an RMF session, options tailor session processing to suit your particular needs. You specify data gatherer options when the session is started and can also modify them during session processing.

RMF takes the options that control Monitor III sessions from the input sources in the following priority order:

1. START command parm value
2. RMF partitioned data set members (ERBRMF04)
3. program defaults

When the session starts, RMF merges the options from these sources in priority order. An option explicitly specified in the START command takes priority over any conflicting specifications in the RMF partitioned data set member or members. If there are options for which no values are specified in the START command or the partitioned data set, RMF uses the program defaults.

You can modify session processing during the session by specifying, on a MODIFY session command, the options to be changed. RMF changes only the options specified on the command. A changed option remains in effect until the session ends or the operator issues the MODIFY session command to change the option again.

Input Merge for the Monitor III Data Gatherer Session

Input merge is the process RMF uses to determine and establish the options to be in effect for the session. RMF performs input merge when you start the session and when you use the MODIFY session command to modify the options of an active Monitor III data gatherer session. Input merge takes options from various input sources and merges them to form a list of options for the session.

When the Session Is Started

At the start of the session, input merge uses a "fill in the blanks" procedure; that is, it takes options from the three possible input sources in a defined priority order. Once an option is filled in, no options from a lower-priority input source can override that option. The input sources and their priority order are:

1. The **parm** field of the START command. Any options specified in this input source have the highest priority. If you specify the MEMBER option, the options contained in the member(s) are processed after any other options speci-

fied on the START command and before RMF proceeds to the next input source.

The MEMBER option can be used to specify up to five members of the RMF partitioned data set (normally SYS1.PARMLIB). If the MEMBER option is used to specify more than one member, RMF takes options from the members in left to right order. If, for example, MEMBER(07,08) is specified, RMF generates the member names ERBRMF07 and ERBRMF08 and takes options from ERBRMF07 first. Thus, if ERBRMF07 specifies OPTIONS and ERBRMF08 specifies NOOPTIONS, OPTIONS is the option established for the session. If a specified member does not exist, RMF continues with the next specified member, if any, or proceeds to the next input source.

2. The default member ERBRMF04 (normally in SYS1.PARMLIB). If the MEMBER option was not specified on the START command, RMF uses this default member as the second highest priority input source. Options from the default member can fill in only those options not specified earlier on a higher priority input source.
3. The program defaults. The program defaults are the lowest priority input source; that is, the program defaults can fill in only those options not filled in by a higher priority input source.

When you issue the START command, RMF merges the input options. During input merge, if RMF detects mutually exclusive options (such as SYNC and NOSYNC) or syntax errors, RMF notes the condition and issues a warning message but does not terminate the merge. When mutually exclusive options are detected, RMF takes the value associated with the first specification of the option. When an invalid value is detected for CYCLE or MINTIME, for example, RMF substitutes a valid value or default, as described for each option under "Monitor III Data Gatherer Session Options." When other syntax errors are detected, RMF ignores the input option in error and uses the next valid specification from a lower priority source.

If the merge is free of error, RMF issues messages ERB100I and ERB105I to indicate that the Monitor III data gatherer has successfully finished initialization and has started to gather data.

RMF displays the option list at the operator console when:

- OPTIONS is in effect
- Errors are detected during input merge

The operator can change the options, if necessary, before session processing begins.

Example: Assume that the operator issued the following START command to start a Monitor III data gatherer session:

```
MODIFY  RMF.A,START III,CYCLE(500),MINTIME(50),MEMBER(08)
```

The input merge process uses two of the three options from the START command to begin the list of session options:

```
CYCLE(500)
MINTIME(50)
```

Because MEMBER(08) is specified in the START command, RMF generates the member name ERBRMF08 and locates the member (normally in SYS1.PARMLIB). Assume that ERBRMF08 contains the following options:

```
MINTIME(200)
OPTIONS
RESOURCE(*JES3)
NOSYNC
```

RMF would add all of these options except MINTIME(200) to the option list. MINTIME(200) would not be used because MINTIME(50) was specified on the higher priority START command. The options for the session are now:

```
CYCLE(500)
MINTIME(50)
OPTIONS
RESOURCE(*JES3)
NOSYNC
```

To complete the option list, input merge would then proceed to the program defaults supplied by IBM. (These defaults are indicated in the discussion of each option earlier in this chapter under "Monitor III Data Gatherer Session Options".) As a result of merging the defaults with the options already specified, input merge would build a complete list of session options. The final option list appearing on the operator console would be:

```
ERB305I  III : PARAMETERS
ERB305I  III :  CYCLE(500)-- COMMAND
ERB305I  III :  MINTIME(50) -- COMMAND
ERB305I  III :  OPTIONS -- MEMBER
ERB305I  III :  RESOURCE(*JES3,JES3) -- MEMBER
ERB305I  III :  NOSYNC -- MEMBER
ERB305I  III :  NOSTOP -- DEFAULT
ERB305I  III :  SYSOUT(A) -- DEFAULT
ERB305I  III :  MEMBER(08) -- COMMAND
```

When the Session Options are Modified

When you use the MODIFY session command to modify the options established for an active session, RMF performs an input merge process. However, the process differs from the input merge used at the start of the session. Input merge as a result of a MODIFY session command starts with the list of options established at the start of the session and uses the input sources to **override** any previously established option.

The input sources and the order in which they are processed are:

1. The **parm** field of the MODIFY session command. Any options specified here will override and replace any options in effect prior to the MODIFY session command.

2. The library data source (normally SYS1.PARMLIB). If the **parm** field of the MODIFY command includes a MEMBER option, RMF generates the member name and uses any options in effect prior to the processing of the library data source, including any options specified in the MODIFY command **parm** field.

   When you specify more than one member, RMF processes the members in left to right order. However, because the merge process that occurs in response to a MODIFY session command uses the input sources to override previously established options, options from the rightmost member will override any corresponding options from a previously processed member. For example, if MEMBER(07,08) is specified on a MODIFY command, RMF generates the member names ERBRMF07 and ERBRMF08 and takes options from ERBRMF07 first. Thus, if ERBRMF07 specifies OPTIONS, the merge process places the option in the list of options currently established for the session. If, however, member ERBRMF08 specifies NOOPTIONS, NOOPTIONS overrides the currently established OPTIONS. NOOPTIONS is thus the option established for the session as a result of the MODIFY command.

When input merge completes, RMF displays the options resulting from the merge at the operator console when an error is detected or when OPTIONS is in effect. The actions RMF takes in response to an error and the response the operator can make are identical to those for input merge at the start of the session.

Example: To modify the options of an active Monitor III data gatherer session to change the NOSTOP option to STOP (after a duration of four hours) and change the time interval to 200 seconds, issue the command:

```
MODIFY RMF.A,MODIFY III,STOP(4H),MINTIME(200)
```

Modifying the Monitor III Data Gatherer Session Options

You can modify the options in effect for an active Monitor III data gatherer session by issuing a MODIFY session command specifying the options to be changed. Once the current MINTIME value expires, the new options go into effect. RMF issues message ERB104I when the options previously in effect for the session have been modified.

You pass the MODIFY session command to RMF through the input field of the MODIFY system command. The required syntax is:

```
{MODIFY} [RMF.]id, {MODIFY} III[,parm]
{  F   }            {  F   }
```

id
The identifier assigned to RMF when it was initialized.

III
The identifier for the session to be modified. For a Monitor III data gatherer session, you must specify III.

parm
The session options to be changed.

You must use a comma to separate the options. If you specify the MEMBER option, any options within the member will override options specified in the command, as described earlier under "Input Merge for the Monitor III Data Gatherer Session".

Example: Assume that the options for a currently active session include CYCLE(500), MINTIME(50) and NOSTOP, and that you want to modify these options to CYCLE(100), MINTIME(200) and STOP(40M).

If you issue the command:

```
MODIFY  RMF.A,MODIFY III,CYCLE(100),MINTIME(200),STOP(40M)
```

the options will be modified as you want.

If, however, member ERBRMF10 includes the options:

```
CYCLE(100)
MINTIME(200)
NOSTOP
```

and you issue the command:

```
MODIFY  RMF.A,MODIFY III,STOP(40M),MEMBER(10)
```

RMF will:

1. Merge the input option from the command and replace NOSTOP in the current option list with STOP(40M).
2. Merge the options from ERBRMF10 with the current options list, replacing CYCLE(500) with CYCLE(100), MINTIME(50) with MINTIME(200) and STOP(40M) with NOSTOP.

In this particular case, the desired STOP(40M) option is not currently in effect. This particular command did not achieve the expected results because any option in a member will override both the corresponding current option and the corresponding option specified on the MODIFY session command.

Ending the Monitor III Data Gatherer Session

You can end the Monitor III data gatherer session using any of the following methods:

- Issuing a system STOP command that stops all active non-TSO RMF sessions. The syntax of the STOP command is:

  $\begin{Bmatrix} \texttt{STOP} \\ \texttt{P} \end{Bmatrix} \begin{Bmatrix} \texttt{[RMF.]id} \end{Bmatrix}$

  id

  The identifier assigned to RMF when it was initialized by the START system command.

  Example:

  To terminate RMF processing (that is, to end the processing of all active sessions), issue the command:

  ```
  STOP RMF.A
  ```

- Specifying the STOP option to indicate the desired duration for the session in minutes or hours. The session ends when the time value expires. Use of the STOP option is described earlier in this chapter under "Monitor III Data Gatherer Session Options".

- Issuing a STOP session command to stop a specific active session. All other active sessions continue processing. A description of this method follows.

The STOP session command is passed to RMF through the input field of the system MODIFY command. The required syntax is:

```
{MODIFY} [RMF.]id, {STOP} III
{  F   }           {  P }
```

id
The identifier assigned to RMF when it was initialized.

III
The identifier for the session to be stopped. For the Monitor III data gatherer session, you must specify III.

Issuing this command causes the data gatherer session to terminate immediately; when processing is complete, RMF issues message ERB102I and ends the session.

Example: To stop the Monitor III data gatherer session while allowing all other active sessions to continue processing, issue the command:

```
MODIFY RMF.A,STOP III
```

Monitor III Data Gatherer Parmlib Member

Five parmlib members are shipped with RMF and are placed in SYS1.PARMLIB when RMF is installed. Only one of these parmlib members applies to a Monitor III session. (For a description of Monitor I and II parmlib members, see *Resource Measurement Facility (RMF) Monitor I and II Reference and User's Guide* LC28-1556.) Based on your installation's particular needs, you can modify options in this parmlib member or supply additional parmlib members. The parmlib member ERBRMF04 contains possible options for the Monitor III data gatherer session.

ERBRMF04: The options supplied for the Monitor III data gatherer are:

```
RESOURCE(*JES2,JES2)
```

RMF Monitor III JCL

RMF supplies cataloged procedures to establish address spaces for the Monitor III data gatherer session. RMF invokes the following RMFGAT cataloged procedure for the Monitor III data gatherer by means of an internal start command:

```
//IEFPROC   EXEC  PGM=ERB3GMFC,REGION=4096K,DPRTY=(15,15)
//SYSUDUMP  DD    SYSOUT=A
```

Notes:

1. Although these procedures are shipped with DPRTY on the EXEC statement, an installation should use an appropriate installation control specification and/or IPS to include the Monitor III data gatherer and display sessions in normal SRM scheduling. The Monitor III data gatherer should have a higher dispatching priority than all other non-system address spaces. If work with a higher dispatching priority than the Monitor III data reporter (display sessions) is executing, then Monitor III display sessions will not be dispatched when their RANGE time expires. Assigning a higher dispatching priority to the data reporter should solve this problem.

2. REGION size depends on the CYCLE time, MINTIME value, and RANGE time chosen for Monitor III (see Monitor III Data Gatherer Session Options earlier in this chapter for more information on CYCLE and MINTIME. See Chapter 5 for more information on RANGE.) The REGION size of 4096K bytes is appropriate for the following default values:
   - CYCLE time = one second
   - MINTIME value = 100 seconds
   - RANGE time = 100 seconds

Any data set that you choose must have the same characteristics as SYS1.PARMLIB. It must be a fixed blocked partitioned data set with a logical record length of 80. Each record within a member is a card image record and must conform to the following rules:

- Valid data must be placed in columns 1 to 72. Columns 73 to 80 are ignored.
- The RMF options can appear in any order. They must be separated from each other by commas, one or more blanks, or comments, in the form /* text */.
- No blanks can appear within an option.

The RMF partitioned data set is normally SYS1.PARMLIB. See "Monitor III Data Gatherer Parmlib Member" for a description of the contents of the parmlib member ERBRMF04 that IBM supplies for a Monitor III data gatherer session.

The DDname that RMF dynamically allocates during a Monitor III session is named RMFM3III. This dataset contains messages for the Monitor III data gatherer session. The Roman numeral III identifies the Monitor III data gatherer session.

When you omit the DCB characteristics for the RMFM3III data set, the characteristics used are:

```
DCB=(RECFM=VBA,LRECL=137,BLKSIZE=1693)
```

Note: To preallocate this data set, add a DD statement to the RMFGAT cataloged procedure.

Chapter 3. Monitor III Concepts and Usage

Monitor III provides contention-oriented reports that highlight delays that jobs encounter when using resources. Because the main function of the operating system is to satisfy users' requests for service from resources, most inabilities to fulfill such requests immediately show up in system control blocks. Monitor III obtains its data from system control blocks.

The data gatherer samples data for each active address space at the start of every **CYCLE**, then combines these samples at the end of the **MINTIME** period and stores the data in local storage for subsequent retrieval by the Monitor III data reporter.

The data reporter summarizes all sampled data for a **RANGE** period. Thus, the **RANGE** period must be an integer multiple of the **MINTIME** value. If the data gatherer takes a sample at each **CYCLE** and does not get delayed, the **RANGE** time divided by the **CYCLE** value is the number of samples used in producing the display report. You specify the **CYCLE** and **MINTIME** values at the start of the data gatherer session, and **RANGE** during the reporter session. (see Chapter 2 "Monitor III Data Gatherer Session").

Many data fields included in Monitor III session reports are similar in their calculation and are based on the following concepts:

- *Jobs* and *users* are always related to an *address space* when requesting service. For the purpose of describing Monitor III reports, jobs and users are synonymous.
- A *job group* is a collection of jobs or users with similar characteristics. Examples of job groups are TSO, batch, system, started tasks (STC), domains, and performance groups.
- *Resources* are any service entities for which a *user* can be queued. Examples of resources are devices (DASD, tape, MSC), processor, storage, serially reusable resources that must be enqueued on, JES, and HSM (hierarchical storage manager).
- *Job delay* allows you to determine which system resources are causing delay of all jobs, job groups, or specific jobs and to what extent the jobs are delayed. You can also determine, for a specific resource, the jobs that are being delayed while waiting for the resource and the extent of the job delay.

Common Monitor III Report Measurements

Most values included in Monitor III session reports are similar in their calculation. The following definitions and general formulas are common to all RMF reports:

- WORKFLOW (%) for address spaces and resources
- DELAY (%) for address spaces
- USING (%) for address spaces

Address Space WORKFLOW (%)

The workflow of an address space represents how a job uses system resources and the speed at which the job moves through the system in relation to the maximum average speed at which the job could move through the system. The speed at which the system performs the work of one job depends on the simultaneous work requested by other jobs.

A value from 0% to 100% measures the workflow within the RANGE period. A low workflow value indicates that a job has few of the resources it needs and is contending with other jobs for system resources. A high workflow value indicates that a job has all the resources it needs to execute, and that it is moving through the system at a relatively high speed.

For example, a job that would take four minutes to execute if all the resources it needed were available, would have a workflow of 25% if it took sixteen minutes to execute.

The following formula defines the workflow of a *single* address space:

```
                          using samples
WORKFLOW (%) = -------------------------------- * 100
                   using samples + delay samples
```

where:

using samples = the number of samples where the job was found using PROC or DEV (DASD, TAPE, MSC) resources. For source fields used in this calculation, see PROC and DEV in the "Resource WORKFLOW (%)" section.

delay samples = the number of samples where the address space was delayed by hardware resources (PROC, DEV, and STOR), and by software resources (ENQ, HSM and JES). For source fields used in this calculation, see PROC and DEV in the "Resource WORKFLOW (%)" section, and descriptions of the STOR, ENQ, HSM and JES delay reports in Chapter 4.

Note: In calculating WORKFLOW, Monitor III counts an address space as using a resource if at least one of its ready tasks is using the resource. Even if the address space has other ready tasks delayed for the same resource, Monitor III counts the address space as using the resource (single state case). For example, if a job has four ready tasks in its address space, and one task is using the processor while three tasks are simultaneously delayed for the processor, Monitor III considers this address space to have a using count of one and a delay count of zero.

Also remember that a job can be using one resource and delayed for another at the same sample, or delayed for more than one resource at at time, or using more than one resource. The maximum per sample is two using (PROC and DEV) and six delays (one for each resource).

Example: A job was found to be delayed or productive 75 times. The job was found to be using the processor 5 times and a device 10 times. The job was also found delayed for the processor 15 times, for a device 20 times and for an enqueued resource 25 times. The WORKFLOW (%) of the job would be:

```
                        5 + 10
WORKFLOW (%) = --------------------- * 100 = 20
                 5 +10 + 15 + 20 + 25
```


The following formula defines the workflow of a *group* of address spaces:

```
                               sum of using samples
WORKFLOW (%) = ------------------------------------------- * 100
                sum of using samples + sum of delay samples
```

Note: The sums represent the values for all address spaces in the group.

Resource WORKFLOW (%)

The workflow of resources indicates how efficiently users are being served. The speed with which each resource performs the work of all users is expressed as a value from 0% to 100%.

A low workflow value represents a large queue of work requests and a large number of delayed jobs, while a high workflow value represents little resource queueing contention and a small number of delayed jobs.

The following formula defines the workflow of a resource (DEV or PROC):

```
                          using samples
WORKFLOW (%)=------------------------------* 100
              using samples + delay samples
```

where:

- "using samples" equals one of the following:

  PROC The number of address spaces found using one or more processors. An address space is considered using a processor(s) when either the ASCBCPUS count is greater than zero or the address space has ready work (any ready SRB, interrupted ready task, asynchronous exit routine, or TCB is on the dispatching queue) that could be dispatched by the processor on which the Monitor III data gatherer is running. Other source fields referenced in this calculation include CVTGSMQ, CVTGSPL, CVTASCBH, ASCBLSMQ, ASCBLSPL, ASCBTCBS, and ASCBTCBL.

  DEV The number of address spaces found using one or more devices. An address space is considered using a device(s) when the UCBIOQ field points to an active I/O queue element (IECDIOQ) and the IOQASID field indicates that the address space is the issuer of the I/O request. However, because the channel subsystem accepts an I/O request whether the device, control unit or both are busy or not, the requests might or might not be delayed (queued) in the channel. Therefore, the using requestors for devices might also contain an unknown amount of delay. You must consider this delay when interpreting the workflow value. Other source fields referenced in this calculation include IOQASID, UCBSTART, UCBHALT, and UCBCLEAR.

- "delay samples" equals one of the following:

  PROC The number of address spaces found waiting for a processor. An address space is considered waiting for a processor when the address space has at least one ready unit of work to do. However, the address space with the first ready unit of work is not considered delayed because it would have been using the processor currently being used by Monitor III (if Monitor III was not using the processor). Primary source fields referenced in this calculation are the same as those listed under PROC for using samples.

  DEV The number of address spaces found waiting for a measured device. An address space is considered to be waiting for a measured device when at least one I/O queue element in the I/O queue for the device identifies the address space as the issuer of the I/O request but the request is not active. I/O requests queued in the channel for devices are considered to be using the device, and therefore an unknown amount of delay is missing from the delayed requestor count for devices.

DELAY (%) of Address Spaces

The delay of an address space represents a job that needs one or more resources but that must wait because it is contending for the resource(s) with other users in the system. The delay of an address space for a specific resource or for all resources can vary from 0% to 100%. A delay of 0% indicates no delay during the RANGE period, while a delay of 100% represents a job that was found delayed at every sample during that period. Delay is a percent of TIME during the period; with the default RANGE of 100 seconds, 1% delay is equal to one second of delay to the user.

The following formula defines the delay of an address space for a certain resource during a RANGE period:

```
                 delay samples
DELAY (%) = -------------------- * 100
               number of samples
```

where:

delay samples = the number of samples when the address space was delayed by a hardware or software resource. For source fields used in calculating the delay for a specific resource, see the appropriate delay report in Chapter 4.

number of samples = the total number of samples during the RANGE period.

Note: In calculating DELAY, Monitor III counts an address space as delayed for a resource only if the address space is not using the same identical resource (single state case). For example, if a job has four ready tasks in its address space, and one task is using the processor while three tasks are simultaneously delayed for the processor, Monitor III considers this address space to have a delay count of zero. Whenever there is concurrent using and delay of an address space for the same resource, RMF always considers the address space as using the resource (not delayed for it).

The sum of individual delays can be more than overall delay, with a maximum of 600%.

The delay of a group of address spaces for a certain resource during a RANGE period can also range from 0% to 100% and is calculated as follows:

```
                              sum of delay samples
DELAY (%) = -------------------------------------------------- * 100
              number of samples * average number of address spaces
                                    found in a job group
```

where:

average number of address spaces found in a job group = the sum of all address spaces (of the job group) found in each sample divided by the total number of samples.

USING (%) of Address Spaces

Jobs getting service from hardware resources (PROC or DEV) are *using* these resources. The use of a certain resource by an address space can vary from 0% to 100%, where 0% indicates no use of the resource during the RANGE period and 100% indicates that the address space was found using the resource in every sample during that period. If you use the default range of 100 seconds, 1% of using is equal to 1 second of using to the user.

The following formula defines the use of a resource by an address space during the RANGE period:

```
                using samples
USING (%) = ------------------- * 100
              number of samples
```

where:

using samples = the number of samples when the address space was using PROC or DEV (DASD, TAPE, MSC) resources. For source fields used in calculating the delay for a specific resource, refer to job, device or processor delay reports in Chapter 4.

number of samples = the total number of samples during the RANGE period.

Note: In calculating USING, Monitor III counts an address space as using a resource even if the address space is also delayed for the same identical resource (single state case). For example, if a job has four ready tasks in its address space, and one task is using the processor while three tasks are simultaneously delayed for the processor, Monitor III considers this address space to have a using count of one and a delay count of zero.

PROC and DEV using can add up to more than the overall using percentage, with the maximum being 200 percent.

The using state of a group of address spaces for a certain resource during a RANGE period can also range from 0% to 100% and is calculated as follows:

```
                           sum of using samples
USING (%) = -----------------------------------------------------* 100
             number of samples * average number of address spaces
                                   found in a job group
```

where:

average number of address spaces found in a job group = the sum of all address spaces (of the job group) found in each sample divided by the total number of samples.

Using IBM-Supplied Defaults

When you first begin to gather data with Monitor III, you might want to use the IBM-supplied defaults for several reasons. The default CYCLE value of 1000 milliseconds (1 second) and RANGE value of 100 seconds results in 100 samples being collected every 100 seconds, or 1 sample per second. Because of this relationship, interpreting delay values in reports is relatively easy. For example, a device delay of 43% can be translated as a 43 second delay or 43 device delay samples. Also, comparing delay and workflow values for different users is easy because all values have the same meaning in all reports. Using the default CYCLE and MINTIME values allow you to determine how quickly the wrap around storage buffer fills. If you decrease these values (and collect more samples), the buffer fills more quickly. When the buffer is full, RMF overlays the earliest data with recently collected data. Without data set recording, this reduces the length of time that data remains in the buffer area and limits how far back in time you can retrieve data from. Additionally, decreasing the CYCLE value to less than one second increases the CPU time needed by the data gatherer to sample data, thereby increasing CPU overhead.

When starting your display session, using the default RANGE value of 100 seconds with the default MINTIME value of 100 seconds allows you to view sets of samples as they are collected in each MINTIME interval. The IBM-supplied default for the first screen is the primary menu. When you are in a reporter session, you can choose from the primary menu any RMF report that contains measurement data.

When RMF is first shipped, IBM supplies default report options for each report as well as default options for the session. You can see what these default options are by selecting the appropriate option panels; if you choose, you can modify the options. For more information about these options, see Chapter 4 and 5.

Using Monitor III Reports

When you first collect data with Monitor III, it would be helpful to first look at the workflow/exceptions screen.

(**Note**: If you are examining data sets with information gathered during data set recording or have preallocated data sets for a session, before looking at the workflow/exceptions screen, you can enter the DSINDEX screen command. The DSINDEX screen shows all data sets used during data set recording or all preallocated data sets for the display session. The information on the screen can help you decide what data in the data sets you want to display. See Chapter 6 for more information about DSINDEX.)

In the workflow/exceptions report, you can identify jobs and resources with low workflow values or users that have exceptional conditions at each RANGE period. For example, you can check the MAIN REASON field in the workflow/exceptions report to identify the resource causing the delay. Once you recognize a user or a resource with a potential problem, you can analyze the situation.

If a delay value (for PROC, STOR, DEV, JES, HSM, or ENQ) on the DELAY or workflow/exceptions report is the largest value associated with a job, look at the delay report for that resource. The delay report for the resource indicates the main reason for the delay. In the case of delay due to devices (DEV) or enqueued resources (ENQ), you can further investigate a problem by looking at the DEV resource (DEVR) report and the ENQ resource (ENQR) report. For storage problems involving paging or swapping delays, you can use the resource-oriented storage (STORR) delay report.

You can use the system information (SYSINFO) report to obtain a summary of workflow and delay for the system on which the information was sampled. Thus, one report (SYSINFO) can give you an idea of how the workflow and delay of the measured system affects performance.

Figure 3-1 shows a suggested sequence for using Monitor III reports to resolve potential problems.

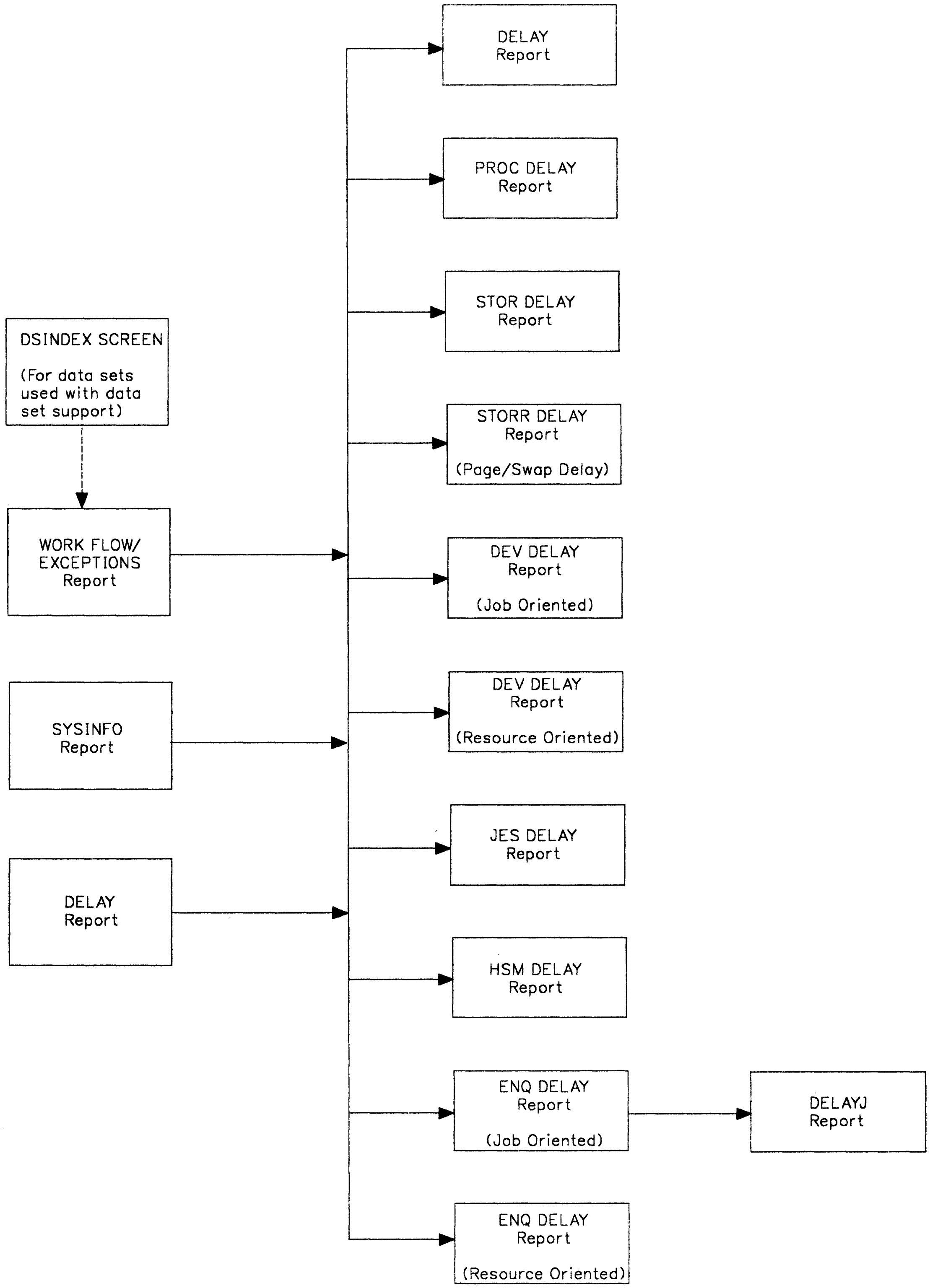


Figure 3-1. Suggested Sequence for Using Monitor III Reports

Examples

Several examples of using Monitor III reports to solve a potential performance problem follow.

Example 1 -- DASD Contention: The WFEX screen showed a job, D75JVK1, with a delay value of 27 percent for the device TIPSV1.

```
                    RMF Workflow/Exceptions -- AQXI          Line 1 of 19
          Samples:     60   Time: 12/12/86 at 10.43.00   Range +     60 Sec

---------- WORKFLOW % -----------  ---------------- EXCEPTIONS ----------------

USER/ACTV  0  20  40  60  80  100  C DMN  PG NAME     WFL  EXCEPT  DLY REASON
           |---+---+---+---+---|                      %             %
*SYSTEM    |**************      |  T ***   2 JBOWES    14  WF-HSM   28
   94/36   |                    |  T ***  14 D75JVK1   27  WF-DEV   27 TIPSV1
*TSO       |**************      |  T ***   2 FOWLER    29  WF-HSM   18
   94/36   |                    |
*BATCH     |********************|
    1/1    |                    |
*STC       |******************  |
   45/30   |                    |
*PROC      |******************* |
           |                    |
*DEV       |****************    |
           |                    |
JES2       |************        |
   48/4    |                    |
DFHSM      |****************    |
           |                    |
*MASTER*   | NOT ACTIVE         |
    0/0    |---+---+---+---+---|
           0  20  40  60  80  100

Command ===> DEVR TIPSV1                                      Scroll ===> CSR
```


To further investigate the device in question, the command DEVR TIPSV1 was entered to display the resource-oriented device delay screen:

```
                     RMF Device Resource Delays -- AQXI          Line 1 of 7
             Samples:     60   Time: 12/12/86 at 10.43.00   Range +    60 Sec

          DEVICE    NUM ACT  CON  DSC  PND  DLY DLY                     USG DLY
VOLUME NUM  TYPE  S EXP  %    %    %    %   DB% CU%  JOBNAME  C DMN  PG  %   %

TIPSV1 7AB 3350   S   1  56    3    7   46           D75JVK1  T ***  14   3  27
                                                     ABRAMS   T *** ***  58  12
                                                     D85MFB1  T *** ***   2   3
                                                     D96BJE1  T ***   2   7   2
                                                     D75RFB1  T ***  14   0   2
                                                     YRUBINS  T ***   2   7   0
                                                     WASIK    T ***   2   2   0









Command ===>                                                   Scroll ===> CSR
```

The DEVR report showed that almost all of the ACT% was PND% time. The PND% time can be time queued for a channel path, a control unit path, a head of string, or a device that is shared and reserved by another system.

In this case, shared DASD was most likely responsible for the large PND% time. Checking the Monitor II reserve activity report confirmed that the other system was reserving this pack frequently for long periods of time.

Example 2 -- Enqueue Problem: The exceptions portion of the WFEX screen contained the following delay:

```
                 RMF Workflow/Exceptions -- AQXI            Line 1 of 19
              Samples:     60   Time: 12/12/86 at 10.43.00   Range +    60 Sec

---------- WORKFLOW % -----------  ---------------- EXCEPTIONS ----------------

USER/ACTV  0  20  40  60  80  100  C DMN  PG NAME      WFL  EXCEPT  DLY REASON
           |---+---+---+---+---|                        %             %
*SYSTEM    |**************     |   B ***   2 D75GMP1A   0  WF-ENQ  100 SYSDSN
   94/36   |                   |
*TSO       |**************     |
   94/36   |                   |
*BATCH     |********************
    1/1    |                   |
*STC       |******************|
   45/30   |                   |
*PROC      |*******************|
           |                   |
*DEV       |****************   |
           |                   |
JES2       |************       |
   48/4    |                   |
DFHSM      |****************   |
           |                   |
*MASTER*   | NOT ACTIVE        |
    0/0    |---+---+---+---+---|
           0  20  40  60  80  100

Command ===> ENQR SYSDSN                                    Scroll ===> CSR
```

This job (D75GMP1A) was completely delayed (100%) by a data set (SYSDSN) that it was enqueued on. To further investigate the reason for the delay, the user entered ENQR SYSDSN to request the resource-oriented enqueue delay screen for SYSDSN:

```
                    RMF ENQ Resource Delays -- AQXI          Line 1 of 34
               Samples:     60   Time: 12/12/86 at 10.57.00   Range +     60 Sec

----------- RESOURCE NAME -----------    ---- DELAYED ----    ---- HOLDING ----
MAJOR/MINOR (SCOPE)                        % NAME     STAT      % NAME     STAT

SYSDSN          (SYSS)                   100 D75GMP1A  SW     100 D75GMP1   EO
 D75GMP1.IATDJOB.P3E.ASM


Command ===>                                                     Scroll ===> CSR
```

The ENQR report showed that batch job D75GMP1A was completely delayed (100%) for SYSDSN by another user D75GMP1.

To solve this problem, the user D75GMP1 must free the data set so that D75GMP1A can execute.

Example 3 -- DASD Contention:: The WFEX screen showed two jobs experiencing delay for the same volume, TSOL07.

```
                 RMF Workflow/Exceptions -- AQXA           Line 1 of 18
           Samples:   100   Time: 01/07/87 at 10.57.40   Range +    100 Sec

---------- WORKFLOW % ----------- ---------------- EXCEPTIONS ---------------
USER/ACTV  0  20  40  60  80  100  C DMN  PG NAME      WFL  EXCEPT   DLY REASON
           |---+---+---+---+---|                       %              %
*SYSTEM    |**                 |   T  6    2 KKNAPP     3  WF-DEV    16 TSOL07
  406/112  |                   |   T  6    2 SRPRIM     6  WF-DEV    11 TSOL07
*TSO       |***                |
  344/54   |                   |
*STC       |*****              |
   39/36   |                   |
*BATCH     |*                  |
   23/23   |                   |
*PROC      |******             |
           |                   |
*DEV       |**************     |
           |                   |
HSM        | NOT ACTIVE        |
    0/0    |                   |
JES2       |*******************|
     1/1   |---+---+---+---+---|
           0  20  40  60  80  100



Command ===> DEVR TSOL07                                    Scroll ===> CSR
```

To further investigate this DASD volume, the command DEVR TSOL07 was entered to display the resource-oriented device report.


```
                 RMF Device Resource Delays -- AQXA        Line 1 of 43
         Samples:    100   Time: 01/07/87 at 10.57.40   Range +    100 Sec

           DEVICE   NUM ACT  CON  DSC  PND  DLY DLY                   USG DLY
VOLUME NUM  TYPE  S EXP  %    %    %    %   DB% CU%  JOBNAME  C DMN  PG  %   %
TSOL07 AFA 3380   S   1  59   21   37    1           KKNAPP   T   6   2  0  11
                                                     E20WTT1  T ***   2  3  10
                                                     JOHND    T *** ***  2  10
                                                     SRPRIM   T   6   2  2   9
                                                     GEINER   T ***   2  2   7
                                                     G51MMP1  T *** ***  3   5
                                                     D10MRM1  T ***   2  0   5
                                                     D46RLW1  T ***   2  3   4
                                                     D75TYT1  T   6  14  1   4
                                                     D81HMY1  T ***   2  4   3
                                                     BENSON   T ***   2  2   3
                                                     PEGGY    T ***   2  1   3
                                                     D89JXB1  T *** ***  1   3
                                                     KISTLER  T   6   2  0   3
                                                     D94RWL1  T ***   2  0   3
                                                     D32SBC1  T ***   2  4   2
                                                     ELLIOT   T *** ***  1   2
                                                     JIMB     T ***   2  0   2

Command ===>                                                   Scroll ===> CSR
```

The DEVR report showed that the TSOL07 volume was very active (59%) and had many contending TSO users (not all are shown on the first frame of this report). The largest portion of the active time was "disconnect time" (37%). Included in disconnect time is "seek", "search", and "rotation" time, when the device is not connected and transferring data.

Analysis of the user workload showed that several of the users were sequentially accessing data sets with very short blocksizes on the volume TSOL07. I/O activity occurred frequently for small amounts of data, causing most of the seek and rotational delay. It was decided that reblocking the data sets to full track blocking would substantially reduce the amount of I/O activity to the volume, as well as reduce the amount of disconnect time.

Chapter 4. Monitor III Session Reports

The RMF Monitor III data reporter retrieves information that the data gatherer collects during a Monitor III data gatherer session. The data reporter analyzes the retrieved data and issues reports. The reports are composed and issued by means of the Interactive System Productivity Facility (ISPF) and sent to a display screen. The Monitor III reporter session is menu-driven, and lets you change options on reports. You can select the information that your reports will display, the colors of the report, and whether you want them displayed in graphic or tabular form.

Starting an RMF Reporter Session

To start the reporter session log on to TSO, and enter from TSO ready mode:

```
RMFWDM
```

You can also enter this command from the ISPF main menu as a TSO command. Split the screen and issue RMFWDM as a TSO command on one ISPF menu. On the other screen you can use other ISPF functions during the reporter session.

Note: Your installation might make RMF a selection on your ISPF selection menu. Enter the selection on the command line to begin the display session.

RMF Monitor III Primary Menu

After the Monitor III reporter session starts, RMF usually displays the primary menu.

```
                          RMF Monitor III Primary Menu


  Select one of the following items or enter command. Press ENTER.

    1 DELAY    Delays (DLY)                13 DELAYJ   Job delay (DLYJ)
    2 DEV      Device delays (DD)          14 DEVJ     Job device (DDJ)
    3 ENQ      ENQ delays (ED)             15 ENQJ     Job ENQ (EJ)
    4 HSM      HSM delays (HD)             16 HSMJ     Job HSM (HJ)
    5 JES      JES delays (JD)             17 JESJ     Job JES (JJ)
    6 PROC     Processor delays (PD)       18 PROCJ    Job processor (PJ)
    7 STOR     Storage delays (SD)         19 STORJ    Job storage (SJ)
    8 SYSINFO  System information (SI)     DI DSINDEX  Dataset index
    9 WFEX     Workflow exception (WE)     OP OPTIONS  Options selection
   10 DEVR     Device resource (DR)         T TUTORIAL Tutorial aid
   11 ENQR     ENQ resource (ER)            X EXIT     End display session
   12 STORR    Storage resource (SR)






  Selection ===>
```

Figure 4-1. Primary Menu

The primary menu allows you to select:

- RMF reports (1-19)
- The RMF Data Set Index (DSINDEX) screen (DI), which displays a list of the data available during a reporter session
- The Option Selection Menu (OP), which allows you to select options to control and modify the reporter session
- The RMF Monitor III Tutorial (T), which contains basic information about RMF Monitor III

RMF reports and their fields are described later in this chapter. For more information on RMF options see Chapter 5, and for more information on the DSINDEX screen, see Chapter 6.

RMF Tutorial and Other Online Information

The RMF tutorial is an online introduction to RMF Monitor III. It gives you a brief overview of an RMF reporter session and contains some examples on using RMF. You can also use the PF1 (HELP) key for additional information on a panel, message, or report you are viewing.

Exiting the Monitor III Reporter Session

To end the RMF Monitor III data reporter, select X on the primary menu.

Selecting a Report from the Primary Menu

You can select an RMF report from the primary menu as follows:

- Enter the number on the left of the report name.
- Enter the report name, or its abbreviation as it appears on the menu. See the reference section for report commands and abbreviations in Chapter 5.

For example, to select the DELAY report, enter a 1 on the primary menu:

```
Selection ===> 1
```

Or enter the report command DELAY on any command line:

```
Command ===> DELAY
```

If you do not specify parameters for report commands (jobname, class, selection, resource), RMF defaults to the options already in effect for the session, or presents you with a report options panel so you can specify a selection if nothing was specified previously. To change report options, enter on the command line of the report:

```
Command ===> ROPTIONS
```

RMF displays the report options panel for that report. On the report options panel, you can change and modify RMF reports by changing the options. RMF saves any report options you change (except DATE, TIME and RANGE) across sessions. Press PF3 (END) to return to the report.

Note: You can also use the option selection menu to access a report options panel. For more information, see "Option Selection Menu."

Delay Reports

RMF provides delay reports that you can access during a report session. Delay reports contain information about job delay and the system resources they are contending for.

Delay of an address space or a group of address spaces is expressed as a value from 0% to 100%. A value of 0% means the job had no delay during the report interval, while 100% indicates that the job was delayed for the resources it required in every sample during that period. See Chapter 3, "Monitor III Concepts and Usage" for a discussion of these RMF measurements.

Delay reports can be **job-oriented or resource-oriented** in the way they present their information.

Job-oriented delay reports list delay percentages by jobname. The job DELAY report allows you to determine which system resources are causing delays for jobs or job groups. It provides an overview of jobs that are contending for system resources and indicates for which resource the job is experiencing the most delay.

The job DELAY report gives you information about job delay for every resource that RMF monitors. These resources include processors (PROC), devices (DEV), storage (STOR), HSM, JES, and serially reusable resources (ENQ). For each of these resources, RMF provides a **detail** report. The names of the detail reports correspond to the resource names that appear in the DELAY report. Like the job DELAY report, the detail reports are **job-oriented**; that is, they list delay percentages by job or job group.

You can use the job DELAY report to determine for which resource (PROC, DEV, STOR, JES, HSM, or ENQ) a job or job group is experiencing the largest delay percentage. Then you can use the detail delay report for that resource to get more information about the job delay.

You can also specify a **single job** for job-oriented DELAY and detail reports; RMF displays the report with only that job or job group.

Resource-oriented delay reports list delays by volume or resource name. The resource-oriented device (DEVR) delay report contains information about device delays. The resource-oriented storage (STORR) delay report contains information about storage delays for jobs. The resource-oriented enqueue (ENQR) delay report contains information about serially reusable resources that jobs are delayed for.

Report options panels allow you to select the jobs or job groups to appear in each job-oriented report. The DEVR and ENQR resource-oriented reports have report option panels that allow you to specify volumes to appear in the DEVR report or resource names to appear in the ENQR report.

The Job DELAY Report

The job DELAY report allows you to determine which system resources are causing delay of jobs or job groups, and to what extent the jobs are delayed.

To request the report, select it from the primary menu or issue the following command from any panel:

```
Command ===> DELAY
```

Figure 4-2 is an example of a tabular DELAY report for all jobs in the system. Figure 4-3 is an example of a graphic DELAY report for all jobs in the system. The DELAY report field headings and their meanings are described in Figure 4-4.

```
                         RMF Delay Report -- AQXI                 Line 1 of 7
             Samples:     60   Time: 12/12/86 at 10.43.00   Range +     60 Sec

                   WFL USG DLY IDL UKN  ------ % DELAYED FOR -------  PRIMARY
NAME     C DMN  PG  %   %   %   %   %   PROC  DEV STOR  JES  HSM  ENQ  REASON

*SYSTEM             72   3   1  62  34     0    1    0    0    0    0
*TSO                61   3   2  91   4     0    1    0    0    1    0
*BATCH             100  14   0   0  86     0    0    0    0    0    0
*STC                88   3   0  32  65     0    0    0    0    0    0
JBOWES   T ***   2  14   5  30  63   2     0    2    0    0   28    0
D75JVK1  T ***  14  27  10  27  58   5     0   27    0    0    0    0  TIPSV1
FOWLER   T ***   2  29   8  20  68   3     0    2    0    0   18    0

Command ===>                                                      Scroll ===> CSR
```

Figure 4-2. Tabular Job Delay (DELAY) Screen for All Jobs

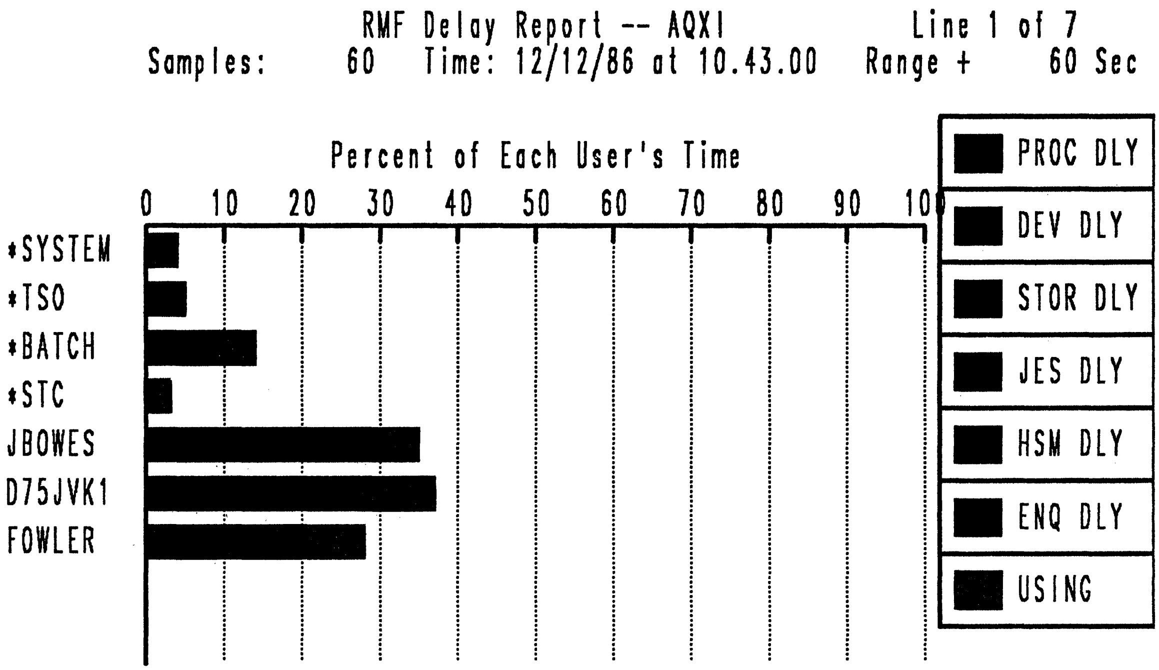


Figure 4-3. Graphic Job Delay (DELAY) Report for All Jobs

Field Heading	Meaning
NAME	One to eight character name of the job or job group. (The primary source fields used are ASCBJBNI and ASCBJBNS.)
C	A one character abbreviation for the job class as follows: S Started task T TSO B Batch For summary entries, this field is blank.
DMN	The domain that a specified job has been running in. (The source field is OUCBDMN.) If a job changes its domain during the RANGE period, RMF displays three asterisks (***) in this field instead of the domain number. For summary entries, this field is blank.
PG	The control performance group that a specified job has been running in. (The source field is OUCBNPG.) If a job changes its group during the RANGE period, RMF displays three asterisks (***) in this field instead of the performance group number. For summary entries, this field is blank.
WFL %	The workflow percentage of the job or job group. For the formula used in calculating this value, see "Address Space WORKFLOW (%)" in Chapter 3.

USG %	The using percentage for the job or job group. The using percentage for a job is calculated as follows:
	`                 using samples`
	`USG % = ------------------------------- * 100`
	`               number of samples`
	where:
	using samples = The single state count of samples when the job or job group was using resources. RMF updates this count only once at each sample if the job is found using one or more processors or one or more devices. RMF determines if a job is using a processor by checking ASCBCPUS for each address space. If the processor running Monitor III has other ready work to do (any ready SRB, interrupted ready task, asynchronous exit routine, or TCB is on the dispatching queue), and if the address space was not already found using a processor, then the first dispatchable unit of work is considered to be using that processor. The processor running Monitor III is not counted as a processor in use if there is no other ready work for it to do. Other source fields referenced in this calculation include CVTGSMQ, CVTGSPL, CVTASCBH, ASCBLSMQ, ASCBLSPL, ASCBTCBS and ASCBTCBL.
	RMF determines if a job is using a device by searching for UCBs that show field UCBIOQ pointing to an active I/O queue element (IECDIOQ). This number reflects the requests that the channel has accepted. The channel accepts requests whether the device is busy or not, so the requests might or might not be delayed (queued) in the channel. Therefore, the using percent for devices may also contain an unknown amount of delay. Other source fields referenced include IOQACTV, IOQASID, UCBSTART, UCBHALT, and UCBCLEAR.
	The using percentage for a job group is calculated as follows:
	`             sum of using samples`
	`USG % = --------------------------------- * 100`
	`        number of samples * average number of`
	`                            address spaces`
	`                            found in a job`
	`                            group`

Figure 4-4 (Part 1 of 3). Fields in the Job Delay (DELAY) Screen

<table>
<tr>
<td>DLY %</td>
<td>
The delay percentage for the job or job group.
The delay percentage for a job is calculated as follows:
<pre>
                    delay samples
DLY % = ------------------------------- * 100
                 number of samples
</pre>
where:
delay samples = The single state count of samples with any delay. RMF increments this count only once for each sample when one or more units of work (TCBs or SRBs) associated with the address space are delayed for any reason (PROC, STOR, DEV, JES, HSM, or ENQ).
The delay percentage for a job group is calculated as follows:
<pre>
               sum of delay samples
DLY % = --------------------------------- * 100
        number of samples * average number of
                            address spaces
                            found in a job
                            group
</pre>
</td>
</tr>
<tr>
<td>IDL %</td>
<td>
The idling percentage for a job or job group. Jobs in terminal wait, timer wait, or waiting for job selection by JES (JES SSREQ number 5) are in an idling state if they are not using the processor or devices and are not delayed for any monitored reason.
Jobs classified as in terminal wait meet all of the following conditions:
- They are not found using any monitored resource
- They are not found delayed for any monitored reason
- They are swapped out (OUCBOUT)
- They are in terminal wait (OUCBTRM bit on and OUCBOWT bit off)
- They are waiting for a user ready indication before being swapped in (ASCBURR)
Jobs classified as in timer wait meet all of the following conditions:
- They are not using or delayed for a monitored resource
- Their address space has a TQE on the TQE chain pointed to by PCCATQEP. The address space identifier must match the value in the TQEAID field.
- The TQE represents a "wait" or "real" request (TQETYPE)
The idling percentage of an address space can vary from 0 to 100%, where 0% indicates that the user is not idling during the RANGE period, and 100% represents a job that is idle at every sample.
The idling percentage for an address space during a refresh period is calculated as follows:
<pre>
                    idle samples
IDL % = ------------------------------- * 100
                 number of samples
</pre>
where:
idle samples = The number of samples that show the job in an idle state.
The idling percentage for a group of address spaces during a RANGE period is calculated as follows:
<pre>
               sum of idle samples
IDL % = --------------------------------- * 100
        number of samples * average number of
                            address spaces
                            found in a job
                            group
</pre>
NOTE: The value reported might include some delay for a non-monitored resource.
</td>
</tr>
</table>

Figure 4-4 (Part 2 of 3). Fields in the Job Delay (DELAY) Screen

Field Heading	Meaning
UKN%	RMF considers jobs that are not delayed for a monitored resource, not using a monitored resource, or not in an idling state to be in an unknown state. Examples of address spaces in an unknown state are: - Idle address spaces that use a non-monitored mechanism for determining when they are active. Most system tasks (STC) show up as unknown when when they are idle. - Address spaces waiting for devices other than DASD, tape, or MSC. - Address spaces waiting for an operator reply to a WTOR. The unknown state percentage for an address space can vary from 0 to 100%, where 0% indicates that the state was always known during the RANGE period and 100% represents a job in an unknown state throughout the RANGE period. The unknown state of an address space during the RANGE period is calculated as follows: $\text{UKN \%} = \frac{\text{unknown samples}}{\text{number of samples}} * 100$ where: unknown samples = The number of samples with the job in an unknown state. The unknown state percentage for a group of address spaces during a RANGE period calculated as follows: $\text{UKN \%} = \frac{\text{sum of unknown samples}}{\text{number of samples} * \text{average number of address spaces found in a job group}} * 100$
% DELAYED FOR	The percentage that each defined resource contributes to the overall delay of the job or job group. The percentages for all these resources add up to DLY % if there is no overlap of the delay states; if there is overlap, the percentages add up to more than DLY %. The defined resources that can delay the job or job group are as follows: • PROC - The job or job group has ready work on the dispatching queue, but it is not being dispatched. • STOR - The job or job group is waiting for a COMM, LOCL, SWAP, or VIO page, or is on the out/ready queue. See the storage delay report. • DEV - The job or job group is delayed for a DASD, tape, or mass storage controller resource. • JES - The job or job group is delayed for a JES subsystem request. • HSM - The job or job group is delayed for an HSM subsystem request. • ENQ - The job or job group is waiting to use an enqueued (reserved) resource.
PRIMARY REASON	Reported only for a specific job, this field provides additional information about the primary reason for the delay. The contents depend on the resource having the largest % DELAYED FOR value. If the resource with the maximum delay is PROC, DEV, STOR, or ENQ, then RMF lists a primary reason. For PROC, this field contains the name of the job that used the processor most often while the reported job was delayed (ASCBJBNI and ASCBJBNS). For DEV, this field contains the volume serial number of the device that the reported job was most often delayed for (UCBVOLI). For ENQ, this field contains the major name (RIBQNAME) of the resource most responsible for the delay. For STOR, this field contains the storage delay category that had the most delay (COMM, LOCL, SWAP, VIO, OUTR). NOTE: RMF does not list a primary reason for the delay if the resource with the maximum delay percentage is JES or HSM.

Figure 4-4 (Part 3 of 3). Fields in the Job Delay (DELAY) Screen

DELAY Report Options Panel

To display the report options panel for the DELAY report shown in Figure 4-2 on page 4-4 enter from the command line of the DELAY report:

```
Command ===> ROPTIONS
```

The options that you specify on this panel (except SUMMARY and CRITERION) affect all job-oriented detail delay reports.

Figure 4-5 is an example of the DELAY report options panel.

```
                     RMF Delay Report Options:  DELAY            Line 1 of 5

Change or verify parameters for all delay reports. To exit, press END.
Defaults will be changed for DELAY, DEV, PROC, STOR, ENQ, JES and HSM.

       DATE ===> 12/12/86    TIME ===> 10:43:00    RANGE ===>  60

  CLASS      ===> ALL        Classes: ALL TSO BATCH STC
  GROUP      ===> ALL        ALL or one of available groups below
  SUMMARY    ===> YES        Summary lines on DELAY report (YES NO)
  CRITERION  ===> 20         Minimum delay to include job in DELAY report

  JOBS       ===> NO         View job selection/exclusion panel next (YES NO)

                             Available Groups
DMN001     DMN002     DMN003     DMN004     DMN005     DMN006     DMN007
DMN008     DMN009     DMN010     DMN011     DMN012     DMN013     DMN014
DMN015     DMN016     DMN017     DMN018     DMN019     DMN020     DMN021
PG001      PG002      PG003      PG004      PG005      PG006      PG007
PG008      PG009      PG010      PG011      PG012      PG013      PG014








Command ===>                                                Scroll ===> CSR
```

Figure 4-5. Class/Selection Report Options panel for DELAY reports

The following are selections on the DELAY report options panel:

DATE, TIME, and RANGE
The date, time and interval range that you can enter for data to be reported on the display screen, using the syntax specified on the language options panel. (See Chapter 5, "Monitor III Options and Commands" for more information on options.) DATE is the beginning month, day, and year of the data you want. TIME is the hour, minute, and second of the beginning of the report interval for the data you want to display. RANGE is the time range of the report interval over which you want RMF to summarize and present the sampled data. These values take effect when you press ENTER and RMF displays them in the report header. RMF does not save the DATE, TIME, and RANGE values you enter here across sessions.

Any separators specified on the language options panel can be used. Any value that is not entered defaults to zero. Leading zeroes can be omitted (for example, 13.5 becomes 13:05). Hardcopy output or online display defaults to the format specified in the language options panel.

CLASS
The job class for a group of address spaces to be included in all job-oriented delay reports. You can specify: TSO, BATCH, or STC. If you want to include all these classes on delay reports, enter ALL in the CLASS field.

GROUP
The domain or performance group to be included in all job-oriented delay reports. You can specify a specific group listed at the bottom of the screen, or choose ALL to display all available groups. You can specify a group that is not listed on this panel. (For example, DMNnnn or PGnnn, where NNN is a value from 0 to 999. PGnnn must be a control performance group.)

SUMMARY
The option to include summary lines on the DELAY report. YES causes RMF to include summary lines; NO omits them from the report. SUMMARY is valid only for the job DELAY report.

CRITERION
The threshold delay percentage value that causes RMF to omit from the DELAY report all jobs with delay percentages that are less than the specified value. The default is zero, which will include all jobs on the report. CRITERION is valid only for the job DELAY report.

JOBS
For job-oriented delay reports, the option to display the job selection/exclusion panel, where you can select the jobs to appear in all job-oriented delay reports. If you enter YES, RMF displays the panel from which you can select or exclude listed jobs to appear in the job-oriented delay reports. You can also add additional jobnames to be reported.

Press the END key to make these values active for the session. If you select YES for JOBS on the delay report options panel and press ENTER, RMF displays the job selection/exclusion panel in Figure 4-6.

```
          RMF MONITOR III DELAY REPORT OPTIONS: DELAY          Line 1 of 19

 Select (S), exclude (X), or fill-in jobs for report. Press END.

 SEL  JOBNAME    SEL  JOBNAME    SEL  JOBNAME    SEL  JOBNAME    SEL  JOBNAME

      ________        ________        ________        ________        ________
      ________        ________        ________        ________        ________
  S   *ALL            *MASTER*        ABRAMS          ADMPRINT        ALLOCAS
      AMSAQXI         BEVK            CATALOG         CCT             CONSOLE
      CRYPTO          CVTFIXUP        DFHSM           DUMPSRV         D15CAD1
      D15JPK1         D15NTM1         D15SJS1         D24RJC1         D24RJC2
      D32SRS1         D58MFL1         D75JVK1         D75RFB1         D85MFB1
      D96BJE1         D96GMD1         D96MRL1         ESS             E17VXL1
      FAGEN           FOWLER          FS00            GRS             HFAM
      HLUNE           HOWARTH         INFACAS         INIT            JAMESJRA
      JBOWES          JES2            JIMB            JUDY            KINN
      KOCH            KREADY          LARSON          LAURIE          LEFT
      LLA             LMIER           LOGWTR          MARZIO          MBPHILL
      MEG             MFLORIA         MXXX            NLDM            NPM
      PAMELA          PCAUTH          PTRACY          RALPH           RMFGAT
      RMF33           SAMON           SASWTR          SLUTZY          SMF
      SOFV3           SONORA06        SONORA08        SONORA11        SONORA13




 COMMAND ===>                                               SCROLL ===> CSR
```

Figure 4-6. Job Selection/Exclusion panel for DELAY Report

The job selection/exclusion panel displays a list of all jobs that are available during the current interval belonging to the CLASS you specified on the previous panel. It also includes any entries that were previously selected independent of the CLASS selection (whether they are currently available or not). All the jobs that are experiencing delays might not fit on this panel. Use PF8 and PF7 to scroll through the remaining jobs.

- To **choose all jobs** for the report, place an S in front of *ALL and press ENTER.
- To **select jobs** for the report, place an S in front of any jobnames to be included and an X in front of *ALL, then press ENTER.
- To **exclude jobs** from the report, place an X in front of any jobnames to be excluded and an S in front of *ALL, then press ENTER.

You can enter new jobnames on the first two input lines of each column. After you press ENTER, these jobnames appear with the rest of the names on the panel and the two input lines are again blank. If you enter the new jobnames without a selection or exclusion code, they appear with an S.

Notes:

The option set INITIAL shipped with RMF contains default options that display this panel with an S in front of *ALL.

1. If no selections are made on this panel, all jobs will be displayed.
2. If S and X selections are made on jobnames, but nothing is specified for *ALL, only the jobnames with S will be displayed.
3. If only X selections are made on jobnames, and nothing is specified for *ALL, all jobs with the X next to them are excluded from the report. All jobs without an X are displayed.

Delay Reports for a Single Jobname

To request a job delay report for a single specific job, issue the DELAYJ command on any command line or select it on the primary menu. When you request a DELAY report for a single job, RMF displays the same report format as it does in a report for multiple jobs. However, if the job changes its domain or performance group during the RANGE period, RMF adds both multiple detail lines and a summary line. The summary line contains three asterisks (***) in the column where the change occurred (DMN or PG).

Figure 4-7 is an example of a tabular DELAY report for a single job. Figure 4-8 is an example of a graphic DELAY report for a single job.

```
                              RMF Job Delays -- AQXI                Line 1 of 4
              Samples:     60   Time: 12/12/86 at 10.44.00   Range +     60 Sec

                    WFL USG DLY IDL UKN  ------ % DELAYED FOR -------  PRIMARY
NAME      C DMN  PG  %   %   %   %   %   PROC  DEV STOR  JES  HSM  ENQ  REASON
KOCH      T ***   2  39  28  47  25   0     0   47    0    0    0    0  TIPSV1
              5   2 100   2   0   7   0     0    0    0    0    0    0
              4   2   0   0   2   0   0     0    2    0    0    0    0  TIPSV1
              3   2  37  27  45  18   0     0   45    0    0    0    0  TIPSV1

Command ===>                                                      Scroll ===> CSR
```

Figure 4-7. Tabular Job Delay Screen for a Single Job (DELAYJ)

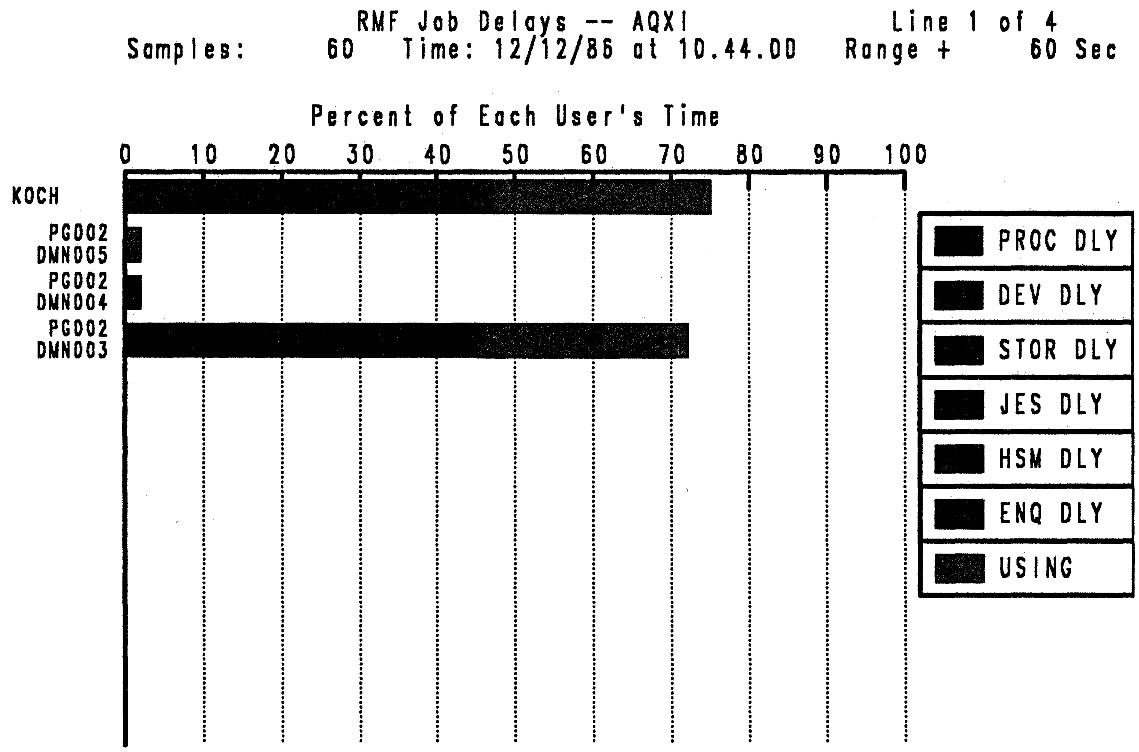


Figure 4-8. Graphic Job Delay Report for a Single Job (DELAYJ)

Report Options Panel for Job Delay Reports for Single Jobs

The job report options panel is available for all single job delay reports (DELAYJ, DEVJ, ENQJ, HSMJ, JESJ, PROCJ, and STORJ). To display the panel, enter ROPTIONS from the command line of any single job delay report.

The report options panel for all delay report lists jobnames that are currently available during the session. For JOBNAME enter the jobname that you want to include in the report. The jobname that you enter becomes the default for all job-oriented delay reports and is saved across sessions. If you select a single-job delay report from the primary menu and a jobname has not been set, RMF displays the job report options panel.

Figure 4-9 is an example of a job report options panel for DELAYJ.

```
            RMF MONITOR III JOB REPORT OPTIONS: DEVJ              Line 1 of 19

 Change or verify parameters for ALL job reports. Press END.
 Defaults will be changed for DELAYJ, DEVJ, PROCJ, STORJ, ENQJ, JESJ and HSMJ.

        DATE ===> 10/10/85   TIME ===>  10:43:00      RANGE ===>   60

     JOBNAME ===> JBOWES      Name of job to be reported

                          AVAILABLE JOBS
  S   *ALL            *MASTER*        ABRAMS          ADMPRINT        ALLOCAS
      AMSAQXI         BEVK            CATALOG         CCT             CONSOLE
      CRYPTO          CVTFIXUP        DFHSM           DUMPSRV         D15CAD1
      D15JPK1         D15NTM1         D15SJS1         D24RJC1         D24RJC2
      D32SRS1         D58MFL1         D75JVK1         D75RFB1         D85MFB1
      D96BJE1         D96GMD1         D96MRL1         ESS             E17VXL1
      FAGEN           FOWLER          FS00            GRS             HFAM
      HLUNE           HOWARTH         INFACAS         INIT            JAMESJRA
      JBOWES          JES2            JIMB            JUDY            KINN
      KOCH            KREADY          LARSON          LAURIE          LEFT
      LLA             LMIER           LOGWTR          MARZIO          MBPHILL
      MEG             MFLORIA         MXXX            NLDM            NPM
      PAMELA          PCAUTH          PTRACY          RALPH           RMFGAT
      RMF33           SAMON           SASWTR          SLUTZY          SMF
      SOFV3           SONORA06        SONORA08        SONORA11        SONORA13


 COMMAND ===>                                                 SCROLL ===> CSR
```

Figure 4-9. DELAYJ Report Options panel

The following are selections on the DELAYJ report options panel:

DATE, TIME, and RANGE

The date, time and interval range that you can enter for data to be reported on the display screen, using the order specified on the language options panel. (See Chapter 5, "Monitor III Options and Commands" for more information on options.) DATE is the beginning month, day, and year of the data you want. TIME is the hour, minute, and second of the beginning of the report interval for the data you want to display. RANGE is the time range of the report interval over which you want RMF to summarize and present the sampled data. These values take effect when you press END and RMF displays them in the report header. RMF does not save the DATE, TIME, and RANGE values you enter here across sessions.

Any separators specified on the language options panel can be used. Any value that is not entered defaults to zero. Leading zeroes can be omitted (for example, 13:5 becomes 13:05). Hardcopy output or online display defaults to the format specified in the language options panel.

JOBNAME

The name of the job or job group to include in all single job delay reports.

Job-Oriented Device Delay

The job-oriented device delay report (DEV) shows jobs delayed by contention for device volumes and identifies, for each job indicated, up to four volumes contributing to the delay. RMF lists the jobs included by descending delay percentages; that is, the job experiencing the most significant delay appears first. To request the report, issue DEV on the command line, or select it on the primary menu.

You can also select a device delay report that displays information for one job; enter DEVJ on the command line or select it on the primary menu. For more information on the format and options for a detailed delay report, see "Delay Reports for a Single Jobname" on page 4-13.

Figure 4-10 is an example of the tabular job-oriented device delay report. Figure 4-11 is an example of the graphic job-oriented device delay report. The job-oriented device delay report field headings and their meanings are described in Figure 4-12.

```
                         RMF Device Delays -- AQXI            Line 1 of 10
             Samples:    60   Time: 12/12/86 at 10.43.00   Range +     60 Sec

                   DLY USG CON  ------------ MAIN DELAY VOLUME(S) ------------
JOBNAME  C DMN  PG   %   %   %    % VOLSER  % VOLSER   % VOLSER   % VOLSER

D75JVK1  T ***  14  27  10   1   27 TIPSV1
ABRAMS   T *** ***  12  62   3   12 TIPSV1
D85MFB1  T *** ***   3   3   1    3 TIPSV1
SONORA08 S   7   3   2   8   3    2 JES2PK
D75RFB1  T ***  14   2   7   2    2 TIPSV1
D96BJE1  T ***   2   2   7   0    2 TIPSV1
FOWLER   T ***   2   2   7   3    2 TSOL07
SONORA13 S   7   3   2   2   1    2 JES2PK
JBOWES   T ***   2   2   2   1    2 TSO010
ADMPRINT S   7   3   2   0   0    2 IPOL0X

Command ===>                                                  Scroll ===> CSR
```

Figure 4-10. Tabular Job-Oriented Device Delay (DEV) Screen

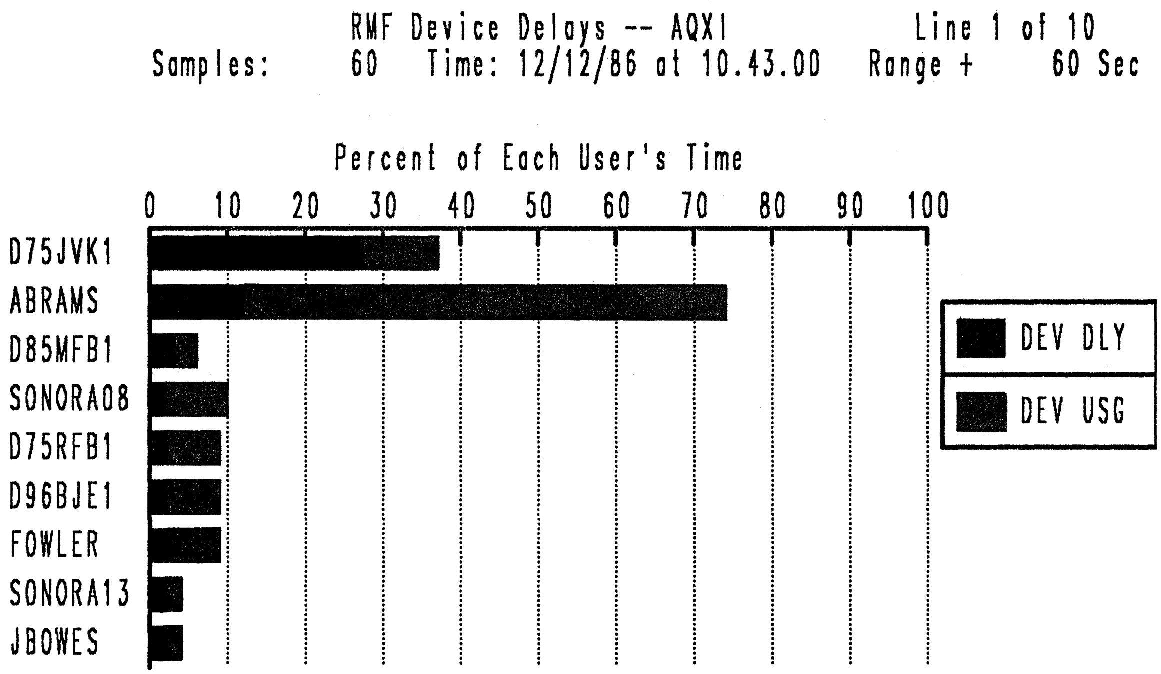


Figure 4-11. Graphic Job-Oriented Device Delay (DEV) Report

<table>
<tr><th>Field Heading</th><th>Meaning</th></tr>
<tr><td>JOBNAME</td><td>One to eight character name of a job that is delayed by device volumes. The device delay report does not summarize data by job groups; all jobs within a job group are reported individually. Primary source fields are ASCBJBNI and ASCBJBNS.</td></tr>
<tr><td>C</td><td>A one character abbreviation for the job class as follows:
S Started task
T TSO
B Batch</td></tr>
<tr><td>DMN</td><td>The domain that a specified job has been running in. (The source field is OUCBDMN.) If a job changes its domain during the RANGE period, RMF displays three asterisks (***) in this field instead of the domain number.</td></tr>
<tr><td>PG</td><td>The control performance group that a specified job has been running in. (The source field is OUCBNPG.) If a job changes its group during the RANGE period, RMF displays three asterisks (***) in this field instead of the performance group number.</td></tr>
<tr><td>DLY %</td><td>Delay the waiting job (address space) is experiencing because of contention for devices during the RANGE period, expressed as a percentage.
The DLY % of a job by device(s) is calculated as follows:<pre>
                  delay samples
DLY % = ------------------------------ * 100
                number of samples
</pre>where:
delay samples = The number of samples where the job was delayed for one or more devices. The single state count of samples being delayed by devices is determined by checking the IOQs that are queued off UCBIOQF. I/O requests queued in the channel for devices are considered to be using the device, and therefore an unknown amount of delay is missing from the delayed request count for devices.
NOTE: This DLY% value is also found in the DEV field on the job delay report.</td></tr>
<tr><td>USG%</td><td>The percentage of time when the job has an outstanding request for service from any DASD, tape, or MSC volume, not just the volumes listed under the VOLSER columns on the report. This value is calculated as follows:<pre>
                  using samples
USG % = ------------------------------- * 100
                number of samples
</pre>where:
using samples = The number of samples when the job has an active request for one or more devices. A request is active when IOS has started the I/O request but the request is not complete.
The device USG% value indicates the time that the request for service is active in the channel, which includes both active time on the device and queuing delay in the channel. Channel queuing time can often be large, particularly with shared DASD. Therefore, jobs with a high USG% value might be using a device a lot or might be experiencing excessive hardware queuing delay. To verify that a high USG% is due to queuing delay, look at the % PEND and % USING fields in the resource-oriented device delay report (Figure 4-16). Primary source fields referenced in this calculation include UCBIOQ, IOQASID, UCBSTART, UCBHALT, and UCBCLEAR.
NOTE: To find all the using volumes for a jobname you must scan an entire resource-oriented device delay (DEVR) report, using the FIND command.</td></tr>
</table>

Figure 4-12 (Part 1 of 2). Fields in the Job-Oriented Device Delay (DEV) Screen

<table>
<tr><th>Field Heading</th><th>Meaning</th></tr>
<tr><td>CON %</td><td>The percentage of time during the RANGE period when devices used by the address space were connected to channel path(s) that actually transferred data between the devices and main storage. This value measures connect time of the DEV volumes as well as I/O requests to any device on a block multiplex channel for which the measurement facility is active. RMF obtains connect time from the ASCBDCTI field at each sample.

NOTES:

1. When comparing the CON % and the USG% fields in this report, you must be aware that CON % is a measured multistate value, while USG% is a sampled single state value. Thus, CON % includes time while the job was using more than one device at the same time, while USG % does not. The value in the CON % field might include more devices than the USG% field. The USG % field may include a considerable amount of delay.

2. IOS updates the ASCBDCTI field when an I/O operation completes. Therefore, some of the connect time from the previous RANGE period might be included in the CON % value, while some of the connect time in the current RANGE period might be absent. This discrepancy is noticeable on devices that have very long channel programs, such as paging devices.</td></tr>
<tr><td>MAIN DELAY VOLUME(S)</td><td>Up to four DEV volumes contributing most to the delay of the job. The DEV volume having the largest delay percentage appears first.

VOLSER — The serial number of a DASD, tape, or MSC volume contributing to the delay of a job. (The source field is UCBVOLI.)

% — The percentage of delay caused because the job was waiting to use the named volume. This value is calculated as follows:

$$\% = \frac{\text{delay samples}}{\text{number of samples}} * 100$$

where:

delay samples = The number of samples when the job was delayed for a specific VOLSER. If there is no overlap in delay states and one to four volumes contribute to the delay of the job, then the percentages add up to the DELAY % value of the job. For source fields referenced in this calculation, see the "DELAY %" field in this report description.</td></tr>
</table>

Figure 4-12 (Part 2 of 2). Fields in the Job-Oriented Device Delay (DEV) Screen

Device Delay Report Options Panel

To display the report options panel for the device delay report, enter ROPTIONS on the command line of the device delay report. (The device delay report options panel is similar to the DELAY report options panel, but does not contain SUMMARY or CRITERION.) The format for the device delay report options panel is the same as that for the other job oriented detail reports. See "Delay Reports" earlier in this chapter.

Figure 4-13 is an example of the DEV report options panel.

```
                    RMF Delay Report Options: DEV              Line 1 of 5

Change or verify parameters for all delay reports. To exit, press END.
Defaults will be changed for DELAY, DEV, PROC, STOR, ENQ, JES and HSM.

       DATE ===> 12/12/86    TIME ===> 10:43:00    RANGE ===>  60

      CLASS ===> ALL         Classes: ALL TSO BATCH STC
      GROUP ===> ALL         ALL or one of available groups below
      JOBS  ===> NO          View job selection/exclusion panel next (YES NO)

                             Available Groups
 DMN001    DMN002    DMN003    DMN004    DMN005    DMN006    DMN007
 DMN008    DMN009    DMN010    DMN011    DMN012    DMN013    DMN014
 DMN015    DMN016    DMN017    DMN018    DMN019    DMN020    DMN021
 PG001     PG002     PG003     PG004     PG005     PG006     PG007
 PG008     PG009     PG010     PG011     PG012     PG013     PG014

Command ===>                                                  Scroll ===> CSR
```

Figure 4-13. DEV Class/Selection Report Options panel

The meanings of the fields are the same as those for the DELAY report options panel described in Figure 4-5 on page 4-9. Select CLASS and GROUP as on the DELAY report options panel.

If you enter YES for JOBS, RMF displays the job selection/exclusion panel for the report. You can select or exclude available jobs and add jobnames that you want to appear on the delay reports. See Figure 4-6 on page 4-11 for an example of the job selection/exclusion report options panel.

Resource-Oriented Device Delay

The resource-oriented device delay report (DEVR) includes information about the activity of device volumes that are contributing to the delays of jobs (as indicated on the job-oriented device delay screen). The first eleven columns in the report contain volume-related information. For a 3090 processor, the last two fields contain data about I/O request delay caused by contention at the control unit and device level. For the 308x and 4381 processors, the headers for these fields appear, but the fields are blank.

The last six columns contain job-related information. RMF sorts the volumes by the average number of delayed users (1 user delayed 100% is equivalent to 100 users each delayed 1% of the time), and the waiting jobs by descending delay percentages. If RMF is unable to obtain valid hardware data it prints dashes for the hardware measurements. percentages normally appear.

If RMF is unable to obtain valid hardware data for a subchannel, it prints dashes instead of DLY DB% and DLY CU%. When RMF is not running on a 3090 processor, these fields are blank.

To request the report, issue the DEVR display command or select it on the primary menu. Figure 4-14 is an example of the tabular resource-oriented device delay report. Figure 4-15 is an example of the graphic resource-oriented device delay report. The resource-oriented device delay report field headings and their meanings are described in Figure 4-16.

```
                RMF Device Resource Delays -- AQXI          Line 1 of 7
         Samples:     60   Time: 12/12/86 at 10.43.00   Range +     60 Sec

          DEVICE   NUM ACT  CON  DSC  PND  DLY DLY                     USG DLY
VOLUME NUM  TYPE  S EXP  %    %    %    %  DB% CU%  JOBNAME  C DMN  PG  %   %

TIPSV1 7AB 3350   S   1  56    3    7   46          D75JVK1  T ***  14   3  27
                                                    ABRAMS   T *** ***  58  12
                                                    D85MFB1  T *** ***   2   3
                                                    D96BJE1  T ***   2   7   2
                                                    D75RFB1  T ***  14   0   2
                                                    YRUBINS  T ***   2   7   0
                                                    WASIK    T ***   2   2   0

Command ===>                                                Scroll ===> CSR
```

Figure 4-14. Tabular Resource-Oriented Device Delay (DEVR) Screen


```
              RMF Device Resource Delays -- AQXI       Line 1 of 1
Samples:     60   Time: 12/12/86 at 10.43.00   Range +     60 Sec
```

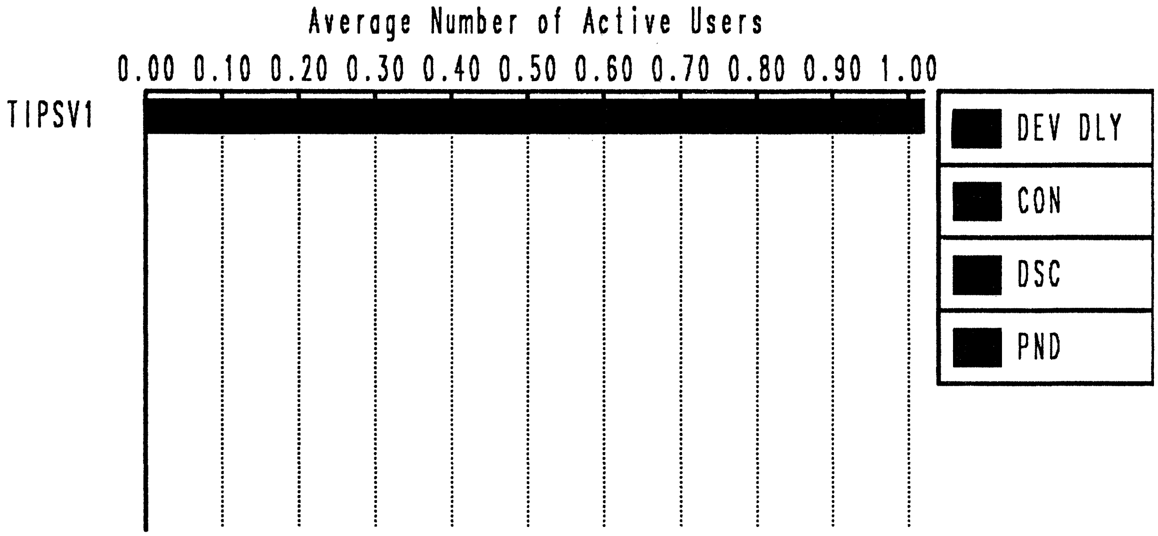


Figure 4-15. Graphic Resource-Oriented Device Delay (DEVR) Report

<table>
<tr><th>Field Heading</th><th>Meaning</th></tr>
<tr><td>VOLUME</td><td>One to six character name of an online volume.
(The source field is UCBVOLI for DASD and tape, and UCBUREC and UCBDSM for MSC (*MSC* on the report).)</td></tr>
<tr><td>NUM</td><td>The number where the volume is mounted (UCBCHAN).</td></tr>
<tr><td>DEVICE TYPE</td><td>The identification number of the device named in the VOLUME column.</td></tr>
<tr><td>S</td><td>Denotes that the device is shared.</td></tr>
<tr><td>NUM EXP</td><td>The number of exposures used by MVS.
For multiple exposure devices, this is usually one less than the number of exposures the device actually has. For standard DASD devices, the number of exposures is one. For tapes and virtual volumes, "-" is displayed instead of the number of exposures.</td></tr>
<tr><td>ACT %</td><td>The percentage of time during the RANGE period when the device was active. To derive this value, RMF computes the accumulated active time as follows:
Active time = pending time + connect time + disconnect time
where:
Pending time = the time all I/O requests wait in the logical control unit (CUCW for the 308x and 908x and CU-HDR for the 3090) queue or the physical control unit queue (for the 4381) before there is an available path. RMF obtains this value from the CMBPENDT field in the channel measurement block (CMB). Pending time includes the time spent waiting for a channel, control unit, or head of string, or for the actual device (if it is a shared device that is reserved by another processor).
Connect time = the time the device was connected to a channel path to actually transfer data between the device and storage. RMF obtains this value from the CMBCONNT field in the channel measurement block (CMB).
Disconnect time = the time the device has an active channel program and is disconnected (not transferring data). RMF obtains this value from the CMBDISCT field in the channel measurement block (CMB). Disconnect time includes seek time, normal rotation delay time, and extra rotation delay because the channel was busy when the device needed to reconnect.
RMF then uses the accumulated active time to calculate the percentage:

```
                  Active time
ACT % =  ------------------------------ * 100
                  RANGE time
```

</td></tr>
<tr><td>CON %</td><td>The percent connect time. See the description under % ACT. RMF calculates the value as follows:

```
           Accumulated connect time
CON % = ------------------------------ * 100
                  RANGE time
```

</td></tr>
<tr><td>DSC %</td><td>The percent disconnect time. See the description under %ACT. RMF calculates the value as follows:

```
          Accumulated disconnect time
DSC % = ------------------------------ * 100
                  RANGE time
```

</td></tr>
</table>

Figure 4-16 (Part 1 of 3). Fields in the Resource-Oriented Device Delay (DEVR) Screen

Field Heading	Meaning
PND %	The percent pending time. See the description under % ACT. RMF calculates the value as follows: `PND % = Accumulated pending time / RANGE time * 100`
DLY DB%	The percentage of time during the RANGE period when the channel subsystem measured I/O request delay because the device was busy. Device busy might mean that the volume is in use by another system, the device is reserved by another system, a head of string busy condition caused the contention, or some combination of these conditions has occurred. RMF calculates the value as follows: `DLY DB% = Accumulated DB time / RANGE time` For 308x, 908x, 4381 processors, the name of the field appears, but the field is blank. See Notes.
DLY CU%	The percentage of time during the RANGE period when there is I/O request delay because the control unit was busy. If the device is shared at the control unit, the contention might be caused by a sharing system. If the device is not shared at the control unit level, the contention is the result of other activity to different devices over an alternate path serviced by this control unit. RMF calculates the value as follows: `DLY CU% = Accumulated CUB DELAY time / RANGE time` For 308x, 908x, or 4381 processors, the name of the field appears, but the field is blank. See Notes.

NOTES:

1. The CON %, DSC %, and PND % values sum to the ACT % value.
2. When comparing the ACT %, CON %, DSC %, or PND % fields with the USG % field in this report, you must be aware that ACT %, PND %, CON %, and DSC % are measured multistate values, while USG % is a sampled single state value. If a single I/O request is very long (such as a long-running channel program), the PND %, CON %, and DSC % values might be too low because of timer overflow errors. (For a description of incomplete hardware measurement data, see the section "Timer Overflow" in Chapter 3 of *Resource Measurement Facility (RMF) Monitor I and II Reference and User's Guide*, LC28-1556.)
3. The channel updates the data fields used to calculate CON %, DSC %, and PND % when the I/O operation completes. Therefore, some of the time from the previous RANGE period might be included in these values, while some of the time in the current RANGE period might be absent from these values. This discrepancy is noticeable on devices that have very long channel programs, such as paging devices.
4. For multi-exposure devices, ACT PND and DSC values can exceed 100% because there can be more than one request active on a device at once.

Figure 4-16 (Part 2 of 3). Fields in the Resource-Oriented Device Delay (DEVR) Screen

Field Heading	Meaning
JOBNAME	One to eight character name of a job using or being delayed by the DEV volume. The DEVR delay report does not summarize data by job groups; all jobs within a job group are reported individually. RMF lists all jobs for each device, by descending delay percentages. Primary source fields are ASCBJBNI and ASCBJBNS.
C	A one character abbreviation for the job class as follows: S Started task T TSO B Batch
DMN	The domain that a specified job has been running in. (The source field is OUCBDMN.) If a job changes its domain during the RANGE period, RMF displays three asterisks (***) in this field instead of the domain number.
PG	The control performance group that a specified job has been running in. (The source field is OUCBNPG.) If a job changes its group during the RANGE period, RMF displays three asterisks (***) in this field instead of the performance group number.
USG %	The percentage of time when the job has had a request accepted by the channel for the specified VOLUME, but the request is not yet complete. The sum of the USG % values for a device will approximate the ACT % value, except for multiple exposure devices. For source fields referenced in this calculation, see the USG% field in the job-oriented device delay report (Figure 4-12).
DLY %	Delay the waiting job (address space) is experiencing because of contention for a specific VOLUME during the RANGE period, expressed as a percentage. For source fields referenced in this calculation, see the DLY % field in the job-oriented device delay report (Figure 4-12).

Figure 4-16 (Part 3 of 3). Fields in the Resource-Oriented Device Delay (DEVR) Screen

Resource-oriented Device Delay Report Options Panel

You can use the resource-oriented device delay report options panel to view the volumes available during the session that might be contributing to device contention for jobs. To display the DEVR report options panel, enter ROPTIONS on the command line of the DEVR report. Figure 4-17 is an example of the DEVR report options panel.

```
                        RMF DEVR Report Options              Line 1 of 17

Change or verify parameters for the DEVR report. Press END.

       DATE ===> 12/12/86    TIME ===> 10:43:00    RANGE ===>  60

     VOLSER ===> TIPSV1      Volume to be reported or ALL

                               Available Volumes
BASECA     BASECB     BASEC0     BASEC1     BASEC2     BASEJM     BERDPK
BSS210     BSS999     CAT212     CAT84I     CB8480     CHKPTX     CHKPT1
CHKI01     CHKPT3     CHKPT4     CKSPL1     CKSPL2     CKSPL3     CLRPAK
C45I01     DASD03     DBLMN1     DBLMN2     DBLMN3     DBVL01     DBVL02
D60AF3     D60AF5     D60AF6     D60AF7     D60PAK     D602A2     D602A3
D602A4     D602B1     D602B2     D602B2     D602DC     D602D5     D602D6
D602D7     D6021B     D6021D     D6021D     D60215     D60217     D60411
D60412     D6044D     D60444     D60444     D60445     D60446     D606A8
D607AF     D607EC     D607E1     D60701     D60707     D608F0     D83CL3
D71CKP     D71CMN     D71SPP     D71WLD     D83CL1     D83CL2     D83D31
D83CMN     D83DB1     D83DB2     D83DMP     D83DRA     D83DRB     D83D31
D83D51     D83ILG     D83I80     D83I81     D83I90     D83I91     D83I92
D83I93     D83JCK     D83JC1     D83JC2     D83JD1     D83JD2     D83JFY
D83JS1     D83JS2     D83JVC     D83JV2     D83JV3     D83J22     D83J23
D83J31     D83J32     D83LOG     D83PAK     D83SPP     D83STA     D83STA



Command ===>                                                   Scroll ===> CSR
```

Figure 4-17. DEVR Report Options panel

The following are selections on the DEVR report options panel:

DATE, TIME, and RANGE
The date, time and interval range that you can enter for data to be reported on the display screen, using the syntax specified on the language options panel. (See Chapter 5, "Monitor III Options and Commands" for more information on options.) DATE is the beginning month, day, and year of the data you want. TIME is the hour, minute, and second of the beginning of the report interval for the data you want to display. RANGE is the time range of the report interval over which you want RMF to summarize and present the sampled data. These values take effect when you press END and RMF displays them in the report header. RMF does not save the DATE, TIME, and RANGE values you enter here across sessions.

Any separators specified on the language options panel can be used. Any value that is not entered defaults to zero. Leading zeroes can be omitted (for example, 13:5 becomes 13:05). Hardcopy output or online display defaults to the format specified in the language options panel.

VOLSER
The volume serial number to be included from the list of available volumes. If you enter a name, RMF makes that volume the default, and saves it across sessions. You can also enter a name that is not on the list, and it will be monitored when it becomes available. If you want to include all volumes listed on the panel, enter ALL.

Job-Oriented Enqueue Delay

The job-oriented enqueue delay report contains jobs waiting for a resource, the resources associated with each waiting job, and the jobs currently holding each resource. RMF lists the jobs by descending delay percentages. You can display the enqueue delay report by specifying the ENQ command or by selecting it on the primary menu.

You can also select a ENQ report that displays information for a single job. Enter ENQJ on any command line or select it on the primary menu. For more information on the format and options for a detailed delay report, see "Delay Reports for a Single Jobname" on page 4-13.

For a description of the report options panel for detail reports, see "Device Delay Report Options Panel" on page 4-21.

Figure 4-18 shows an example of a tabular job-oriented enqueue delay report. Figure 4-19 shows an example of a graphic job-oriented enqueue delay report. The job-oriented enqueue delay report field headings and their meanings are described in Figure 4-20.

```
                           RMF ENQ Delays -- AQXI              Line 1 of 21
               Samples:    60   Time: 12/12/86 at 10.57.00   Range +    60 Sec

           DLY  ------------- RESOURCE WAITING -------------  ---- HOLDING ----
JOBNAME     %     %  STAT MAJOR/MINOR NAMES (SCOPE)              %  NAME/SYS STAT

D75JVK1    97    97  EW   SYSIEFSD        (SYS)                 97 JAMESJRA  SO
                           Q4                                   97 JBOWES    SO
                                                                 3 *MASTER*  SO
                                                                 3 D75RFB1   SO
                                                                 2 YRUBINS   SO
                                                                 2 D53NJV1   SO
D24RJC1    88    88  EW   SYSIEFSD        (SYS)                 88 JAMESJRA  SO
                           Q4                                   88 JBOWES    SO
                                                                 3 D75RFB1   SO
                                                                 2 YRUBINS   SO
                                                                 2 D53NJV1   SO
KOCH       12    12  SW   SYSIEFSD        (SYS)                 12 JAMESJRA  SO
                           Q4                                   12 JBOWES    SO
                                                                 2 D53NJV1   SO
CONSTAN     7     7  SW   SYSIEFSD        (SYS)                  7 JAMESJRA  SO
                           Q4                                    7 JBOWES    SO
                                                                 2 D75RFB1   SO
D75RFB1     7     7  SW   SYSIEFSD        (SYS)                  7 JAMESJRA  SO
                           Q4                                    7 JBOWES    SO
D53NJV1     5     5  SW   SYSIEFSD        (SYS)                  5 JAMESJRA  SO
                           Q4                                    5 JBOWES    SO

Command ===>                                                Scroll ===> CSR
```

Figure 4-18. Tabular Job-Oriented Enqueue Delay (ENQ) Screen

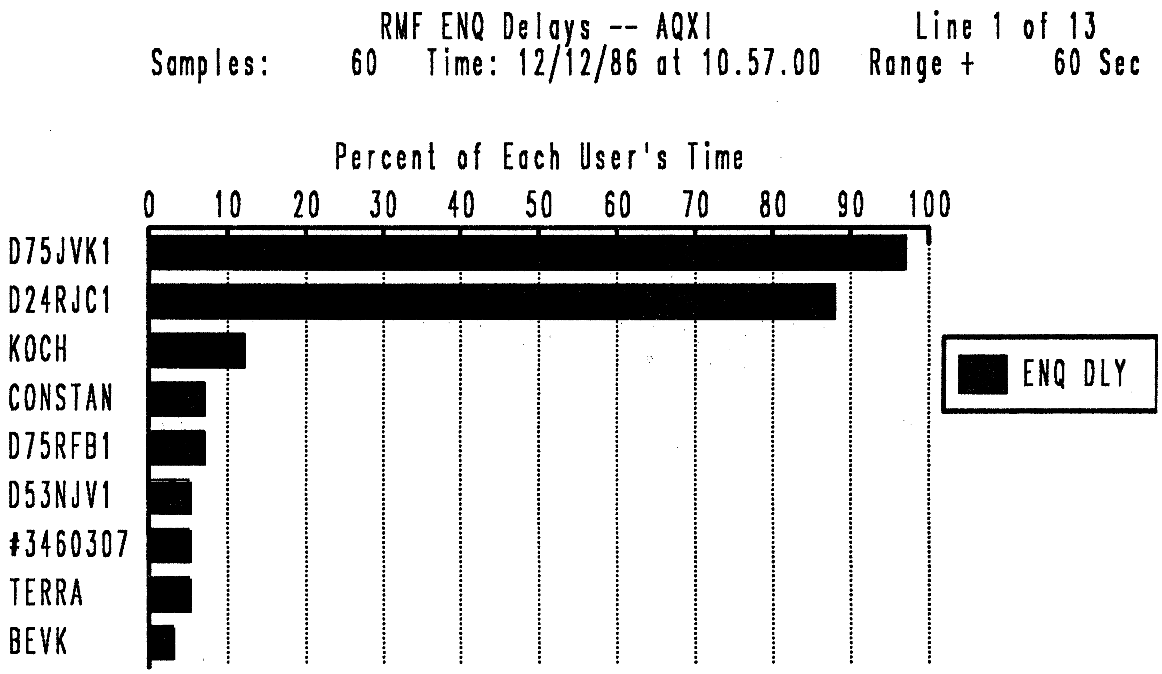


Figure 4-19. Graphic Job-Oriented Enqueue Delay (ENQ) Report

Field Heading	Meaning
JOBNAME	One to eight character name of a job that is waiting for (enqueued on) a resource. The ENQ delay report does not summarize data by job groups; all jobs within a job group are reported individually. Primary source fields are ASCBJBNI and ASCBJBNS.
DLY %	Delay the waiting job is experiencing because of contention for any enqueued resource during the RANGE period. This value is calculated as follows: `DLY % = delay samples / number of samples * 100` where: delay samples = The number of samples when the job was delayed for one or more enqueued resources. RMF calculates this value by incrementing the counter once for each sample when the job is delayed for one or more resources. RMF keeps track of resources in contention via notification from global resource serialization of each ENQHOLD and ENQRLSE SYSEVENT. RMF uses the GQSCAN macro instruction for each contending resource to get information on jobs holding these resources. Primary source fields used in this calculation include RIBEASID, RIBESTAT, RIBQNAME, and RIBNAME. NOTE: This DLY% value is also found in the ENQ field on the job delay report.
RESOURCE WAITING %	Indicates how much of the overall delay of the job for enqueued resources is caused by a specific resource. This value is calculated as follows: `WAITING % = delay samples / number of samples * 100` where: delay samples = The number of samples when the job was delayed for the resource. The source field is RIBESTAT. NOTE: If there is no overlap in delay states, the WAITING% value(s) for a job add up to the DLY % value of the job.
RESOURCE WAITING - STAT	The status indicates whether the waiting job wants exclusive (EW) or shared (SW) use of the resource. (The source fields are RIBETYPE and RIBESTAT.)
MAJOR/MINOR NAMES	The MAJOR name and MINOR name of the resource delaying the job (RIBQNAME and RIBNAME). The major name is listed above the minor name. The major name is up to eight characters long, and the minor name is up to 36 characters long. If the minor name contains unprintable characters it will be up to 18 characters long (represented by 36 hexadecimal digits). If the minor name is longer than 36 characters, RMF only displays the first 36 characters. If there are two resources with the same major name and their minor name differs only after the first 36 characters, then RMF considers them as the same resource. Shown on the same line as the major name, SCOPE shows whether the scope of the resource is system (SYS) or systems (SYSS). It is possible that two resources with the same major and minor name, but different scopes, might exist in the system. RMF determines the SCOPE from the RIBSYS and RIBSYSS source fields.

Figure 4-20 (Part 1 of 3). Fields in the Job-Oriented Enqueue Delay (ENQ) Screen

Field Heading	Meaning	
MAJOR/MINOR NAMES (cont)	The following are the enqueue major names and their associated resources:	
	MAJOR NAME	RESOURCES
	MSFDC	Service processor TP port
	SPFDSN	Data set name
	SPFEDIT	Data set name
	SYSDSN	System data sets
	SYSIAT	JES3 CHKPNT data set
	SYSIEA01	Dump data set
	SYSIEFSD	Serializes device allocations
	SYSIEWLP	SYSLMOD data set (MINOR name is data set name
	SYSIGGV1	Master catalog
	SYSIGGV2	Catalogs (MINOR name is catalog name)
	SYSIKJBC	TSO broadcast data set (MINOR name is relative block address)
	SYSIKJUA	User attribute data set
	SYSSMF01	SMF SYS1.MANx data set
	SYSVSAM	VSAM data sets
	SYSVTOC	VTOC (MINOR name is volser)
	SYSAVM	AVM queue or data areas
	SYSZBDT	MVS bulk data transfer (MINOR name is node name
	SYSZCAXW	Catalog auxiliary work area
	SYSZCMDS	Master trace command or Message loss detection
	SYSZCOMM	Global Resource Serialization ring processing table
	SYSZCSD	CSD control block field
	SYSZEC16	Purge data set
	SYSZIGGI	TSB (MINOR name is ASID)
	SYSZISTOC	Configuration restart data set (MINOR name is ddname)
	SYSZJES2	JES2 buffer or data set
	SYSZJWTP	Job step messages
	SYSZOPEN	System data sets
	SYSZPCCB	Private catalog control block
	SYSZPGAD	PAGEADD command
	SYSZPSWD	Password data set
	SYSZRPLW	Catalog name (MINOR name is catalog name)
	SYSZSIPS	SYSEVENT
	SYSZSMF1	SMF buffer
	SYSZTIOT	Device allocation
	SYSZTRC	System trace
	SYSZUSRL	User label tracks
	SYSZVARY	Reconfiguration commands
	SYSZVMV	Volume mount and verify
	SYSZVOLS	System volumes (MINOR name is volser)
	SYSZWTOR	WTOR reply (MINOR name is REPLYxx, where xx is the message id)

Figure 4-20 (Part 2 of 3). Fields in the Job-Oriented Enqueue Delay (ENQ) Screen

<table>
<tr><th>Field Heading</th><th>Meaning</th></tr>
<tr><td>HOLDING
- %</td><td>Indicates how much a specific job is contributing to the holding of a resource. The value is expressed as a percentage. For example, a HOLDING % of 100 indicates that the specified job was enqueued on the resource and delaying the waiting job for the entire RANGE period. This value is calculated as follows:<pre>
                        holding samples
HOLDING % = --------------------------- * 100
                       number of samples
</pre>where:
holding samples = The number of samples when the holding job held the resource and the delayed job was waiting for it. For primary source fields used in this calculation see the DELAY % field in this report description.</td></tr>
<tr><td>HOLDING
-NAME/SYS</td><td>The name of the job that is holding the resource that the delayed job is waiting for. (The source fields are ASCBJBNI and ASCBJBNS). If the holding job is from another system, RMF also provides the system name (global resource serialization system identifier).</td></tr>
<tr><td>HOLDING
- STAT</td><td>The status indicates whether the holding job has exclusive (EO) or shared (SO) use of the resource. (The source fields are RIBETYPE and RIBESTAT.)</td></tr>
</table>

Figure 4-20 (Part 3 of 3). Fields in the Job-Oriented Enqueue Delay (ENQ) Screen

Resource-Oriented Enqueue Delay

The resource-oriented ENQ delay report is similar to the job-oriented ENQ delay report, but the information about a specific resource is kept together. RMF reports the resources according to the number of waiting jobs in descending order, the jobs waiting for each resource in descending DELAY percentage order, and the jobs holding the resource in descending HOLDING percentages. To display the ENQR report, enter ENQR on any command line or or select it on the primary menu.

Figure 4-21 is an example of a tabular resource-oriented ENQ delay report. Figure 4-22 is an example of a graphic resource-oriented ENQ delay report. The resource-oriented ENQ delay report field headings and their meanings are described in Figure 4-23.

```
                    RMF ENQ Resource Delays -- AQXI             Line 1 of 34
               Samples:    60   Time: 12/12/86 at 10.57.00   Range +     60 Sec

----------- RESOURCE NAME -----------       ---- DELAYED ----    ---- HOLDING ----
MAJOR/MINOR (SCOPE)                          % NAME      STAT     % NAME      STAT

SYSIEFSD        (SYS)                       97 D75JVK1   EW      97 JAMESJRA  SO
 Q4                                                              97 JBOWES    SO
                                                                  3 *MASTER*  SO
                                                                  3 D75RFB1   SO
                                                                  2 YRUBINS   SO
                                                                  2 D53NJV1   SO
                                            88 D24RJC1   EW      88 JAMESJRA  SO
                                                                 88 JBOWES    SO
                                                                  3 D75RFB1   SO
                                                                  2 YRUBINS   SO
                                                                  2 D53NJV1   SO
                                            12 KOCH      SW      12 JAMESJRA  SO
                                                                 12 JBOWES    SO
                                                                  2 D53NJV1   SO
                                             7 CONSTAN   SW       7 JAMESJRA  SO
                                                                  7 JBOWES    SO
                                                                  2 D75RFB1   SO
                                             7 D75RFB1   SW       7 JAMESJRA  SO
                                                                  7 JBOWES    SO
                                             5 D53NJV1   SW       5 JAMESJRA  SO
                                                                  5 JBOWES    SO
                                             5 #3460307  SW       5 JAMESJRA  SO
Command ===>                                                     Scroll ===> CSR
```

Figure 4-21. Tabular Resource-Oriented Enqueue Delay (ENQR) Screen

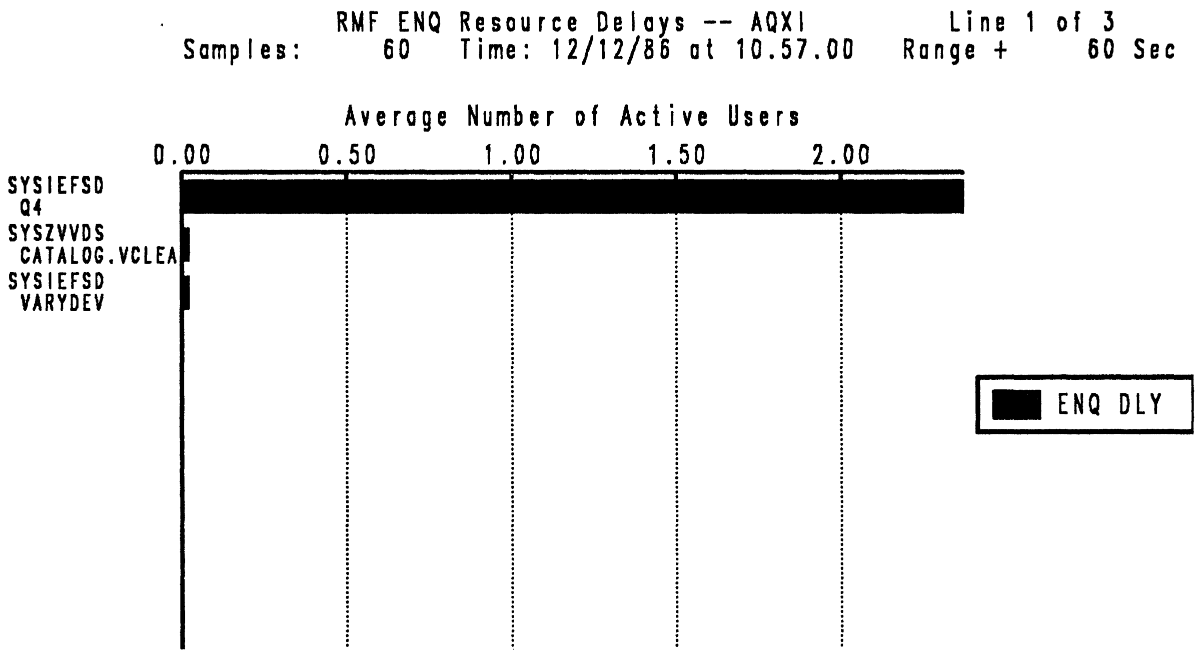


Figure 4-22. Graphic Resource-Oriented Enqueue Delay (ENQR) Report

Field Heading	Meaning
RESOURCE NAME	The MAJOR name and MINOR name of the resource delaying the job. (The source fields are RIBQNAME and RIBNAME.) The major name is listed above the minor name. The major name is up to eight characters long and the minor name is up to 36 characters long. If the minor name contains unprintable characters, it will be up to 18 characters long (represented by 36 hexadecimal digits). If the minor name is longer than 36 characters, RMF only displays the first 36 characters. If there are two resource with the same major name and their minor name differs only after the first 36 characters, then RMF considers them as the same resource. Shown on the the same line as the major name, SCOPE shows whether the scope of the resource is system (SYS) or systems (SYSS). It is possible that two resources with the same major and minor name, but different scopes, might exist in the system. RMF determines the SCOPE from the RIBSYS and RIBSYSS source fields.
DELAYED - %	The delay percentage of the job for a specific enqueued resource. This value is calculated as follows: `DELAYED % = delay samples / number of samples * 100` where: delay samples = The number of samples when the job was delayed for a specific enqueued resource. RMF calculates the number of samples delayed by incrementing a counter once for each sample when the job is delayed for that resource. For source fields referenced in this calculation see DELAY % in the job-oriented ENQ delay report (Figure 4-20).
DELAYED - NAME	One to eight character name of the job delayed for the resource. (The source fields are ASCBJBNI and ASCBJBNS.) RMF lists all jobs delayed for the resource.
DELAYED - STAT	The status indicates whether the waiting job wants exclusive (EW) or shared (SW) use of the resource. (The source fields are RIBETYPE and RIBESTAT.)
HOLDING - %	The percent of the RANGE that a specific job was holding the resource while the named job was delayed. For example, a HOLDING % of 100 indicates that the specified job held the resource for the entire RANGE period. This value is calculated as follows: `HOLDING % = holding samples / number of samples * 100` where: holding samples = The number of samples when the holding job was holding the resource while the named job was delayed. For source fields referenced in this calculation, see DELAY % in the job-oriented ENQ delay report (Figure 4-20).
HOLDING -NAME/SYS	The name of the job that is holding the resource that the delayed job is waiting for. (The source fields are ASCBJBNI and ASCBJBNS.) If the holding job is from another system, RMF also provides the system name (global resource serialization system identifier).
HOLDING - STAT	The status indicates whether the holding job has exclusive (EO) or shared (SO) use of the resource. (The source fields are RIBETYPE and RIBESTAT.)

Figure 4-23. Fields in the Resource-Oriented Enqueue Delay (ENQR) Screen

ENQR Report Options Panel

The resource-oriented enqueue delay report options panel allows you to select from a list of available major names, resources to be included in the report. To display the ENQR report options panel, enter ROPTIONS on the command line of the ENQR report.

Figure 4-24 is an example of the ENQR report options panel.

```
                           RMF ENQR Report Options                 Line 1 of 1

Change or verify parameters for the ENQR report. Press END.

       DATE ===> 12/12/86    TIME ===> 10:57:00    RANGE ===>  60

      MAJOR ===> SYSIEFSD    ENQ major name for report or ALL

                          Available ENQ Major Names
CLRLOG00   SYSIEFSD   SYSZVVDS









Command ===>                                                    Scroll ===> CSR
```

Figure 4-24. ENQR Report Options Panel

The following are selections on the ENQR report options panel:

DATE, TIME, and RANGE

The date, time and interval range that you can enter for data to be reported on the display screen, using the syntax specified on the language options panel. (See Chapter 5, "Monitor III Options and Commands" for more information on options.) DATE is the beginning month, day, and year of the data you want. TIME is the hour, minute, and second of the beginning of the report interval for the data you want to display. RANGE is the time range of the report interval over which you want RMF to summarize and present the sampled data. These values take effect when you press END and RMF displays them in the report header. RMF does not save the DATE, TIME, and RANGE values you enter here across sessions.

Any separators specified on the language options panel can be used. Any value that is not entered defaults to zero. Leading zeroes can be omitted (for example, 13:5 becomes 13:05). Hardcopy output or online display defaults to the format specified in the language options panel.

MAJOR

The major name of the resource from the list of available major names. listed on the panel to be included in the report. If you enter a name, RMF makes that major name the default and saves it across sessions. You can also enter a name that is not on the list and it will be reported when it becomes available. If you want to include all major names that are available, enter ALL.

HSM Delay

The HSM (Hierarchical Storage Manager, Program Number 5740-XRB) delay report allows you to investigate situations where jobs are delayed when requesting service from HSM. The report includes information that describes the reason for delay.

RMF lists all jobs delayed during the refresh period in order by descending delay percentage. You request this screen by issuing the HSM command or by selecting it from the primary menu. To display the report options panel for the HSM delay report, enter the ROPTIONS command. This panel contains the same options as the DEV report options panel in Figure 4-5 on page 4-9.

You can also select an HSM report to display information for a single job. Enter HSMJ on any command line or select it on the primary menu. For more information on the format and options for a detailed delay report, see "Delay Reports for a Single Jobname" on page 4-13.

Figure 4-25 is an example of the tabular HSM delay report. Figure 4-26 is an example of the graphic HSM delay report. The HSM delay report field headings and their meanings are described in Figure 4-27.

```
                        RMF HSM Delays -- AQXI                Line 1 of 2
HARDCOPY      Samples:     60   Time: 12/12/86 at 10.43.00   Range +     60 Sec

          DLY  -------------------- MAIN DELAY REASON(S) --------------------
JOBNAME    %    %  F-CODE EXPLANATION            %  F-CODE EXPLANATION

JBOWES     28   28    3   RECALL A DATASET
FOWLER     18   18    3   RECALL A DATASET






















Command ===>                                                  Scroll ===> CSR
```

Figure 4-25. Tabular HSM Delay Screen

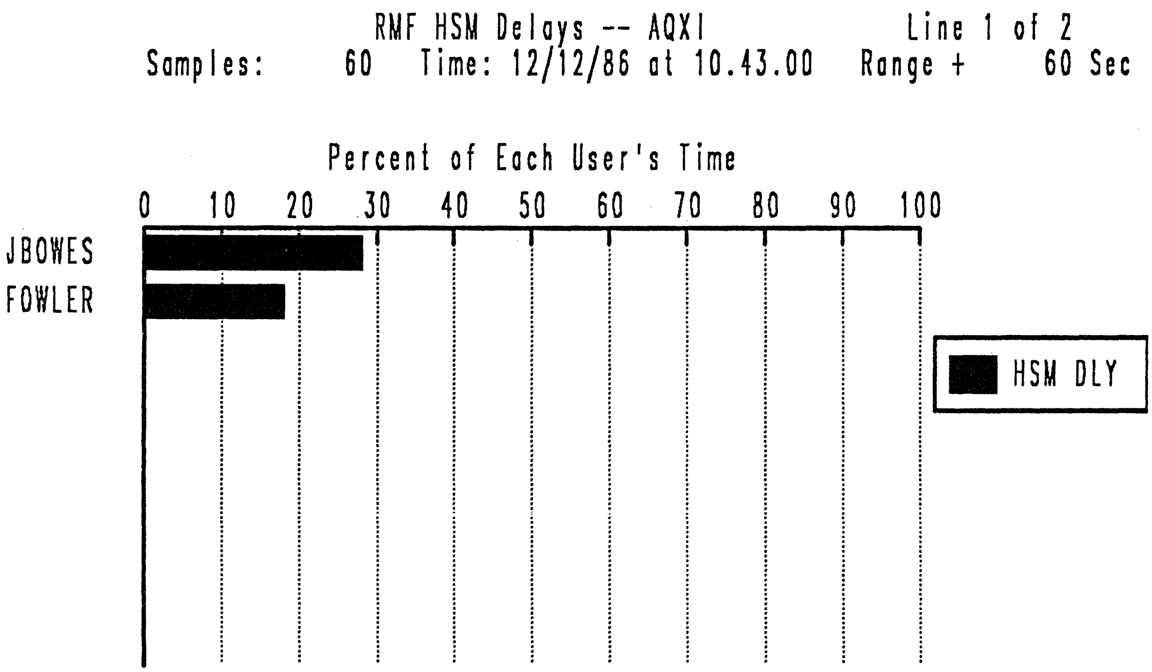


Figure 4-26. Graphic HSM Delay Report

<table>
<tr><th>Field Heading</th><th>Meaning</th></tr>
<tr><td>JOBNAME</td><td>One to eight character name of the job delayed when requesting service from HSM. The HSM delay report does not summarize data by job groups; all jobs within a job group are reported individually.
Primary source fields are ASCBJBNI and ASCBJBNS.</td></tr>
<tr><td>DLY %</td><td>Delay the waiting job is experiencing because of contention for HSM during the RANGE period. This value is calculated as follows:
<pre>
                    delay samples
DLY % = ------------------------------ * 100
                  number of samples
</pre>
where:
delay samples = The number of samples when the job was delayed by HSM. RMF calculates this value by incrementing its counter once for each sample when one or more units of work in the address space had HSM delay. RMF scans the HSM management work element (MWE) queue, and considers the user delayed if all of the following conditions are met:

The MWE has a request from the user, as indicated by the user's ASCB address in the MWEASCB field.
The request is a "waited-on" request (the MWENOW bit is off).
The request has not completed processing (the MWEDONE bit is off).
Field MWEFUNC contains one of the function codes listed under MAIN DELAY REASON(S).

NOTE: This DLY % value is also found in the HSM field on the job delay report.</td></tr>
<tr><td>MAIN DELAY REASON(S)</td><td>The subsystem function code that indicates the main reason for the delay. RMF reports the one or two function codes with the highest counts as the main delay reasons.

% Indicates how much of the HSM delay of the job is caused by the reported subsystem function. This value is calculated as follows:
<pre>
                  delay samples
  % = ------------------------------ * 100
                number of samples
</pre>
where:
delay samples = The number of samples when the job was delayed for HSM for a specific subsystem function. For primary source fields used in this calculation see the "DELAY %" field in this report description.

NOTE: The MAIN DELAY REASON % values add up to the DELAY% value of the job if there is no overlap in delay states and there are no more than two function codes responsible for the delay.

The HSM F-codes (in decimal) and their explanations are as follows:
<table>
<tr><th>F-CODE NUMBER</th><th>EXPLANATION</th></tr>
<tr><td>03</td><td>RECALL A DATA SET</td></tr>
<tr><td>05</td><td>RECOVER A DATA SET</td></tr>
<tr><td>06</td><td>MIGRATE A DATA SET</td></tr>
<tr><td>07</td><td>BACK UP A DATA SET</td></tr>
<tr><td>08</td><td>READ CNTL DS REC (MOD. CODE HEX 04)*</td></tr>
<tr><td>08</td><td>TSO USER ISSUES HLIST (MOD. CODE HEX 03)*</td></tr>
<tr><td>08</td><td>JES3 - C/I LOCATE (MOD. CODE HEX 01,02)*</td></tr>
<tr><td>12</td><td>DELETE A DATA SET</td></tr>
</table>
* Modification codes do not appear on the HSM delay screen.</td></tr>
</table>

Figure 4-27. Fields in the HSM Delay Screen

JES Delay

The JES delay report allows you to investigate situations where executing jobs are delayed when requesting service from JES. The report includes information that describes the reason for delay. RMF lists all jobs delayed during the range period in descending delay percentages. You can request the JES report by specifying JES on any command line or by selecting it on the primary menu.

If JES2 or JES3 control blocks change at your installation, Monitor III modules could be affected. If your JES delay report never contains any data, it might be the result of changes in JES mapping macros. RMF provides source modules that map offsets to JES control block fields sampled by Monitor III. You must recompile these source modules when JES control blocks change. See the appropriate release of the *Program Directory for Use with Program Product Number 5665-274 Resource Measurement Facility* for more information on installation procedures.

To display the report options panels for the JES report, enter ROPTIONS on the command line of the JES report. The JES report options panel contain the same information as the DEV report option panel. See "Device Delay Report Options Panel" on page 4-21 for more information.

You can also select a JES report to display information for a single job by entering JESJ on any command line or selecting it on the primary menu. For more information on the format and options for a detailed delay report, see "Delay Reports for a Single Jobname" on page 4-13.

Figure 4-28 is an example of the tabular JES delay report. Figure 4-29 is an example of the graphic JES delay report. The JES delay report field headings and their meanings are described in Figure 4-30.


```
                      RMF JES Delays -- AQFT                   Line 1 of 3
              Samples:    100   Time: 10/14/86 at 13.18.20   Range +    100 Sec

          DLY  --------------------- MAIN DELAY REASON(S) ---------------------
JOBNAME    %    %  F-CODE EXPLANATION            %  F-CODE EXPLANATION

TCHANG     1    1   12   JOB DELETE
MCKNSY1    1    1   12   JOB DELETE
GROSSI     1    1   12   JOB DELETE

Command ===>                                                   Scroll ===> CSR
```

Figure 4-28. Tabular JES Delay Screen

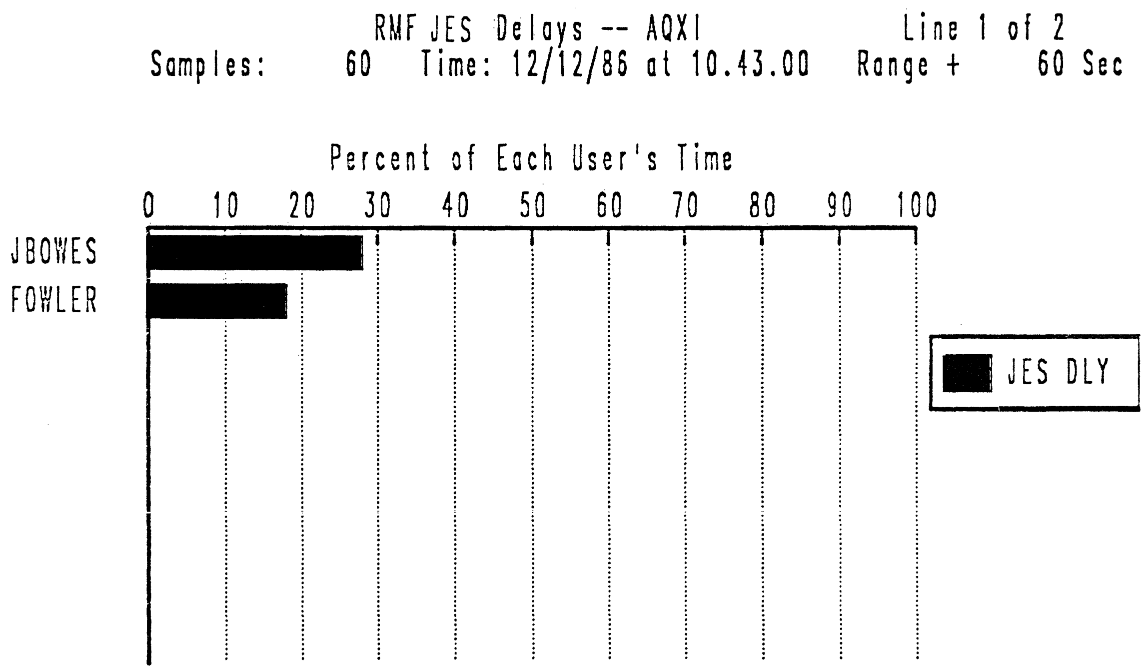


Figure 4-29. Graphic JES Delay Report

<table>
<tr><th>Field Heading</th><th>Meaning</th></tr>
<tr><td>JOBNAME</td><td>One to eight character name of the job delayed when requesting service from JES. The JES delay report does not summarize data by job groups; all jobs within a job group are reported individually. (Primary source fields are ASCBJBNI and ASCBJBNS).</td></tr>
<tr><td>DLY %</td><td>Delay the waiting job is experiencing because of JES during the RANGE period. This value is calculated as follows:
<pre>
                   delay samples
DLY % = ------------------------------- * 100
                 number of samples
</pre>
where:
delay samples = The number of samples when the job was delayed for JES. RMF calculates this number by incrementing its counter once for each sample when one or more units of work in the address space had JES delay.
For JES2 delay, RMF scans all subsystem job blocks (SJBs). If the wait bit is on in the SJBECB field and the function code in the SJBTFUNC field is one of the codes listed under MAIN DELAY REASON(s), then RMF counts the user as delayed.
For JES3 delay, RMF scans all JES3 staging areas (STAs) to see if the address space identifier (ASID) matches the value in one of the STASEAID fields. If there is a match, RMF considers the user delayed if the STAFREE bit is off and the "wait request" (STAWAIT) or "reply request" (STAREPLY) bit is on with one of the valid JES3 function codes in the STAFUNC and STAMOD fields. See MAIN DELAY REASON(S) in this report description for valid JES3 function codes.
NOTE: This DLY% value is also found in the JES field on the job delay report.</td></tr>
<tr><td>MAIN DELAY REASON(S)</td><td>The subsystem function code that indicates the main reason for the delay. RMF reports the one or two function codes with the highest counts as the main delay reasons.
% Indicates how much of the JES delay of the job is caused by the reported subsystem function. This value is calculated as follows:
<pre>
              delay samples
% = ------------------------------- * 100
            number of samples
</pre>
where:
delay samples = The number of samples when the job was delayed for JES for a specific subsystem function. For primary source fields used in this calculation see the "DELAY %" field in this report description.
NOTE: The MAIN DELAY REASON % values add up to the DELAY% value of the job if there is no overlap in delay states and there are no more than two function codes responsible for the delay.</td></tr>
</table>

Figure 4-30 (Part 1 of 2). Fields in the JES Delay Screen

Field Heading	Meaning
	The JES2 F-codes (subsystem request number, in decimal) and their explanations are: F-CODE NUMBER — EXPLANATION 01 — PROCESS SYSOUT 02 — CANCEL 03 — JOB STATUS 12 — JOB DELETE 13 — JOB REQUEUE The JES3 F-codes (subsystem interface service number, in decimal) and their explanations are: F-CODE NUMBER — EXPLANATION 023 — DYNAMIC ALLOCATION - NORMAL PATH 026 — CHANGE DD VIA MDS - NORMAL PATH 027 — CHANGE ENQUEUE USE 132 — USER JDS ACCESS 138 — REMOTE DEST VAL CHK (MOD. CODE HEX 20)* 138 — CANCEL (MOD. CODE HEX 40)* 138 — JOB STATUS (MOD. CODE HEX 80)* 144 — PROCESS SYSOUT INTERFACE 147 — MAIN SERVICE - MSS 149 — DYNAMIC ALLOCATION - FAST PATH 151 — CHANGE DD VIA DYNAMIC ALLOC. - FAST PATH * Modification codes do not appear on the JES delay screen

Figure 4-30 (Part 2 of 2). Fields in the JES Delay Screen

Processor Delay

The processor (PROC) delay report displays all jobs that were waiting for or using the processor during the RANGE period. To display the processor delay report enter PROC on any command line or select it on the primary menu.

RMF reports the jobs by descending overall delay percentages. Because use of the processor by many jobs might contribute to the delay of another job, RMF reports up to three jobs in the HOLDING JOB(S) field. The jobs in this field are those that were most often found using the processor while the job was delayed.

The report options panel for the processor delay report contains the same information as the report options panels for the DEV report. See "Device Delay Report Options Panel" on page 4-21. You can display the report options panels by entering the ROPTIONS on the command line of the PROC report.

You can also select a processor delay report that displays information on one job by entering PROCJ on any command line or selecting it on the primary menu. For more information on the format and options for a detailed delay report, see "Delay Reports for a Single Jobname" on page 4-13.

Figure 4-31 is an example of the tabular processor delay screen. Figure 4-32 is an example of the graphic processor delay report. The field headings and their meanings are described in Figure 4-33.

```
                          RMF Processor Delays -- AQXI            Line 1 of 50
            Samples:      60   Time: 12/12/86 at 11.01.00   Range +     60 Sec

                       DLY USG  TCB+ VEC  ----------- HOLDING JOB(S) -----------
JOBNAME    C DMN  PG   %   %   SRB% RATIO  %  NAME       %  NAME       %  NAME

CONSTAN    T ***   2   2  15   11.1     0   2 *MASTER*   2 RMF33      2 BEVK
STAVITZ    T *** ***   2   3    1.7     0   2 #3460318   2 JAMESJRA
YRUBINS    T ***   2   2   2    3.5     0   2 *MASTER*   2 RMF33      2 BEVK
D32SRS1    T   3   2   2   0    0.3     0   2 *MASTER*   2 RMF33      2 BEVK
SOS        S   7   3   2   0    0.0     0   2 *MASTER*   2 RMF33      2 BEVK
SONORA11   S   7   3   2   0    0.8     0   2 *MASTER*   2 RMF33      2 BEVK
JES2       S   7   4   0  10    4.1     0
D24RJC1    T ***   2   0   8    2.6     0
JAMESJRA   B   1   1   0   7    6.6     0
*MASTER*   S   0   0   0   5    4.9     0
#3460318   B   8   6   0   5    2.1     0
KOCH       T ***   2   0   5    5.0     0
VTAM       S   7   5   0   3    3.9     0
BEVK       T ***   2   0   2    0.9     0
RMF33      S   7   3   0   2    0.2     0
NLDM       S   7   3   0   2    2.4     0
CATALOG    S   0   0   0   2    4.7     0
JBOWES     T   3   2   0   2    0.1     0
ZAPPER     T   3   2   0   2    0.6     0
YRUBINSH   B   1   1   0   2    1.1     0
GRS        S   0   0   0   0    3.8     0
CONSOLE    S   7   3   0   0    0.4     0
Command ===>                                                     Scroll ===> CSR
```

Figure 4-31. Tabular Processor Delay (PROC) Screen

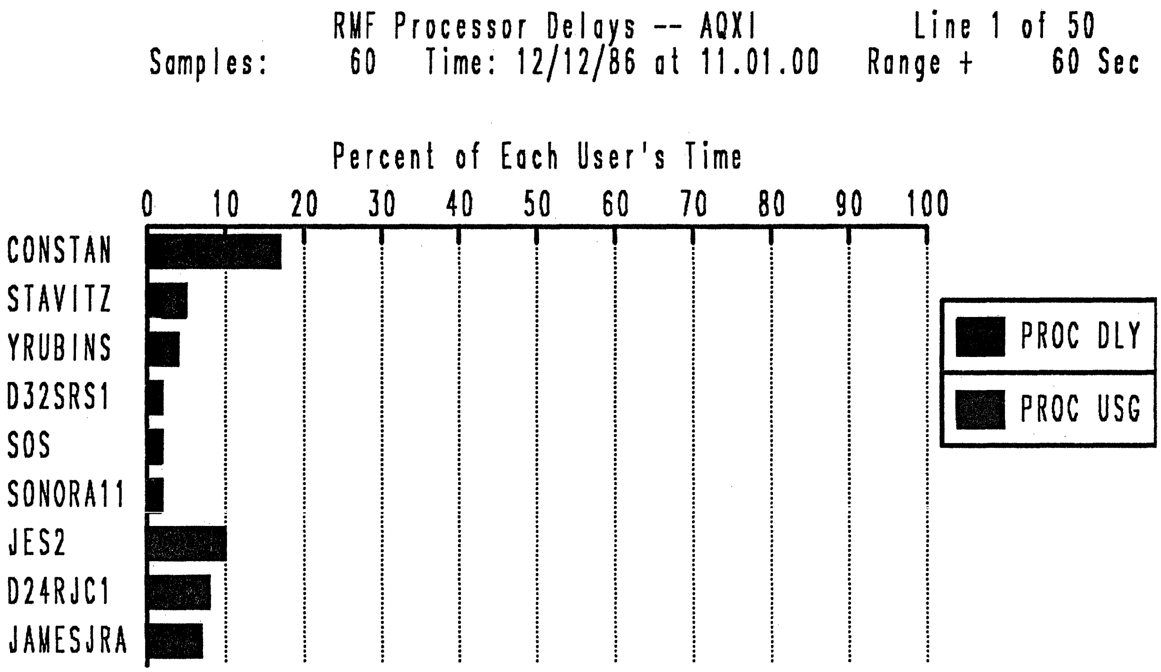


Figure 4-32. Graphic Processor Delay (PROC) Report

Field Heading	Meaning
JOBNAME	A one to eight character name of a job. The processor delay report does not summarize data by job groups; all jobs within a job group are reported individually. Primary source fields are ASCBJBNI and ASCBJBNS.
C	A one character abbreviation for the job class as follows: S Started task T TSO B Batch
DMN	The domain that a specified job has been running in. (The source field is OUCBDMN.) If a job changes its domain during the RANGE period, RMF displays three asterisks (***) in this field instead of the domain number.
PG	The control performance group that a specified job has been running in. (The source field is OUCBNPG.) If a job changes its group during the RANGE period, RMF displays three asterisks (***) in this field instead of the performance group number.

DLY %	Delay the waiting job (address space) is experiencing because of contention for the processor during the RANGE period, expressed as a percentage.
	The DLY % of a job for the processor is calculated as follows:
	`                    delay samples`
	`DLY % = ------------------------------- * 100`
	`                  number of samples`
	where:
	delay samples = The single state count of samples being delayed by the processor. RMF increments this count only once for each sample when one or more units of work (TCBs, SRBs, interrupted ready task or asynchronous exit) associated with the address space are delayed for the processor. Primary source fields used in this calculation include CVTGSMQ, CVTGSPL, CVTASCBH, ASCBCPUS, ASCBLSMQ, ASCBLSPL, ASCBTCBS, and ASCBTCBL.
	NOTE: This DLY% value is also found in the PROC field on the job delay report.

USG%	The percentage of time when the job is receiving service from the processor. This value is calculated as follows:
	`                    using samples`
	`USG % = ------------------------------- * 100`
	`                  number of samples`
	where:
	using samples = The number of samples when the job was found using the processor determined by checking ASCBCPUS for this address space. If the processor running Monitor III has other ready work to do (any ready SRB, interrupted ready task, asynchronous exit routine, or TCB is on the dispatching queue), then it looks for the first address space having a unit of work on the dispatching queue that is not already using another processor.
	Then the number of samples is incremented by one for the address space having the first dispatchable unit of work according to the dispatcher sequence search order. The processor running Monitor III is not counted as a processor in use if there is no other ready work to do. Primary source fields used in this calculation are the same as those listed under the DLY % field in this report description.

Figure 4-33 (Part 1 of 2). Fields in the Processor Delay (PROC) Screen

Field Heading	Meaning
TCB+ SRB%	The percentage of total processor time used by the job during the RANGE period (ASCBEJST and ASCBSRBT). This value is calculated to tenths of a percent as follows: $$\text{TCB+SRB\%} = \frac{\text{CPU time explicitly charged to the address space (TCB time + SRB time)}}{\text{RANGE time}} * 100$$ NOTE: When comparing the TCB+SRB% and the USING% fields in this report, you must be aware that TCB+SRB% is a measured multistate value, while USING% is a sampled single state value. In a multiprocessor environment when a job is using two or more processors, the TCB+SRB%value can exceed 100%.
VECTOR RATIO	The ratio of vector usage to total processor usage for the job. This value is calculated as follows: $$\text{VECTOR RATIO} = \frac{\text{vector processor time used by the job}}{\text{total processor time used by the job including the vector processor}}$$ NOTE: This field will only contain a value when measured on a 3090 system with a vector processor online. If measured on another system or with the vector processor offline, the VECTOR RATIO field will contain zeros.
HOLDING JOB(S)	Up to three jobs that, by their use of the processor, contributed most to the delay of the job listed under JOBNAME. % The percentage of delay caused by the named job to the job waiting to use the processor. This value is calculated as follows: $$\% = \frac{\text{holding samples}}{\text{number of samples}} * 100$$ where: holding samples = The number of samples when the job was using the processor and delaying the other job (indicated in the JOBNAME field). For source fields referenced in this calculation, see the DELAY % field in this report description. NOTE: In a multiprocessor environment, there is a holding job for each processor. For example, in a two-processor environment, two jobs can each account for 100% of the delay of the job waiting for the processor.
NAME	The name of a job contributing to the delay of the job waiting to use the processor.

Figure 4-33 (Part 2 of 2). Fields in the Processor Delay (PROC) Screen

Storage Delay

Job-Oriented Storage Delay

The job-oriented storage delay report displays all jobs that were delayed for real storage during the range period. RMF considers storage delays of jobs to be caused by common page-in I/O, local page-in I/O, swap-in I/O, VIO-page-in, or jobs found on the out ready queue. RMF reports the contribution of each of these categories to the delay of a job for storage. RMF reports the jobs in order of descending delay percentage. All jobs that use any frames during the report interval period appear in the storage delay report.

To display the storage delay report, issue the STOR command or select it on the primary menu.

The report options panels for the storage delay report are the same as the panels for the device delay report. For more information, see "Device Delay Report Options Panel" on page 4-21.

You can also select a storage delay report that displays information on one job by entering STORJ on any command line or selecting it on the primary menu. For more information on the format and options for a detailed delay report, see "Delay Reports for a Single Jobname" on page 4-13.

Figure 4-34 is an example of the storage delay report. The storage delay report field headings and their meanings are described in Figure 4-36.

```
                         RMF Storage Delays -- AQXA                Line 1 of 310
             Samples:     20   Time: 01/28/87 at 13.31.40   Range +     20 Sec

0                           DLY  ------- % DELAYED FOR ------   -- AVERAGE FRAMES -
 JOBNAME    C  DMN    PG     %   COMM   LOCL   VIO  SWAP  OUTR    ACTV  FIXED   IDLE
0HAYES      T  ***     2    20      0     20     0     0     0     189     40    522
 GENIED     T  ***     2    10      0     10     0     0     0      94     40     92
 JENNIE     T  ***     2    10      0      0     0     0     0      26     30    109
 BRENDAF    T  ***     2     5      0      0     0     5     0       4     34     66
 LILLIS     T    3     2     5      0      5     0     0     0       6      2      0
 PETRO      T  ***     2     5      0      5     0     0     0      38     31    105
 WINTERS    T  ***     2     5      0      5     0     0     0      48     27     34
 D81HTM1    T  ***     2     5      0      0     0     5     0      10     30     57
 *MASTER*   S    0     0     0      0      0     0     0     0     140      0      0
 PCAUTH     S    7     3     0      0      0     0     0     0      33     10      0
 TRACE      S    7     3     0      0      0     0     0     0     103     10      0
 GRS        S    0     0     0      0      0     0     0     0     622     10      0
 DUMPSRV    S    0     0     0      0      0     0     0     0       0      0      0
 CONSOLE    S    7     3     0      0      0     0     0     0     173     10      0
 ALLOCAS    S    7     3     0      0      0     0     0     0     701     10      0
 LLA        S    7     3     0      0      0     0     0     0     170     11      0
 RMF33      S    7     3     0      0      0     0     0     0     155     11      0
 SMF        S    0     0     0      0      0     0     0     0      90     10      0
 SAMON      S    7     3     0      0      0     0     0     0       0     20     50
 TSO        S    0     0     0      0      0     0     0     0      28     16      0
 WHOSP2     S    7     3     0      0      0     0     0     0       0      0      0
 VTAM       S    7     5     0      0      0     0     0     0     586     11      0
 LOGWTR     S    7     3     0      0      0     0     0     0      22     19      0
 DFHSM      S    7     3     0      0      0     0     0     0       0     35    172
 CVTFIXUP   S    7     3     0      0      0     0     0     0       0     11     18
 SOFV3      S    7     3     0      0      0     0     0     0       0     17     40

Command ===>                                                   Scroll ===> CSR
```

Figure 4-34. Tabular Storage Delay (STOR) Screen

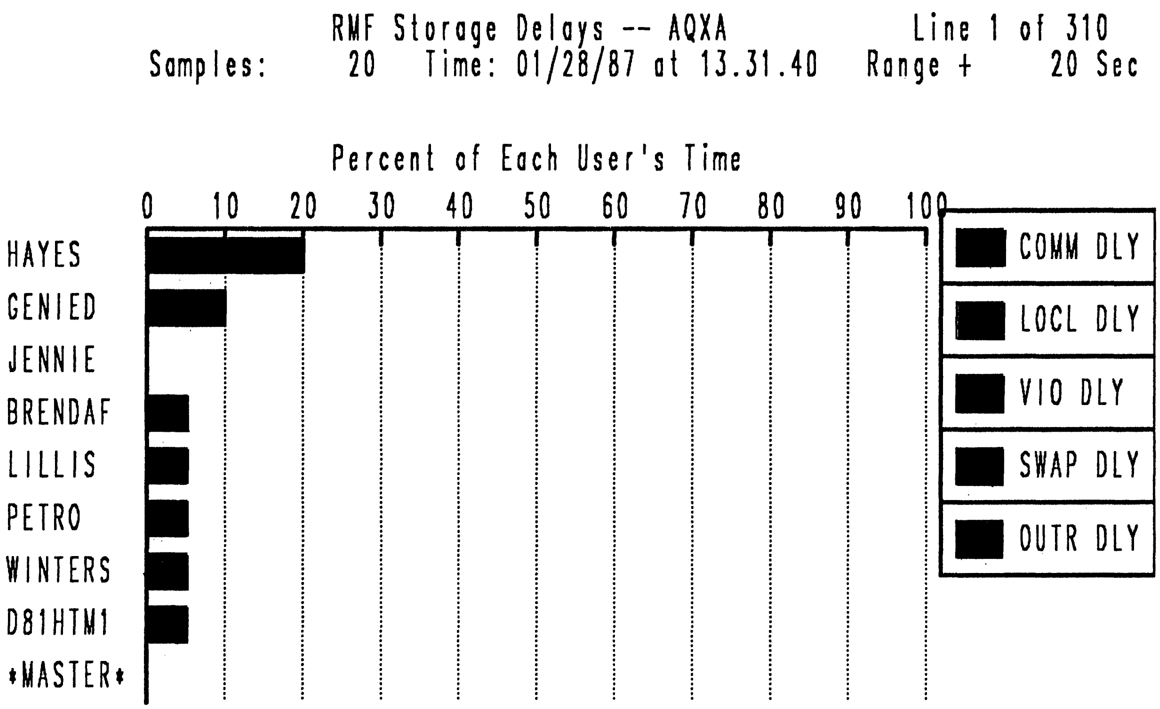


Figure 4-35. Graphic Storage Delay (STOR) Report

<table>
<tr><th>Field Heading</th><th>Meaning</th></tr>
<tr><td>JOBNAME</td><td>One to eight character name of a job that is delayed for storage. The STOR delay report does not summarize data by job groups; all jobs within a job group are reported individually. Primary source fields are ASCBJBNI and ASCBJBNS.</td></tr>
<tr><td>C</td><td>A one character abbreviation for the job class as follows:
S Started task
T TSO
B Batch</td></tr>
<tr><td>DMN</td><td>The domain that a specified job has been running in. (The source field is OUCBDMN.) If a job changes its domain during the RANGE period, RMF displays three asterisks (***) in this field instead of the domain number.</td></tr>
<tr><td>PG</td><td>The control performance group that a specified job has been running in. (The source field is OUCBNPG.) If a job changes its group during the RANGE period, RMF displays three asterisks (***) in this field instead of the performance group number.</td></tr>
<tr><td>DLY %</td><td>Delay the waiting job (address space) is experiencing because of contention for storage during the RANGE period, expressed as a percentage.
The DELAY % of a job for storage is calculated as follows:<pre>
                     delay samples
DELAY % = ------------------------------ * 100
                   number of samples
</pre>where:
delay samples = The number of samples where the job was delayed for storage one or more times due to COMM, LOCL, VIO, SWAP, and OUTR (see descriptions of these fields under "% DELAYED FOR").
NOTE: This DELAY % value is also found in the STOR field on the job delay report.</td></tr>
<tr><td>% DELAYED FOR</td><td>The percentage that COMM, LOCL, VIO, SWAP, and OUTR contribute to the delay of the job for storage. If there is no overlap of the delay states, the percentages for all these resources add up to the DLY % value; if there is overlap, the percentages add up to more than the DLY % value.
The meaning of each category contributing to the delay of the job for storage follows:
COMM The percentage that common (CSA or LPA) storage paging contributes to the delay of the job from the time of the page fault until I/O is completed.
LOCL The percentage that local (private) storage paging contributes to the delay of the job from the time of the page fault until I/O is completed.
VIO The percentage that virtual I/O contributes to the delay of the job from the time of the page fault until I/O is completed.
SWAP The percentage that swapping contributes to the delay of the job from the time of swap initiation until the last swap page I/O is completed.
For COMM, LOCL, VIO, and SWAP, RMF scans all ASM AIA chains. If the address space has one or more incomplete page input requests, RMF updates the counter in the appropriate category (COMM, LOCL, VIO, and SWAP) once per sample. RMF uses the AIAPRIV, AIASWAP and AIAVIO fields to determine if the page input request is in the COMM, LOCL, VIO, and SWAP category. Other fields referenced in these calculations include AIADUPLX, AIAWRITE, AIALSQA, and AIASWPFX.
OUTR The percentage that being swapped out and ready contributes to the delay of the job. RMF updates the counter in the OUTR category once for each sample when the address is not on the wait queue (OUCBOFF=0) and is on the out queue (OUCBOUT=1).</td></tr>
</table>

Figure 4-36 (Part 1 of 2). Fields in the Storage Delay (STOR) Screen

<table>
<tr><th>Field Heading</th><th>Meaning</th></tr>
<tr><td>AVERAGE FRAMES</td><td>The average number of private storage frames the job held during the RANGE period. All the frame figures represent storage occupancy over time, and can be very different from the working set size of the job 5 average frames can represent 500 frames held for one second, or 5 frames held for 100 seconds. It is the average amount of storage needed to run the job, averaged over time when it is both running and not running. In most cases, considerably more storage is actually needed to bring the job in and run it.
This field is broken down as follows:

ACTV The average number of frames held by the job while it was active. This value represents the average number of active real and extended storage frames the job used during the RANGE period. This value is calculated as follows:
<pre>
                    Sum of real frames
                    + sum of extended
          AVG   storage frames
     ACTV FRAMES = ------------------------
                     number of samples
                         in RANGE
</pre>
The accumulated real storage frames are the sum of the values in the ASCBFMCT field in all samples when the job was active. The accumulated extended storage frames are the sum of the values in the RAXESCT field in all samples when the job was active.

FIXED The average number of fixed frames the job was using during the RANGE period including frames both above and below the 16 megabyte line. The average number of fixed frames is calculated as follows:
<pre>
                          Sum of fixed frames
     AVG FIX FRAMES = ----------------------
                            number of samples
                                in RANGE
</pre>
The accumulated number of fixed frames is the sum of the values in the OUCBFIXB field and the OUCBFIX field in each sample.

IDLE The average number of frames held by the job when it was idle. This value represents the average number of real and extended storage frames the job used when it was idle during the RANGE period. This value is calculated as follows:
<pre>
                      Sum of real idle frames
                      + sum of extended
                      storage idle frames
     AVG IDLE =   ------------------------
     FRAMES   number of samples
</pre>
The accumulated real storage frames are the sum of the values in the ASCBFMCT field in all samples. The accumulated extended storage frames are the sum of the values in the RAXESCT field in all samples.

NOTE: Extended storage frames are calculated only when RMF is running on a 3090 processor that has installed extended storage: otherwise, only real storage frames contribute to the values.</td></tr>
</table>

Figure 4-36 (Part 2 of 2). Fields in the Storage Delay (STOR) Screen

Resource-Oriented Storage Delay

The resource-oriented storage delay report (STORR) provides information about storage problems and paging space delay by volume serial. To display the resource-oriented storage delay report, enter STORR on any command line or select it on the primary menu.

The report has two parts. The first part includes general information about the use of real and extended storage; this information appears under the heading STORAGE SUMMARY. The second part includes information about page/swap activity and paging delays; this information appears under the heading PAGE/SWAP ACTIVITY.

If RMF cannot provide data in the PAGE/SWAP ACTIVITY section for ACT %, CON %, DSC %, and PND %, dashes appear in the area where the percentages normally appear.

If RMF is unable to obtain valid hardware data for a subchannel, it prints dashes instead of DLY DB% and DLY CU%. When RMF is not running on a 3090 processor, these fields are blank.

Extended storage is reported only when RMF is running on a 3090 processor and extended storage is installed.

Figure 4-37 is an example of the resource-oriented storage delay report in tabular mode. Figure 4-38 is an example of the resource-oriented storage delay report in graphic mode. The resource-oriented storage delay report field headings and their meanings are described in Figure 4-39.

Note: The resource-oriented storage delay report does not have a corresponding report options panel. If you enter the ROPTIONS command, you receive an informational message stating that no report options are available.


```
                 RMF Storage Resource Delays -- AQXA           Line 1 of 12
           Samples:     60  Time: 12/18/86 at 15.53.20   Range +     60 Sec

------------------------------- STORAGE SUMMARY -------------------------------
                  AVG HI UIC/     FRAMES                  % FRAMES
   STORAGE         MIGR AGE       ONLINE     NUC    SQA  COMM  ACTV  IDLE  AVAIL
   Real (Main)       255          32655        2      3    11    43    39      5
   Extended

----------------------------- PAGE/SWAP ACTIVITY ------------------------------
VOLUME DEV    NUM  USG  ACT  CON  DSC  PND  DLY  DLY  SPACE   AVG ACTIVE USERS
SERIAL TYPE   EXP   %    %    %    %    %   DB%  CU%   TYPE  TOTL LOCL SWAP COMM

PAGE12 3351P   3   22   27   11    4   12             SWAP   0.1  0.0  0.1  0.0
PAGE04 3351P   3   22   23    9    5    9             SWAP   0.1  0.0  0.1  0.0
PAGE03 3351P   3   20   28    4   22    2             LOCL   0.4  0.4  0.0  0.0
PAGE80 3380    1   18   18    5   13    0             LOCL   0.1  0.1  0.0  0.0
PAGE01 3351P   3   15   26    5   19    2             LOCL   0.2  0.2  0.0  0.0
PAGE09 3351P   3   13   16    5    9    2             LOCL   0.2  0.2  0.0  0.0
PAGE02 3351P   3   13   17    9    5    3             SWAP   0.1  0.0  0.1  0.0
PAG6C4 3380    1   12   15    4   11    0             LOCL   0.2  0.2  0.0  0.0
PAGE10 3351P   3   12   22   12    4    6             SWAP   0.1  0.0  0.1  0.0
PAGE11 3351P   3    8   11    4    6    1             LOCL   0.1  0.1  0.0  0.0
RES21B 3380    1    7    3    1    2    0             COMM   0.0  0.0  0.0  0.0
                                                      PLPA   0.0  0.0  0.0  0.0


Command ===>                                                   Scroll ===> CSR
```

Figure 4-37. Tabular Resource-Oriented Storage Delay (STORR) Screen

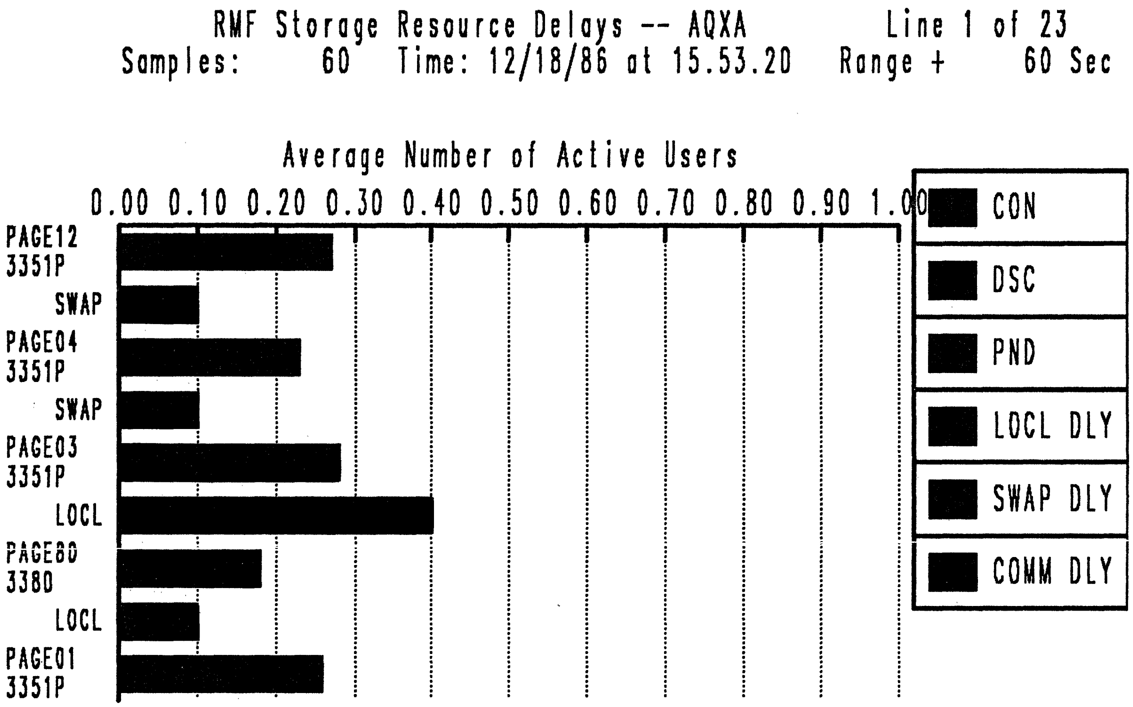


Figure 4-38. Graphic Resource-Oriented Storage Delay (STORR) Report

<table>
<tr><th>Field Heading</th><th colspan="3">Meaning</th></tr>
<tr><td>STORAGE SUMMARY</td><td colspan="3">REAL (MAIN)

The following categories appear under this heading:</td></tr>
<tr><td></td><td>AVG HI UIC</td><td colspan="2">The average high unreferenced interval count. The AVG HI UIC is a good indicator of storage contention. To obtain the average, RMF gathers the HI UIC every sample and divides it by the number of samples during the RANGE period.</td></tr>
<tr><td></td><td>FRAMES ONLINE</td><td colspan="2">The number of usable online real storage frames. The value is taken from RCEPOOL. The value is gathered every sample and divided by the number of valid samples to obtain the number of online real storage frames for the RANGE period; nucleus frames are not included in this value.</td></tr>
<tr><td></td><td>% FRAMES</td><td colspan="2">The percentage of the total online real storage that was being used for NUC, SQA, COMM, ACTV, IDLE, and that was available. See Note.

The values for each category are expressed as percentages, and the categories are as follows:</td></tr>
<tr><td></td><td></td><td>NUC</td><td>The number of frames allocated to the nucleus (NUC) divided by the total number of online real storage frames during the RANGE period. The result is multiplied by 100 to obtain a percentage.

The value for the number of NUC frames is taken from the communications vector table (CVT). The source fields are CVTDOFFS - CVTDOFFE (for the number DAT-OFF nucleus frames), CVTRWNE - CVTRWNS and CVTERWNE - CVTERWNS (for the number of READ-WRITE nucleus frames), and CVTRONE - CVTRONS (for the number of READ-ONLY frames); the total frames for NUC are the sums of the values for DAT-OFF, READ-WRITE, and READ-ONLY NUC divided by 4096.</td></tr>
<tr><td></td><td></td><td>SQA</td><td>The number of frames allocated to the system queue area (SQA) divided by the total number of online real storage frames during the RANGE period. The result is multiplied by 100 to obtain a percentage.

The value for the number of SQA frames is taken from the page/frame table (PFTE) entries maintained by RSM.</td></tr>
<tr><td></td><td></td><td>COMM</td><td>The number of frames allocated to the common area (COMM) divided by the total number of online real storage frames during the RANGE period. The result is multiplied by 100 to obtain a percentage. The value for the number of common area frames for real storage is taken from RCECOMAL.</td></tr>
<tr><td></td><td></td><td colspan="2">NOTE: NUC and SQA storage are both part of common storage (COMM) and are included in the COMM value.</td></tr>
</table>

Figure 4-39 (Part 1 of 7). Fields in the Resource-Oriented Storage Delay (STORR) Screen

Field Heading	Meaning	
	ACTV	The number of private frames allocated to jobs that are active divided by the total number of online real storage frames during the RANGE period. The result is multiplied by 100 to obtain a percentage. This value represents the number of real storage frames allocated to all active address spaces (See definition of USER/ACTIVE in the workflow/exceptions report for a description of active users). The source for real ACTV frames is ASCBFMCT (allocated page frame count) when the address space is active during the RANGE period.
	IDLE	The number of private frames allocated to jobs that are idle divided by the total number of online real storage frames during the RANGE period. The result is multiplied by 100 to obtain a percentage. This value represents the number of real storage frames allocated to all idle address spaces (See definition of USER/ACTIVE in the workflow exceptions report for a description of idle users). The source for real IDLE frames is ASCBFMCT (allocated page frame count) when the address space is idle during the RANGE period.
	AVAIL	The number of available frames divided by the total number of online real storage frames during the RANGE period. The result is multiplied by 100 to obtain a percentage. The value for the number of available frames for real storage is taken from RCEAFC.

Figure 4-39 (Part 2 of 7). Fields in the Resource-Oriented Storage Delay (STORR) Screen

Field Heading	Meaning
STORAGE SUMMARY	EXTENDED (**NOTE**: The fields for this section contain data only if RMF is running on a 3090 processor that has installed extended storage) The following categories appear under this heading: MIGRATION AGE — The length of time, in seconds, that a a page resides in extended storage before it migrates to auxiliary storage. The value is gathered from MCVMGAGE every sample and divided by the number of samples in the RANGE period. FRAMES ONLINE — The number of usable online real storage frames. The value is taken from RCEPOOL. The value is gathered and summed at every sample and divided by the number of valid samples to obtain the number of online real storage frames for the RANGE period. Nucleus frames are not included in this value. % FRAMES — The percentage of the total installed extended storage that are used for COMM, ACTV, IDLE, and that are available. The values for each category are expressed as percentages, and the categories are as follows: COMM — The number of frames allocated to the common area (COMM) divided by the total number of installed extended storage frames during the RANGE period. The value for the number of common area frames for extended storage is taken from RCECOMES. ACTV — The number of frames allocated to jobs that were active, divided by the total number of installed extended storage frames during the the RANGE period. This value represents the number of extended storage frames allocated to all active address spaces. (See definition of USER/ACTIVE in the workflow/exceptions report for a description of active users). The source for extended ACTV frames is RAXESCT (allocated page frame count) when the address space is active during the RANGE period. IDLE — The number of frames allocated to jobs that were idle divided by the total number of installed extended storage frames during the RANGE period. This value represents the number of extended storage frames allocated to idle address spaces (See definition of USER/ACTIVE in the workflow/exceptions report for a description of idle users). The source for extended IDLE frames is RAXESCT (allocated page frame count) when the address space is idle during the RANGE period. AVAIL — The number of available frames divided by the total number of installed extended storage frames during the RANGE period. The value for the number of available frames for extended storage is taken from RCEAEC.

Figure 4-39 (Part 3 of 7). Fields in the Resource-Oriented Storage Delay (STORR) Screen

Field Heading	Meaning
PAGE/SWAP ACTIVITY	This section of the STORR report identifies which page or swap data sets are are causing storage delay for the job(s). The PAGE/SWAP devices are listed by their using %, starting with the highest percentage value. The categories under this heading are as follows: **VOLUME SERIAL** One to six character name of an online volume that contains a page or swap data set. (The source field is UCBVOLI) **DEV TYPE** The identification number of the device (UCBCHAN). **NUM EXP** The number of exposures used by MVS.(DVTMEXNR of DVTG3) **USG %** The percentage of time when the job has had a request accepted by the channel for the specified VOLUME but the request is not yet complete. The sum of the USG % values for a device will approximate the % ACT value, except for multiple exposure devices. For source fields used in this calculation, see the USG% field in the job-oriented device delay report (Figure 4-12). **ACT %** The percentage of time during the RANGE period when the device was active. To derive this value, RMF computes the accumulated active time as follows: Active time = pending time + connect time + disconnect time where: Pending time = the time all I/O requests wait in the logical control unit (CUCW for the 308x and 908x and CU-HDR for the 3090) queue or the physical control unit queue (for the 4381) before there is an available path. RMF obtains this value from the CMBPENDT field in the channel measurement block (CMB). Pending time includes the time spent waiting for a channel, control unit, or head of string, or for the actual device (if it is a shared device that is reserved by another processor). Connect time = the time the device was connected to a channel path to actually transfer data between the device and storage. RMF obtains this value from the CMBCONNT field in the channel measurement block (CMB). Disconnect time = the time the device has an active channel program and is disconnected (not transferring data). RMF obtains this value from the CMBDISCT field in the channel measurement block (CMB). Disconnect time includes seek time, normal rotation delay time, and extra rotation delay because the channel was busy when the device needed to reconnect.

Figure 4-39 (Part 4 of 7). Fields in the Resource-Oriented Storage Delay (STORR) Screen

Field Heading	Meaning
	RMF then uses the accumulated active time to calculate the percentage: `% ACT = (Active time / RANGE time) * 100`
CON %	The percent connect time. See Notes. RMF calculates the value as follows: `CON % = (Connect time / RANGE time) * 100`
DSC %	The percent disconnect time. See Notes. RMF calculates the value as follows: `DSC % = (Disconnect time / RANGE time) * 100`
PND %	The percent pending time. See Notes. RMF calculates the value as follows: `PND % = (Pending time / RANGE time) * 100`

Figure 4-39 (Part 5 of 7). Fields in the Resource-Oriented Storage Delay (STORR) Screen

Field Heading	Meaning
	DLY DB% The percentage of time during the RANGE period when the channel subsystem measured I/O request delay because the device was busy. Device busy might mean that the volume is in use by another system, the device is reserved by another system, a head of string busy condition caused the contention, or some combination of these conditions has occurred. The value is taken from SCHMDTDB. RMF calculates the value as follows: `%DB delay = DB DELAY time / RANGE time * 100`
	DLY CU% The percentage of time during the RANGE period when there is I/O request delay because the control unit was busy. If the device is shared at the control unit level, the contention might be caused by a sharing system. If the device is not shared at the control unit level, the contention is the result of other activity to different devices over an alternate path serviced by this control unit. This value is taken from SCHMDTCB. RMF calculates the value as follows: `%CU delay = CU DELAY time / RANGE time * 100`

```
              DB DELAY time
%DB delay = ---------------------------- * 100
              RANGE time

              CU DELAY time
%CU delay = ---------------------------- * 100
              RANGE time
```

NOTES:

1. The CON %, DSC %, and PND % values sum to the ACT % value. DB and CU delay are a subset of pending time and sum to PND % or less.

2. When comparing the ACT %, CON %, DSC %, or PND % fields with the USG % field in this report, you must be aware that ACT %, PND %, CON %, and DSC % are measured multistate values, while USG % is a sampled single state value. If a single I/O request is very long (such as a long-running channel program), the PND %, CON %, and DSC % values might be too low, because of timer overflow errors. (For a description of incomplete hardware measurement data, see the section "Timer Overflow" in Chapter 3 of *Resource Measurement Facility (RMF) Monitor I and II Reference and User's Guide*, LC28-1556.)

3. IOS updates the data fields used to calculate CON %, DSC %, and PND % when the I/O operation completes. Therefore, some of the time from the previous RANGE period might be included in these values, while some of the time in the current RANGE period might be absent from these values. This discrepancy is noticeable on devices that have very long channel programs, such as paging devices.

Figure 4-39 (Part 6 of 7). Fields in the Resource-Oriented Storage Delay (STORR) Screen

Field Heading	Meaning
	SPACE TYPE — The space types for which the percentage of the volume's delay is reported. The types appear in the following order: LOCL — User private area SWAP — Swap data sets COMM — Common area PLPA — Pageable link pack area
	AVG ACTIVE USERS — The average number of jobs waiting for the data set. `AVG ACTIVE USERS = (Sum of all delay samples for all jobs waiting for the data set) / (Number of valid samples)` TOTL — The percentage COMM, LOCL, and SWAP contribute to the overall delay according to the SPACE TYPE specified. The percentages for all these resources add up to DLY % if there is no overlap of the delay states; if there is overlap, the percentages add up to more than DLY %. The meaning of each category contributing to the delay is as follows: LOCL The percentage that local (private) storage paging contributes to the delay from the time of the page fault until I/O is completed. SWAP The percentage that swapping contributes to the delay from the time of swap initiation until the last swap page I/O is completed. COMM The percentage that common (CSA or LPA) storage paging contributes to the delay from the time of the page fault until I/O is completed. For LOCL, SWAP, and COMM, RMF scans all ASM AIA chains. If the address space has one or more incomplete page input requests, RMF updates the counter in the appropriate category (LOCL, SWAP, or COMM) once per sample. RMF uses the AIAPRIV, AIASWAP and AIAVIO fields to determine if the page input request is in the LOCL, SWAP, or COMM category. Other fields referenced in these calculations include AIADUPLX, AIAWRITE, AIALSQA, and AIASWPFX.

Figure 4-39 (Part 7 of 7). Fields in the Resource-Oriented Storage Delay (STORR) Screen

SYSINFO Report

The system information report provides an overview of workload and delay on the measured system. It summarizes workflow and delay information by domain and performance group.

The report also lets you examine how effective the MVS system controls are for an installation. For example, do the domain controls for processor use and storage allow the system to satisfactorily perform important work during critical times? You can use the SYSINFO report to answer this question and make the necessary adjustments to the measured system.

The SYSINFO report has two parts. The first part identifies the measured system, the number of online processors, the installation performance specification (IPS), the option member (OPT), the installation control specification (ICS), and information about the average CPU utilization and TCB/SRB time. The second part summarizes information for all users and for each domain and performance group, depending on selection, for the measured system. By analyzing the information in the SYSINFO report, you can establish exception conditions for the workflow/exceptions (WFEX) report.

To display the system information report, enter SYSINFO on any command line or select it on the primary menu. Figure 4-40 is an example, in tabular mode, of the general system information report that lists all users, domains and performance groups. Figure 4-41 is an example of the system information report in graphic mode.

The system information report field headings and their meanings are described in Figure 4-42.


```
                     RMF System Information -- AQXI          Line 1 of 22
          Samples:     60   Time: 12/12/86 at 10.40.00   Range +    60 Sec

   --------------------- 3084 VERSION 66 ----------------------- IPS = IEAIPSXI
   PROCESSOR(S) ONLINE:  4          VECTOR PROCESSORS:  0        OPT = IEAOPTXI
   AVERAGE CPU UTIL:    26%         AVERAGE TCB+SRB:   16%       ICS = IEAICSXI

------- WFL --USERS-- TRANS FRAM VEC  -AVG USG-    ---AVG NUMBER DELAYED FOR----
NAME     %   TOT  ACT  /SEC %ACT UTL  PROC  DEV    PROC  DEV STOR  JES  HSM  ENQ

*SYSTEM  53   92   34  1.92   32   0   0.7  3.0     0.0  3.0  0.2  0.0  0.0  0.0
*TSO     52   46    4  1.92    2   0   0.3  0.8     0.0  1.0  0.0  0.0  0.0  0.0
*BATCH   88    1    1  0.00    0   0   0.3  0.5     0.0  0.1  0.1  0.0  0.0  0.0
*STC     47   45   30  0.00   30   0   0.2  1.7     0.0  2.0  0.2  0.0  0.0  0.0
DMN000  100   13    6  0.00    8   0   0.1  0.2     0.0  0.0  0.0  0.0  0.0  0.0
DMN001   82    0    0  0.00    0   0   0.1  0.1     0.0  0.0  0.0  0.0  0.0  0.0
DMN003  100   34    0  1.78    0   0   0.1  0.1     0.0  0.0  0.0  0.0  0.0  0.0
DMN004   45    5    1  0.12    0   0   0.1  0.4     0.0  0.5  0.0  0.0  0.0  0.0
DMN005   52    6    2  0.02    1   0   0.1  0.4     0.0  0.5  0.0  0.0  0.0  0.0
DMN006          1    0  0.00    0   0   0.0  0.0     0.0  0.0  0.0  0.0  0.0  0.0
DMN007   42   31   23  0.00   20   0   0.1  1.4     0.0  2.0  0.2  0.0  0.0  0.0
DMN008   90    1    1  0.00    0   0   0.2  0.3     0.0  0.0  0.0  0.0  0.0  0.0
DMN009  100    1    1  0.00    2   0   0.0  0.1     0.0  0.0  0.0  0.0  0.0  0.0
PG000   100   13    6  0.00    8   0   0.1  0.2     0.0  0.0  0.0  0.0  0.0  0.0
PG001    82    0    0  0.00    0   0   0.1  0.1     0.0  0.0  0.0  0.0  0.0  0.0
PG002    45   43    3  1.78    1   0   0.2  0.7     0.0  1.0  0.0  0.0  0.0  0.0
PG003    32   29   21  0.00   14   0   0.1  0.9     0.0  1.9  0.2  0.0  0.0  0.0
PG004    91    1    1  0.00    4   0   0.0  0.5     0.0  0.1  0.0  0.0  0.0  0.0
Command ===>                                                   Scroll ===> CSR
```

Figure 4-40. Tabular System Information Screen (SYSINFO) for all Users, Domains, and Performance Groups

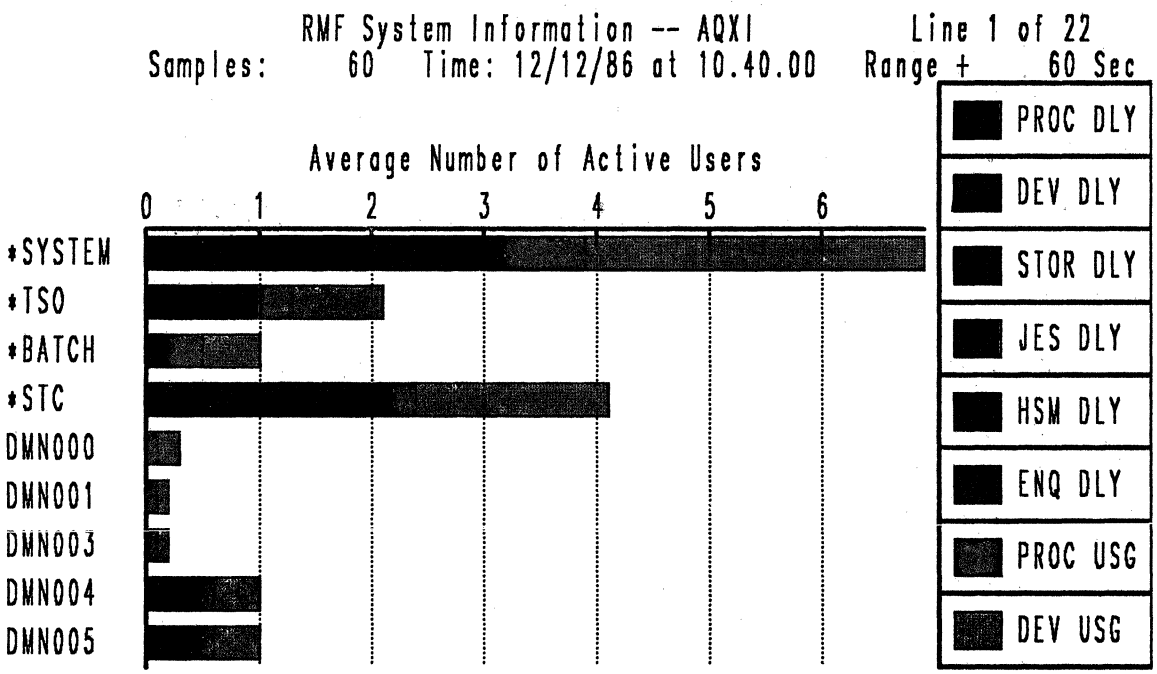


Figure 4-41. Graphic System Information Report (SYSINFO)

Field Heading	Meaning
MODEL NUMBER	The series number of the measured system. RMF obtains this value from the CVTMDL field in the communications vector table (CVT).
VERSION	The processor version number (hexadecimal) of the measured system.
IPS	The installation performance specification. RMF obtains this value from the WMSTID field in the SRM workload manager specification table (WMST).
PROCESSOR(S) ONLINE	Number of online processors during the RANGE period. RMF obtains this value from the CDSCPUOL field in the common system area (CSA).
VECTOR PROCESSORS	Number of vector processors online during the RANGE period.
OPT	The name of the option member. The option member (IEAOPTxx) contains parameters that affect swapping and other system resource manager (SRM) decisions. RMF obtains the OPT member from the RMPTOPTN field in the SRM parameter table (RMPT).

AVERAGE CPU UTIL	The average utilization percentage for all processors. RMF scans the logical configuration communication area (LCCA) for the addresses of each processor, then obtains the accumulated processor wait time from the LCCAWTIM field at the beginning and end of the RANGE period. The time of a processor is computed as the RANGE time minus the processor wait time.
	
	RMF first indicates the average processor time as the accumulated processor time for all processors divided by the number of processors.
	
	RMF then calculates the following to get the percentage of processor utilization:
	
	`                  Average CPU time * 100`
	`AVG CPU UTL  =  ------------------------`
	`                         RANGE`

AVERAGE TCB+SRB	The average percentage of processor time used by all address spaces per processor during the RANGE period. RMF gathers the processor time for each address space (ASCBEJST and ASCBSRBT) into an accumulator. Then it divides the accumulated processor time for all address spaces by the number of processors to obtain an average per processor.
	
	RMF then calculates the average TCB + SRB percentage as follows:
	
	`             Average processor time for`
	`               all address spaces`
	`               (TCB time + SRB time)`
	`TCB + SRB % = ---------------------- * 100`
	`                RANGE time`

ICS	The name of the installation control specification. If one is active, RMF obtains the value from the RMCTICST in the SRM control table (RMCT). If none is active, a series of dashes appears.
NAME	A name of a job group (*SYSTEM, *TSO, *BATCH, *STC) or the selected domain or performance group. (The primary source fields for domain number is OUCBDMN and for performance group number OUCBNPG.)
WFL %	The WORKFLOW percentage of that particular job group, domain, or performance group. A value of 100% indicates no workload contention, while a value of 0% indicates that all requests for system resources are delayed.

Figure 4-42 (Part 1 of 3). Fields in the System Information Report (SYSINFO)

Field Heading	Meaning
USERS	The number of users within the job group. This category includes the following headings: TOT — The total number of users equals the number of different users found in all address spaces for the job group listed during the RANGE period. See the definition of USER/ACTIVE under "Workflow/Exceptions Report". ACTV — The average number of active users is a measure of system workload. See the definition of USER/ACTIVE under "Workflow/Exceptions Report".

TRANS/SEC	The number of transactions per second that occur for a given job group or performance group during the RANGE period.
	When used with the number of active users in the report, the TRANS/SEC field gives you an overview of how fast the system can handle the amount of work for a given job group or performance group.
	RMF obtains the transaction count per address space from the OUXBTRC field in the SRM user extension block OUXB if the address space has not been swapped. The number of completed transactions between cycles is accumulated for each sample. The average percentage of transactions per second is then calculated as follows:
	`Accumulated completed transaction count`
	`AVG TRANS PER SEC = --------------------`
	`RANGE time`
	Note: The sampling technique used produces accurate results for job classes (TSO, BATCH, STC) and for performance groups, but domains can change frequently and the sampled results are not as accurate as the measured transaction rates provided in the Monitor I workload activity report.

FRAM % ACT	The percentage of real and extended storage frames used by active users for the job group, domain, or performance group during the RANGE period. For a definition of active users, see USER/ACTIVE under "Workflow/Exceptions Report"
	RMF accumulates the number of real storage frames for all active users during the RANGE period, then calculates the percentage as follows:
	`Accumulated real storage frames + extended storage frames used by the active users`
	`FRAM % ACT = -------------------------* 100`
	`Online real storage frames + installed extended storage frames`
	To obtain average values, RMF divides the values gathered every sample by the number of valid samples.

Figure 4-42 (Part 2 of 3). Fields in the System Information Report (SYSINFO)

Field Heading	Meaning
VEC UTL	The vector utilization time expressed as a percentage. RMF gathers the vector processor time for each address space (ASSBVEST) into an accumulator. Then it divides the accumulated processor time for all address spaces by the number of vector processors to obtain an average per processor. RMF then calculates the vector utilization percentage as follows: `VEC UTL % = (Average vector processor time / RANGE time) * 100` **Note**: The VEC UTL field contains data only when measured on a 3090 system with a vector processor online. When measured on another system or on a 3090 with the vector processor offline, the VEC UTL field contains zeros.
AVG USG	The average percentage of using time is summarized for each job group. RMF takes the sum of using samples for the address space(s) associated with the job group and divides by the the number of samples. The average using time is reported for the following categories: PROC — The average number of users using the processor during the report interval. DEV — The average number of users using devices during the report interval. See average active users field in the STORR report for how this value is calculated.
AVG NUMBER DELAYED FOR	The average number of delayed users is summarized for each job group. RMF takes the sum of delay samples for the address space(s) associated with the job group and divides by the number of samples in the RANGE. The average using time is reported for the following categories: PROC — Delay the waiting jobs experienced because of contention for the processor during the RANGE period. For how this field is calculated, see the corresponding field in the processor delay report (Figure 4-31). DEV — Delay the waiting jobs experienced because of contention for the devices during the RANGE period. For how this field is calculated, see the corresponding field in the job-oriented device delay report (Figure 4-12). STOR — Delay the waiting jobs experienced because of contention for storage during the RANGE period. For how this field is calculated, see the corresponding field in the job-oriented storage delay report (Figure 4-36). JES — Delay the waiting jobs experienced because of contention for JES during the RANGE period. For how this field is calculated, see the corresponding field in the JES delay report (Figure 4-30). HSM — Delay the waiting jobs experienced because of contention for HSM during the RANGE period. For how this field is calculated, see the corresponding field in the HSM delay report (Figure 4-27). ENQ — Delay the waiting jobs experienced because of contention for an enqueued resource during the RANGE period. For how this field is calculated, see the corresponding field in the ENQ delay report (Figure 4-20).

Figure 4-42 (Part 3 of 3). Fields in the System Information Report (SYSINFO)

SYSINFO Report Options Panel

To display the SYSINFO Report Options panel enter ROPTIONS on the command line of the SYSINFO report. This panel is similar to the JOB/SELECTION report options panel. See Figure 4-6 on page 4-11

Figure 4-43 is an example of the SYSINFO report options panel.

```
                    RMF SYSINFO Report Options                Line 1 of 4

Select (S), exclude (X), or fill-in GROUPs for the SYSINFO report.
Press END.

      DATE ===> 12/12/86    TIME ===> 10:40:00    RANGE ===>  60

   SUMMARY ===> YES        Summary lines on SYSINFO report (YES NO)

Sel Group   Sel  Group   Sel  Group   Sel  Group   Sel  Group   Sel  Group


    _______      _______      _______      _______      _______      _______
    _______      _______      _______      _______      _______      _______
 S  *ALL         *DMN         *PG          DMN000       DMN001       DMN003
    DMN004       DMN005       DMN006       DMN007       DMN008       DMN009
    PG000        PG001        PG002        PG003        PG004        PG005
    PG006        PG008        PG014









Command ===>                                                  Scroll ===> CSR
```

Figure 4-43. System Information Report Option Panel

The following are selections on the SYSINFO report options panel:

DATE, TIME, and RANGE
The date, time and interval range that you can enter for data to be reported on the display screen, using the syntax specified on the language options panel. (See Chapter 5, "Monitor III Options and Commands" for more information on options.) DATE is the beginning month, day, and year of the data you want. TIME is the hour, minute, and second of the beginning of the report interval for the data you want to display. RANGE is the time range of the report interval over which you want RMF to summarize and present the sampled data. These values take effect when you press END and RMF displays them in the report header. RMF does not save the DATE, TIME, and RANGE values you enter here across sessions.

Any separators specified on the language options panel can be used. Any value that is not entered defaults to zero. Leading zeroes can be omitted (for example, 13.5 becomes 13:05). Hardcopy output or online display defaults to the format specified in the language options panel.

SUMMARY
The option to include summary lines on the SYSINFO report. Summary lines contain summarized information about the total system, job classes (*SYSTEM, *TSO, *BATCH, or *STC), domains, and performance groups. YES causes RMF to include summary lines ; NO omits them from the report.

All available domains and performance groups are listed at the bottom of the report options panel. You can do the following:

- To **choose all performance groups and domains**, place an S in front of the *ALL field and press ENTER.
- To **choose all domains**, place an S in front of the *DMN field and press ENTER.
- To **choose all performance groups**, place an S in front of the *PG field and press ENTER.
- To **exclude specific performance groups and domains**, use the X selection character.
- To **include specific performance groups and domains**, use the S selection character.

You can add new domains and performance groups on the first two input lines of each column. When you press ENTER, these domains and performance groups appear with the rest of the domains and performance groups on the panel, and the two input lines are again blank. When the new entries become available, RMF displays them on the report. if you enter the new domains and performance groups without a selection or exclusion code, they appear with an S.

SUMMARY and any groups selected or excluded on the System Information report options panel are saved across sessions.

Workflow/Exceptions Report

The workflow/exceptions report has two major parts:

Workflow is a measure of the the speed at which jobs move through the system in relation to the speed at which they could move through the system. A low workflow percentage indicates that a job has few of the resources it needs and is contending with other jobs for system resources. A high workflow percentage indicates that a job has the resources it needs to execute, and that it is moving through the system at a relatively high speed.

Conceptually, workflow percentage is the percentage of time that a job is able to do work when it is trying to do work. For example, a job that could execute in one minute if all the resources that it needed were available, would have a workflow of 25% if it took four minutes to execute. (These workflow formulas are described in Chapter 3, "Monitor III Concepts and Usage.") You tailor workflow reporting by specifying the WFL option statement on the workflow/exceptions report options panel.

Exceptions indicates jobs or job groups that meet the exception criteria specified on the workflow/exceptions report options panel. You control the reporting of these exceptional values by specifying the EX options statement on the workflow/exceptions (WFEX) report options panel.

To display the workflow/exceptions report, enter WFEX on any command line, or select it on the primary menu.

The information provided in the workflow portion on the left side of the report can help you to determine the speed with which users are proceeding through the system and how efficiently users are being served. The exceptions portion on the right side identifies exceptional occurrences. Figure 4-44 is an example of the workflow/exceptions report.


```
                       RMF Workflow/Exceptions -- AQXI          Line 1 of 19
             Samples:     60   Time: 12/12/86 at 10.43.00   Range +     60 Sec

---------- WORKFLOW % ----------- ---------------- EXCEPTIONS ----------------

USER/ACTV  0  20  40  60  80  100  C DMN  PG NAME      WFL  EXCEPT  DLY REASON
           |---+---+---+---+---|                       %               %
*SYSTEM    |**************     |   T ***   2 JBOWES    14  WF-HSM   28
  94/36    |                   |   T ***  14 D75JVK1   27  WF-DEV   27 TIPSV1
*TSO       |**************     |   T ***   2 FOWLER    29  WF-HSM   18
  94/36    |                   |
*BATCH     |********************
   1/1     |                   |
*STC       |******************
  45/30    |                   |
*PROC      |*******************|
           |                   |
*DEV       |****************   |
           |                   |
JES2       |************       |
  48/4     |                   |
DFHSM      |****************   |
           |                   |
*MASTER*   | NOT ACTIVE        |
   0/0     |---+---+---+---+---|
           0  20  40  60  80  100

Command ===>                                                   Scroll ===> CSR
```

Figure 4-44. Workflow Exceptions (WFEX) Screen

The workflow/exceptions report field headings, their meanings, and the possible contents are as follows:

Workflow

The section of the report that displays workflow percentage for jobs or job groups. It contains the following:

USER/ACTIVE

The average number of users/average number of active users in an address space or group of address spaces.

The average number of users equals the sum of the total number of users found at each sample divided by the number of samples during the report interval.

The average number of active users is a measure of system workload. A user in a system is either ACTIVE or IDLE during a report interval. An ACTIVE user is using a resource, is delayed by a resource, or is in an unknown state. An IDLE user is in terminal wait, timer wait, or is waiting for JES job selection.

The calculation is:

```
                                     SUM OF
                          TOTAL NUMBER OF ACTIVE USERS
                                 AT EACH SAMPLE
AVG NO OF ACTIVE USERS = ----------------------------
                            NUMBER OF VALID SAMPLES
```

The USER/ACTIVE values for the specific address space or group of address spaces in WORKFLOW% appear under each job group (*SYSTEM, *TSO, *BATCH, *STC, *DMNnnn, and *PGnnn), in the report.

WORKFLOW%

Shown as a horizontal line of asterisks over a base measurement line, a percentage from 0 through 100. For groups of address spaces (*SYSTEM, *TSO, *BATCH, *STC, *DMNnnn, and *PGnnn), the percentage represents the speed with which the address spaces in the group are proceeding through the system. RMF can also present workflow for a single user-specified address space or the master address space, (which is specified as *MASTER*). For resources (*PROC,*DEV) the percentage represents how efficiently each resource is serving its users.

Workflow elements that appear in the WFEX report depend on the values specified on the WFEX report options panel.

If NO REQUESTS appears in a line, it indicates that RMF did not find any requests for service form the associated resource during the range period. If NOT ACTIVE appears in the WORKFLOW % field next to a jobname, TSO user id, or started task name, it indicates that the job was selected on the WFL option but is currently not running. If NO WORKFLOW appears in the WORKFLOW % field, RMF did not find the job either USING or DELAYED during the period.

Exceptions

The section of the report that shows the exceptional situations a job or job group encountered in relation to the hardware and software resources. The exceptions are those requested on EX option(s). If the user specifies more than one delay category on an EX statement, Monitor III reports only the delay category with the highest delay percentage.

The fields reported for each exception are described in Figure 4-45.

Field Heading	Meaning
C	A one character abbreviation for the job class as follows: S Started task T TSO B Batch
DMN	The domain that a specified job has been running in. (The source field is OUCBDMN.) If a job changes its domain during the RANGE period, RMF displays three asterisks (***) in this field instead of the domain number. For job groups, this field is blank.
PG	The control performance group that a specified job has been running in. (The source field is OUCBNPG.) If a job changes its group during the RANGE period, RMF displays three asterisks (***) in this field instead of the performance group number. For job groups, this field is blank.
NAME	The one to eight character name of an address space or group of address spaces specified on an EX statement. Primary source fields used are ASCBJBNI and ASCBJBNS.
WFL %	The WORKFLOW percentage of that particular address space or group of address spaces. A value of 100% indicates no workload contention, while a value of 0% indicates that all requests for system resources are delayed.
EXCEPT	Specifies the condition that was tracked for an exceptional value and the resource with the largest DELAY (%) causing this exceptional condition. For example, an EXCEPT value of WF-DEV indicates that RMF compared WORKFLOW (WF) and DEV delay category with specified threshold values and found that devices (DEV) was the resource category responsible for the largest percentage of the delay that caused a decreased workflow for the associated address space or group of address spaces.
DLY %	Specifies the delay of an address space or a group of address spaces caused by the condition named under EXCEPT. For example, if WF-DEV is in the EXCEPT field then a value of 100 in the DELAY % field indicates that the job was delayed by at least one device at every sample. For the formula used to calculate the delay of an address space or group of address spaces see the "Job Delay" report description earlier in this section (Figure 4-4).
REASON	The primary reason for the condition identified in the EXCEPT field. The reason is always associated with the delay. The meaning depends on the contents of EXCEPT: If EXCEPT contains: - **ENQ**, then **REASON** identifies the **major** name of the resource responsible for the greatest percentage of delay (The source field is RIBQNAME.) - **PROC**, then **REASON** identifies the **jobname** with the highest USING percentage (The source fields are ASCBJBNI and ASCBJBNS.) - **DEV**, then **REASON** identifies the volume serial number of the device responsible for the greatest percentage of delay (The source field is UCBVOLI.) - **STOR**, then **REASON** identifies the extended reason responsible for the greatest percentage of delay. (COMM, LOCL, VIO, SWAP, or OUTR) If EXCEPT contains JES or HSM, this field is blank.

Figure 4-45. Fields in the Exceptions Portion of the Workflow/Exceptions (WFEX) Report

Workflow Exceptions Report Options Panel

You can customize your workflow/exceptions (WFEX) report by modifying WORKFLOW and exceptions statements on the workflow/exceptions (WFEX) report options panel. To display the WFEX report options panel, enter the ROPTIONS on the command line of the WFEX report.

You can use the edit commands listed at the top of the panel to delete, insert or re-arrange the workflow/exception statements.

Figure 4-46 is an example of the workflow/exceptions report options panel.

```
                  RMF Workflow/Exception Report Options          Line 1 of 12

         DATE ===> 12/12/86    TIME ===> 10:43:00    RANGE ===>  60

 Enter or edit workflow/exceptions statements. Press END.

 EDIT CHARACTERS:  Insert (I)  Delete (D)  Repeat (R)  Copy (C)
                   Move   (M)  Before (B)  After  (A)

 EDT TYPE STATEMENT
     WFL  *SYSTEM
     WFL  *TSO
     WFL  *BATCH
     WFL  *STC
     WFL  *PROC
     WFL  *DEV
     WFL  DFHSM
     WFL  JES2
     WFL  *MASTER*
     EX   RMF,WFL<0
     EX   RMFGAT,WFL<0
     EX   SYSTEM,WFL<10&(PROC>3|STOR>3|DEV>3|JES>3|HSM>3|ENQ>3)




 Command ===>                                                Scroll ===> CSR
```

Figure 4-46. Workflow Exceptions Report Options panel

To change the WFEX report enter the commands in the edit (EDT) column next to the entry you want to edit and press ENTER. Keep in mind that duplicate entries are only displayed once on the report and RMF issues no error message.

Workflow/Exception Report Options Statements

WFL *name

WFL defines which workflow elements RMF is to display, where name is one of the following:

- *SYSTEM -- workflow for the total system
- *TSO -- workflow for TSO address spaces
- *STC -- workflow for started tasks
- *BATCH -- workflow for BATCH address spaces
- *DMNnnn -- workflow for the address spaces in domain nnn
- *PGnnn -- workflow for the address spaces in performance group nnn
- *PROC -- workflow for tightly-coupled processors or uniprocessors
- *DEV -- workflow for I/O devices
- name -- workflow for the job, TSO user id, or started task identified by name

The default option set shipped with RMF contains the statement: WFL *SYSTEM.

Monitor III allows you to specify any number of workflow statements.

EX *name[{(ANY) | (AVG)}],comparison[op1 comparison[...op1 comparison]]

The EX option indicates that RMF is to test for one or more exceptional conditions and defines the condition(s). The definition consists of a comparison between a **condition name** and a **threshold value** for the condition. An operator (< or >) establishes the relation between the condition and the threshold value. Monitor III compares the threshold value with delay or workflow values (depending upon the specified condition). If RMF recognizes that an exception has occurred, the exception is reported on the workflow/exceptions screen.

Only one EX option can be specified for an address space or a group of address spaces, but it can contain exception definitions for both workflow and delay. If more than one EX option exists for the same name, RMF takes the first EX option specified. One EX option should not be longer than 74 characters, and you can make the EX options more flexible and readable by using parentheses to separate comparisons and/or groups of comparisons. Parentheses also allow RMF to deal with multiple comparisons in the proper sequence.

The variables that are used with the EX option are:

name

Specifies the address space or group of address spaces to be tested for an exceptional condition.

- For a single address space, specify the one to eight character name of the job running in the address space. The MASTER address space must be specified as *MASTER*.

- For a group of address spaces, the name must start with an asterisk (*). Valid group names are *SYSTEM, *TSO, *BATCH, *STC, *DMNnnn, and *PGnnn.

<u>ANY</u>/AVG
Specifies, for a group of address spaces, whether the exception defined applies to any address space in the group or to an average of all the address spaces in the group:

<u>ANY</u> Means that RMF is to report an exception when any address space in the group identified by name fulfills the specified condition. ANY is the default value.

AVG Means that RMF is to report an exception when the delay or workflow percentage of the specified address space group fulfills the specified condition.

comparison
Defines each exceptional condition that RMF is to test for. Each comparison has the following syntax:

```
condition name op2 threshold value
```

Note: For clarity, spaces precede and follow op2 in the syntax description of the comparison, but spaces are not needed in the actual statement.

condition name
Specifies the name of the condition that RMF is to test for an exceptional value. The condition can be the workflow of an address space or group of address spaces or the delay an address space or group of address spaces encounters while waiting for resources. Valid condition names are:

- WFL - compares workflow percentage with the threshold
- DEV - compares the delay percentage for devices with the threshold
- PROC - compares the delay percentage for the processor with the threshold
- STOR - compares the delay percentage for storage with the threshold
- JES - compares the delay percentage for JES with the threshold
- HSM - compares the delay percentage for HSM with the threshold
- ENQ - compares the delay percentage for enqueued resources with the threshold
- DOR - compares the delay percentage for all RMF resources with the threshold

Note: To save keystrokes, you can use only the first two letters of any condition name.

op2
Indicates that any value that is greater than (>) or less than (<) the threshold value causes an exception. The valid operators are either > or < .

threshold value
Specifies the threshold value (0 - 100) that the Monitor III data reporter compares to either a computed workflow value or a computed delay value. When the computed value meets the specified condition, the user is notified on the workflow/exceptions screen.

Note: RMF does not check or validate threshold values greater than 100 and will not issue an error message if you specify a threshold value outside the valid range.

op1

Allows combinations of delay and workflow comparisons or definitions of upper and lower limits for workflow or delay exceptions by using the "and" (&) relation or the "or" (|) relation. The valid operators are & or |, and normally & takes precedence over |. If you want RMF to evaluate an "or" connection before an "and" connection, enclose the "or" connection in parenthesis (see Example 2).

Note: For clarity, a space appears in the syntax description between op1 and comparison, but the space is not needed in the actual statement.

Examples

The following are examples of the EX option:

1. To cause RMF to recognize an exception for JOB1 when its workflow percentage is less than 30, or greater than 80, enter:

   ```
   EX(JOB1,WFL<30|WFL>80)
   ```

2. To cause RMF to recognize an exception for JOB2 when its workflow percentage is less than 30 and when **simultaneously** it is delayed for the processor more than 90 percent or for a device more than 30 percent or for storage more than 60 percent, enter:

   ```
   EX(JOB2,WFL<30&(PROC>90|DEV>30|STOR>60))
   ```

   This example shows how to use parentheses to cause RMF to evaluate the "or" connections before it evaluates the "and" connection.

3. To cause RMF to recognize exceptions for each job in the system when its workflow percentage is less than 10 percent and it is delayed for the any resource RMF measures (processor, storage, devices, JES, HSM, or ENQ) more than three percent, enter:

   ```
   EX(*SYSTEM,WFL<10&(PROC>3|STOR>3|DEV>3|JES>3|HSM>3|ENQ>3))
   ```

4. In example 3, you could use DOR to indicate the same exceptions as follows on the panel:

   ```
   EX(*SYSTEM,WFL<10&DOR>3)
   ```

   In this example, DOR indicates that any delay for an RMF resource (PROC, STOR, DEV, JES, HSM, or ENQ) greater than 3% is to be included in the WFEX report.

Chapter 5. Monitor III Options and Commands

This chapter describes the RMF Monitor III reporter session and how you use commands and options on ISPF panels to control the session. It includes the following:

- Description of the RMF dialog panels
- Controlling session processing through screen commands and options
- Tables of commands and options for reference

For examples of the reports that the Monitor III data reporter produces, see Chapter 4.

RMF Monitor III Primary Menu

After the Monitor III reporter session starts, RMF usually displays the primary menu.

```
                 RMF Monitor III Primary Menu

Select one of the following items or enter command.  Press ENTER.

  1 DELAY    Delays (DLY)                13  DELAYJ   Job delay (DLYJ)
  2 DEV      Device delays (DD)          14  DEVJ     Job device (DDJ)
  3 ENQ      ENQ delays (ED)             15  ENQJ     Job ENQ (EJ)
  4 HSM      HSM delays (HD)             16  HSMJ     Job HSM (HJ)
  5 JES      JES delays (JD)             17  JESJ     Job JES (JJ)
  6 PROC     Processor delays (PD)       18  PROCJ    Job processor (PJ)
  7 STOR     Storage delays (SD)         19  STORJ    Job storage (SJ)
  8 SYSINFO  System information (SI)     DI  DSINDEX  Dataset index
  9 WFEX     Workflow exceptions (WE)    OP  OPTIONS  Option selection
 10 DEVR     Device resource (DR)         T  TUTORIAL Tutorial aid
 11 ENQR     ENQ resource (ER)            X  EXIT     End display session
 12 STORR    Storage resource (SR)


 Selection ===>
```

Figure 5-1. RMF Monitor III Primary Menu

Selections 1-19 are for RMF reports. Selection DI displays the RMF data set index (DSINDEX) screen (DI), which contains the dates and times of the data available during a reporter session. For more information on the data set index screen, see Chapter 6.

The remaining selections on the primary menu allow you to select the following:

- The option selection menu (OP), which allows you to select options that control your RMF session and specify options for your RMF reports
- The RMF Monitor III tutorial (T), which contains basic information about RMF Monitor III

To exit from an RMF session, select X on the primary menu.

Option Selection Menu

To change the options of an RMF reporter session, select OP on the primary menu, or enter the following command on any command line:

```
Command ===> OPTIONS
```

RMF displays the **option selection** menu, and from it you can select the options you wish to change for the session.

```
              RMF Monitor III Option Selection Menu

Select one of the following options or enter command.  Press ENTER.

  1 SESSION         Session Initialization Options (SO)
  2 COLOR           Set Graphics Colors and/or Patterns (CO)
  3 LANGUAGE        Set Language and Date/Time Options (LO)
  4 ROPTIONS        Select report options for
                      REPORT ===> --------    (RO)
  5 OPTSET          Change or Select Option Set (OS)
  6 PARMLIB         Convert PARMLIB Member (PO)









Selection ===>
```

Figure 5-2. Option Selection Menu

The session, color, language and report options allow you to set or modify options for an RMF session. OPTSET allows you to specify different sets of options used during a session, PARMLIB allows you to convert options in a parmlib member to an ISPF format RMF can use.

Session Options Panel

The **session options** panel allows you to specify options that apply to more than one report. To display the session options panel, enter 1 on the option selection menu, or enter the following command on any command line:

```
Command ===> SESSION
```

Session options affect session processing for all reports. Figure 5-3 shows the RMF default session options. The values saved on this panel become part of the current set of options (called the **current option set**) and apply to all displayed reports whenever that option set is in effect. For more information about options sets, see "Option Set Selection" on page 5-12.

```
                          RMF Session Options

Change or verify parameters.  Press END to save and end.

  MODE             ===> STOP       Initial Mode (STOP GO)
  FIRST SCREEN     ===> PRIMARY    Initial screen selection (ex:PRIMARY)
  REFRESH          ===> 100        Refresh period (in seconds)
  RANGE            ===> 100S       Time range 10-9999 sec    (ex:100S,100)
                                               1-166 min     (ex:2M)
  TIME LIMIT       ===> NONE       Time limit or NONE
                                               1-999 min     (ex:10M)
                                               1-128 hours   (ex:1H)
  DSINDEX ORDER    ===> ASCEND     (ASCEND DESCEND)          (ex:ASCEND)
  HARDCOPY         ===> OFF        Hardcopy mode (ON OFF)    (ex:ON)
  SYSOUT           ===> A          Class for printed output
  OUTPUT DATA SET ===>
                                   Dataset for hardcopy (overrides SYSOUT)
  REPORT FORMAT    ===> TABULAR    (GRAPHIC TABULAR)     (ex: GRAPHIC)




Command ===>
```

Figure 5-3. Session Options Panel

To change these values, enter changes on the session options panel. Remember that these changes are saved across RMF sessions.

The selections that you enter on the Session Options panel for MODE, REFRESH, RANGE and TIME LIMIT affect all RMF reports.

The following are the fields on the session option panel.

MODE
Specifies the initial mode in which RMF presents the reports. Specify GO or STOP. In GO mode, RMF refreshes your reports with new data at the interval specified in the REFRESH field. During a reporter session, note that if you wish to switch from GO to STOP mode, use the PA1 (ATTN) key. (On an IBM 3270 personal computer use either PA1 or Alt-Finish as set up by your installation.)

FIRST SCREEN
Specifies the panel or screen that RMF displays first when you start the reporter session. FIRST SCREEN options include the primary menu (PRIMARY), the data set index screen (DSINDEX), the tutorial (TUTORIAL), or the options selection menu (OPTIONS). You can also enter any valid report name.

REFRESH
Specifies how often RMF produces a new report while in GO mode. Each new report contains data from the the current RANGE. If the REFRESH value you specify is not a multiple of MINTIME, RMF adjusts the REFRESH value to the nearest MINTIME multiple. (MINTIME is specified for a gatherer session and is the amount of time after which RMF gathers all data samples into a set of samples for display. See "Options" in Chapter 2 for a description of MINTIME.)

RANGE
Specifies the time range over which you want RMF to summarize and present sampled data.

TIME LIMIT
Specifies how long you want an RMF session to be able to run in GO mode. At the end of the specified time, RMF displays the primary menu with a warning message. Specifying NONE allows you to remain in GO mode indefinitely. This feature is useful for stopping an unattended terminal session running in GO mode. Timing begins at the beginning of the session or when the TIME LIMIT value is changed on the session options panel.

DSINDEX ORDER
Specifies the order in which RMF displays data sets on the DSINDEX screen. ASCEND displays the oldest data set first ; DESCEND displays the most recent data set first.

HARDCOPY
Specifies whether RMF is to produce output for every report displayed during the session. If you specify ON, RMF directs hardcopy output of all reports to the specified SYSOUT class or to the data set specified in OUTPUT DATA SET. If you specify OFF, RMF does not produce any hardcopy output of the reports. (To print individual reports see "Printing Screens and Tabular Reports," later in this chapter)

SYSOUT
Specifies the SYSOUT class to which RMF is to direct printed output. If you specify a data set for OUTPUT DATA SET, RMF ignores SYSOUT.

OUTPUT DATA SET
Specifies a data set where RMF will direct printed output of the reports. OUTPUT DATA SET overrides SYSOUT.

Note: RMF allocates a data set for SYSOUT with a ddname format of RMFM3TSn. If you specify a data set for OUTPUT DATA SET, do not use that ddname.

The DCB characteristics for this data set are:

```
DCB=(DSORG=PS,RECFM=VBA,LRECL=137,BLKSIZE=3429)
```

The record format must be VBA and the data set organization must be PS.

REPORT FORMAT
Specifies a graphic or tabular screen display. If you specify GRAPHIC for a report and your terminal does not support graphics, RMF produces a tabular version of the report.

To exit the panel and save the changes, use the END (PF3) command. If RMF detects errors, it displays the session options panel again with an appropriate error message. All changes take effect immediately (with the exception of the MODE, FIRST SCREEN, SYSOUT, and OUTPUT DATA SET options; these options take effect when the next RMF session is started). RMF saves the changes across sessions.

Color Graphic Options

The **color graphic options** panels allow you to specify colors and patterns for the graphic displays of Monitor III reports. To use these panels, you must have a terminal that supports graphics. The color graphic options are on two panels. To display the first panel, select 2 on the option selection panel, or enter the following command on any command line:

```
Command ===> COLOR
```

To access the second panel press the PF8 (DOWN) key and to return to the first panel, press the PF7 (UP) key.

Items on these two panels can represent the command line, headings, titles, and the graphic bars that contain and display data on the graphic reports. On these panels, you can change, for example; the color for the command line (CMD Line), or the pattern for the device delay bar (DEV DLY). You enter changes directly on the panels by choosing colors or choosing patterns.

Choosing Colors
You can choose among 7 colors. The numbers corresponding to the colors (1-7) appear at the bottom of the screen. Enter the desired color number under the COLOR column of the items you want to change.

Choosing Patterns
You can choose among 17 patterns. The numbers corresponding to the patterns (0-16) appear at the bottom of the screen. Enter the desired pattern number under the PATTERN column of the items you want to change.

If you want to add an item to be reported, enter it under the name column on one of the blank lines on the second color graphic options panel and assign it a color and pattern. Entering the CANCEL and RESET commands changes the values on both panels, regardless of which one it was entered on. See "Cancelling and Resetting Entries on Option panels" later in this chapter.

To save changes on the color graphic panels and exit, use the END (PF3) key. Changes become part of your current option set and are saved across sessions. Figure 5-4 and Figure 5-5 show both color graphic panels.

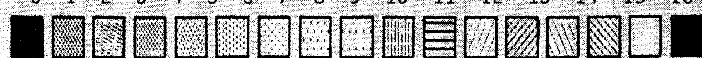
```
                          RMF Color Graphic Options      Screen 1 of 2

  Change or verify the color and pattern assignments.
  Enter DOWN(PF8) to get the second panel. Press END to save and end.

 ID    Name       Color   Pattern            ID    Name         Color  Pattern
  1    CMD Line   ===>7                       7    COMM DLY     ===>2  ===> 9
  2    Headings   ===>1                       8    DEV DLY      ===>2  ===>12
  3    Title      ===>7                       9    ENQ DLY      ===>2  ===>14
  4    CON        ===>5   ===> 3             10    HSM DLY      ===>2  ===> 5
  5    DSC        ===>5   ===> 7             11    JES DLY      ===>2  ===>13
  6    PND        ===>5   ===> 5             12    LOCL DLY     ===>2  ===>12
                                             13    OUTR DLY     ===>2  ===>14

  1   2   3   4   5   6   7   Colors

  0  1  2  3  4  5  6  7  8  9  10  11  12  13  14  15  16
```



```
                                                          Patterns

 Command ===>
```

Figure 5-4. Color Graphic Option Panel 1

The following are the fields that appear on both color graphic options panels.

ID
Specifies the ID number that represents the item's name, color and pattern assignments.

NAME
Specifies the name of the report item that the colors and patterns represent.

COLOR
Specifies a number (1-7) that represents the color for the graphic bar that depicts the data for NAME.

PATTERN
Specifies a number (0-16) that represents the pattern for the graphic bar that depicts data for NAME.

```
                 RMF Color Graphic Options     Screen 2 of 2

 Change or verify the color and pattern assignments.
 Enter UP(PF7) to get the first panel. Press END to save and end.

ID    Name      Color   Pattern       ID    Name       Color  Pattern
14    PROC DLY  ===>2   ===>10        21    _______    ===>_  ===>_
15    STOR DLY  ===>2   ===> 9        22    _______    ===>_  ===>_
16    SWAP DLY  ===>2   ===>13        23    _______    ===>_  ===>_
17    VIO DLY   ===>2   ===>11        24    _______    ===>_  ===>_
18    DEV USG   ===>4   ===> 9        25    _______    ===>_  ===>_
19    PROC USG  ===>4   ===> 0        26    _______    ===>_  ===>_
20    USING     ===>4   ===> 4        27    _______    ===>_  ===>_

  1   2   3   4   5   6   7   Colors

  0  1  2  3  4  5  6  7  8  9  10  11  12  13  14  15  16
                                                          Patterns

Command ===>
```

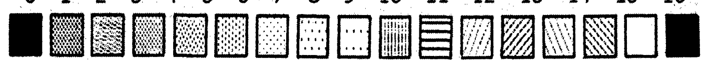


Figure 5-5. Color Graphic Option Panel 2

Language Options

The **language options** panel allows you to specify the following for all RMF Monitor III output and report options.

- format of the date
- character used to separate the date
- character used to separate the time
- character used as a decimal point for output values

To display the language options panel, select option 3 on the option selection menu or enter the following command on any command line:

```
Command ===> LANGUAGE
```

Figure 5-6 shows the language options panel.

```
                          RMF Language Options

Change or verify parameters.  Press END to save and end.

  DATE FORMAT     ===>MDY       Order for input and output
                                  Month (M), Day (D), and Year (Y)
  DATE SEPARATOR  ===> /        Date separator for output (/ or . or -)
  TIME SEPARATOR  ===> .        Time separator for output (. or - or :)
  DECIMAL POINT   ===> .        Decimal point in output    (. or ,)








Command ===>
```

Figure 5-6. Language Options Panel

The following are the fields on the language options panel.

DATE FORMAT
Specifies the order for the date using M for month, D for day and Y for year. You can specify any order.

DATE SEPARATOR
Specifies the separator to be used in the date to separate the month, day and year. Enter a slash (/), a period (.), or a dash (-).

TIME SEPARATOR
Specifies the separator to be used in the time to separate hours, minutes, and seconds. Enter a period (.), a dash (-), or a colon (:).

DECIMAL POINT
Specifies the character to be used as a decimal point for numeric values. Enter a period (.) or a comma (,).

Report Options Panels

The report options panels allow you to change the options for all RMF reports except the STORR report. You can customize these reports to allow for different jobs, job groups, resource names, and workflow exceptions to appear in the report displays.

To obtain the report option panel for a report, specify the ROPTIONS command on the command line of the report you wish to change.

You can also select the report options panel for a report from the options selection menu. Enter the full name of the report on the REPORT line of the ROPTIONS selection, and select 4 on the command line of the options selection menu. To return to the option selection panel, use the PF3 key (END).

RMF saves all values entered on a report option panel in your current option set; the options take effect immediately. When you enter a RANGE value on a report option panel, that value overrides the RANGE value on the session options panel, but when you enter GO mode or enter a BREF or FREF command for the report (without specifying RANGE), the RANGE value specified on the session options panel again takes effect. For more information on report options panels for individual reports, see "Using the BREF/FREF Commands."

Option Set Selection

The **option set selection** menu allows you to build different sets of options to control an RMF display session. To display the option set selection menu, enter option 5 on the option selection menu or enter the following command on any command line:

```
Command ===> OPTSET
```

An **option set** is a set of ISPF tables and contains all the options that you can define on the **session, color graphic, report option, and language option** panels.

This menu allows you to add or delete option sets. All option sets appear in alphabetical order on the panel; however, only one option set can be active or **current** for an RMF session, and you cannot delete an active option set. If an option set is not current, RMF saves it by name and description in an ISPF table.

RMF is shipped with a default option set called INITIAL, which appears on the option set menu. Figure 5-7 shows an option set selection menu:

```
                         RMF Option Set Selection Menu          Line 1 of 4

Current Option Set:  INITIAL

Select (S), Delete (D), and/or fill-in a new option set. Press END.

Select     Name      Description

           -----     --------------------------------------------
           -----     --------------------------------------------
           INITIAL   RMF initial option set
           DAY       WFEX options for day shift
           NIGHT     WFEX options for night shift
           PAYROLL   WFEX/Report Options for Monitoring Payroll



Command ===>                                                 Scroll ===> CSR
```

Figure 5-7. Option Set Selection Menu

Creating a new option set: To create a new option set, enter a name and a description on the input lines on the option set selection menu, and press enter. RMF initializes the new option set with the values of the current option set. An entry in the DESCRIPTION field is optional.

Making an Option Set current: To make an option set current, place an S under SELECT next to the option set name. (You can create a new option set and make it current by placing an S next to the option set name you specify on the input line and then pressing ENTER.) The option set you select becomes the current option set.

Deleting an Option Set: To delete an option set, enter D under SELECT next to the name of the option set and press enter. RMF displays a warning panel to confirm the delete. However, note that RMF does not permit you to delete the current option set.

Selecting Option Sets: If you want to change options in an option set, you must first make the option set current; then change the session, color graphic, report, and language options, using the option panels. RMF records the changes that you make on these panels during the session in the current option set.

Parmlib Conversion Panel

RMF no longer accepts options from a parmlib member for a reporter session. The **parmlib conversion** panel allows you to convert an existing parmlib member to ISPF format and store the options in an option set that RMF can use.

To display the parmlib conversion panel, enter option 6 on the option set selection menu or enter the following command on any command line:

```
Command ===>  PARMLIB
```

Note:

> When you convert the options in an existing parmlib member, RMF starts with the values currently in effect for the session, and modifies only those values that have been specified in the parmlib member that you are converting.

```
                          RMF Parmlib Conversion Option

Change/verify entries. Press ENTER to perform conversion.
Press END to exit without conversion.
Press HELP for more information.

  Parmlib Information:
    MEMBER NAME       ===> ERBRMF05
    DATASET NAME      ===>
                                             If IEFPARM is preallocated,
                                             do not supply DATASET NAME.

  New Option Set:
    NAME              ===> ERBRMF05
    DESCRIPTION       ===> Conversion of parmlib member ERBRMF05

  Conversions Requested:
    WFEX OPTIONS      ===> YES           (YES NO)
    SESSION OPTIONS   ===> YES           (YES NO)


Command ===>
```

Figure 5-8. Parmlib Conversion Panel

The following are the fields on the parmlib conversion panel.

MEMBER NAME
Specifies the name of the parmlib member that contains your RMF options.

DATASET NAME
Specifies the name of the data set that contains your RMF options. If IEFPARM was preallocated the word PREALLOCATED appears here; do not change this name.

NAME
Specifies the name of the option set that you want to create to contain the options in the parmlib member specified in MEMBER NAME. After you perform the conversion, this option set becomes current. If you enter the name of an existing option set, RMF displays a warning panel.

DESCRIPTION
Specifies a description of the option set to contain your parmlib values.

WFEX OPTIONS
Specifies whether to copy the workflow/exceptions report options from your parmlib member into your option set. Specify YES or NO.

SESSION OPTIONS
Specifies whether you want to copy the session options from your parmlib member into your option set. Specify YES or NO.

Note: In order to perform the conversion, you must specify YES in either the WFEX OPTIONS field or the SESSION OPTIONS field.

Monitor III Reporter Commands

This section explains RMF commands in alphabetical order. At the end of this chapter, there are three tables that list RMF commands and options.

Using the BREF/FREF Commands

Once in STOP mode, you can obtain reports on any data in the data gatherer's storage or, with data set support, data contained in user-defined data sets through the use of the BREF (backward referencing) and FREF (forward referencing) commands. You can also do this by using the TIME and RANGE fields on the report option panels.

Depending on the parameters specified and if you are using data set support, you can display data from the following sources:

- the data gatherer's local storage (the local storage buffer) or data gatherer data sets
- user-defined data sets

You can use the DSINDEX screen to list in chronological order the beginning date/time and end date/time for samples stored on each data set used during data set recording. Remember that you can specify the Date, Time, and Range on the report option panels.

The BREF and FREF commands have the same syntax:

```
{FREF}             {.}  {.}                  {:}   {:}                {nnnM    }
{BREF}[DATE=mm{/}dd{/}yy][,TIME=hh{-}mm{-}ss]   [,RANGE={nnnn[S]}]]
                   {-}  {-}                  {.}   {.}
```

The parameters DATE, TIME and RANGE are all optional and indicate the following:

$\textbf{DATE}=\textbf{mm}\left\{\begin{matrix}.\\/\\-\end{matrix}\right\}\textbf{dd}\left\{\begin{matrix}.\\/\\-\end{matrix}\right\}\textbf{yy}$

Specifies the month, day, and year of the data you want. If you omit this parameter, RMF uses the date displayed on the screen. Leading zeroes can be omitted. For example, specify DATE=9/3/83 rather than DATE=09/03/83. You can use D as an abbreviation for DATE.

Note: The sequence you use for the month, day and year on the BREF/FREF commands must be the same as the sequence specified on the language options panel.

$\textbf{TIME}=\textbf{hh}\left\{\begin{matrix}:\\-\\.\end{matrix}\right\}\textbf{mm}\left\{\begin{matrix}:\\-\\.\end{matrix}\right\}\textbf{ss}$

Specifies the hour, minute, and second of the data you want to retrieve first. If you omit this parameter, RMF uses the begin or end time of the report currently displayed on the screen. The conditions under which RMF uses the begin or end time are described later in this section. Leading zeroes can be omitted. Seconds or hours can be omitted if they are zeroes. For example, specify TIME=9.5 or TIME=9:5, rather than TIME=09.05.00 or TIME=09:05.00 You can use T as an abbreviation for TIME.

RANGE = $\left\{\begin{array}{l}\textbf{nnnM}\\ \textbf{nnnn[S]}\end{array}\right\}$

Specifies the time range over which you want RMF to summarize and present the sampled data. Valid time range values are 0 to 9999 seconds or 0 to 166 minutes. If you specify a value without M or S, RMF uses seconds. If you omit the RANGE parameter, RMF uses the RANGE value currently on the screen. You can use R as an abbreviation for RANGE.

Notes:

1. If the data defined by the DATE, TIME, and RANGE parameters is not available in the data gatherer's storage or, if you have specified data sets, in either the data gatherer's storage or user-defined data sets, RMF issues a message to indicate which data is available.
2. If you have specified data sets during a Monitor III data gatherer session, time gaps in the recorded sets of samples might have occurred during data set recording. If, during the reporter session, RMF detects gaps for the requested RANGE time, the following occurs:
   - If all of the data defined by the DATE, TIME, and RANGE parameters is not available because of a time gap, RMF issues messages describing the BEGIN/END time of the gap.
   - If part of the data defined by the DATE, TIME, and RANGE parameters is not available because of one or more time gaps, RMF issues a message to indicate the BEGIN/END time of the first gap. RMF displays the available data, but because some reported values like TCB + SRB time depend on the actual time of the sampling, the results can be misleading.
3. If the TIME specified is not exactly at the beginning of a MINTIME interval, or the RANGE is not a multiple of MINTIME, RMF might present more data than you request. RMF always presents the data that includes the TIME and RANGE values you specify except if the begin or end time of an interval lies within a time gap.
4. You should be aware that a large RANGE value increases the local storage area and CPU time needed by the data reporter.

The BREF and FREF commands perform the same function when you specify a DATE and/or TIME value (with or without a RANGE value). Both commands allow you to pinpoint the time at which you want to start viewing data collected either prior to or subsequent to entering STOP mode.

The BREF and FREF commands perform different functions when one of the following conditions occurs.

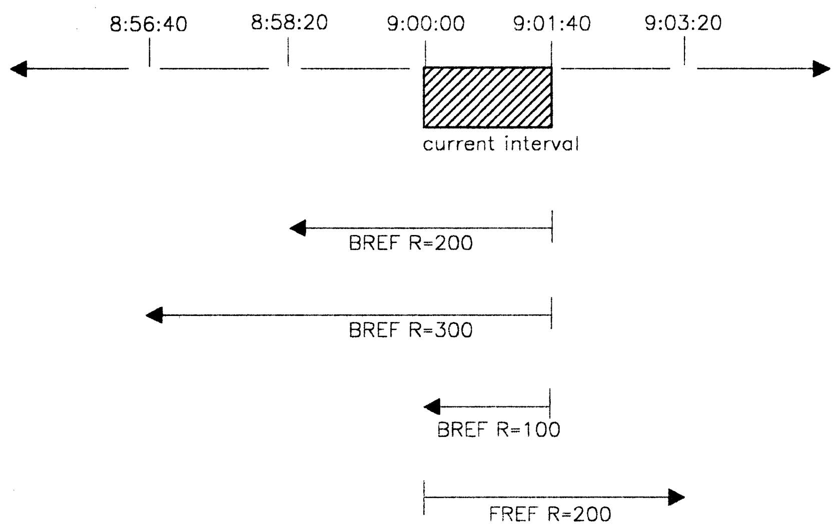
- RANGE is the only parameter specified
- No parameters are specified

Using BREF/FREF with the RANGE value: If RANGE is the only parameter you specify, the FREF and BREF commands use the TIME value currently displayed on the top of the screen. The FREF command uses the TIME value as the beginning time of the new report and adds the RANGE value you specify to obtain the report interval. The BREF command uses the end time of the current report interval (TIME plus RANGE value displayed at the top of the screen) and subtracts the RANGE value you specify to obtain the beginning time of the new report interval.

Using BREF and FREF by specifying only a RANGE value allows you to include in the report interval data from the current report interval indicated by TIME and RANGE at the top of the screen. With BREF, you can access data in a previous interval as well as the current interval; with FREF, you can access data in a later interval as well as well as the current interval.

For example, if the current RANGE and MINTIME values are 100 seconds, and the TIME on the top of the display screen is 9:00:00, then RMF displays a report containing data from 9:00:00 to the TIME + RANGE value at the top of the screen, which would be 9:01:40. To view data from a previous interval, as well as the currently displayed interval (9:00:00 to 9:01:40), specify BREF R=200. RMF presents a report containing data from 8:58:20 to 9:01:40. (8:58:20 being the TIME + RANGE value at the top of the screen minus 200.) To include one more preceding interval, specify BREF R=300 to present data from 8:56:40 to 9:01:40. If you want to display data only from the current interval again (9:00:00 to 9:01:40), shorten the range parameters on the command to 100 seconds (BREF R=100).

Using the FREF command you can display reports containing data from subsequent intervals. For example, specify FREF R=200 to display a report containing data from 9:00:00 to 9:03:20. The following diagram shows how these BREF and FREF commands extend the range backward and forward, as well as the intervals included in the display reports as a result of the commands.



If you specify RANGE=0 with the date and/or time, you can pinpoint the time at which you want to start viewing data. RANGE=0 causes RMF to adjust the range to the smallest possible value, which is the MINTIME value you specified in the data gatherer options. If you want to begin viewing the report at the TIME value on the display screen and you specify BREF or FREF, you must specify RANGE = 0.

Using BREF/FREF without parameters: If you do not specify any parameters, the **FREF** command uses the TIME value on the display screen and *adds* the RANGE value (on the screen) to calculate the begin time of the data RMF retrieves. The **BREF** command uses the TIME value on the display screen and *subtracts* the RANGE value to calculate the beginning time of the data RMF retrieves.

Once you pinpoint the time that you want to start viewing data collected by the data gatherer, you can issue additional FREF or BREF commands to move backward and forward in time. You can also use the PF10 or PF11 keys, which have default settings of BREF and FREF, respectively.

Cancelling Entries on Option Panels

If you have made changes and wish to return to the values that were originally on the panel when you first entered the screen, issue:

```
Command ===>  CANCEL
```

CANCEL cancels all changes made on the screen and changes the panel fields to the original values as they appeared when you first entered the panel.

Note: CANCEL does not work on the job report options panel.

Using COMMANDS for Help with any RMF Command

The COMMANDS command displays the RMF help menu for commands, where you can access a definition of the command you want more information on.

Displaying Current Range Data

To display a report with data from the current RANGE, enter the command:

```
Command ===> CURRENT
```

If issued on a non-report screen, RMF displays the last report viewed with data from the current RANGE. If you have not viewed any reports during the session, RMF displays the workflow/exceptions report with data from the current RANGE.

Searching for a Field

To search for a field on a scrollable report, enter the command:

```
Command ===>  FIND xxxxxx
```

where xxxxxx is a character string that can be enclosed in apostrophes, but cannot contain any blanks.

To find the next occurrence of that string enter:

```
Command ===>  RFIND
```

RFIND is usually assigned to PF5.

If you issue these commands on a graphic report, RMF only performs a search on the tabular version of the report. If the string that you specified is found and visible on the report, RMF positions the cursor on the line where the string is found. If the string is part of a graphic bar and is not visible, RMF positions that line at the top of the screen but does not place the cursor on that line.

Setting GO Mode

To switch from STOP mode to GO mode, enter the following command on the command line of any report:

```
Command ===>  GO
```

These are some rules to keep in mind while using the GO command:

- You can not enter any commands on the command line while in GO mode.
- If you enter GO on a panel that is not a report, the last displayed report will be displayed in GO mode or, if no report has been previously displayed during the session, the workflow/exceptions report.
- You cannot enter GO mode during a reporter session with preallocated data sets. If you have specified MODE(GO) on the session options panel, RMF ignores the GO option.

Setting STOP Mode: To switch from GO mode to STOP mode, press the ATTN key or the PA1 key. (On an IBM 3270 personal computer use either PA1 or Alt-Finish as set up by your installation.) This action freezes the current report to allow you to frame through, for example, job or resource delay exceptions. While in STOP mode, the data gatherer continues to collect data and place it in local storage. With data set recording, the data gatherer continues to copy data from local storage to the data sets.

Activating Graphic mode

If you are in TABULAR mode when you start a session, use the GRAPHIC command to switch modes:

```
Command ===>  GRAPHIC
```

RMF activates GRAPHIC mode and if your installation has the Graphical Data Display Manager (GDDM) program product, you can display graphic reports. The default for GRAPHIC is ON. To return to tabular report display, you can specify on the command line:

```
Command ===>  GRAPHIC OFF
```

Printing Screens and Tabular Reports

To set the hardcopy mode for the session, issue the following command:

```
Command ===>  HARDCOPY ON
```

You can also specify HARDCOPY on the session options panel. When hardcopy mode is in effect, RMF writes all tabular reports requested during the session to the output data set you specified on the session options panel, or to SYSOUT. To terminate hardcopy mode, specify:

```
Command ===> HARDCOPY OFF
```

Hardcopy prints only tabular reports; if you specify HARDCOPY ON and access any graphic reports during a session, RMF prints the tabular version of the report.

To print a single report or screen when you specify HARDCOPY OFF on the session options panel, issue from the report or screen:

```
Command ===>  HARDCOPY REPORT
Command ===>  HARDCOPY SCREEN
```

The HARDCOPY command with the SCREEN or REPORT parameters overrides HARDCOPY OFF.

The HARDCOPY REPORT command causes RMF to print all frames of the report whether they are displayed or not. The HARDCOPY SCREEN will print any screen image. You can use this to print option panels, with the exception of the color graphic option panels.

If you issue HARDCOPY without parameters on the command line, the default is ON, which prints the tabular version of all reports you access during the session.

Note:

The ISPF PRINT command should only be used while in tabular mode. If used in graphic mode, unpredictable results will occur. For more information on ISPF commands, see the ISPF library.

Printing Graphic Reports

To send displayed graphic measurements to the Interactive Chart Utility (ICU) and start an interactive session, you can use the ICU command. You can use the ICU utility to save or print a chart.

When you issue the ICU command on an RMF graphic report, RMF saves the graphic report image as a member with the name of the report to the data set:

```
userid.RMFISPF.ADMGDF(report name)
```

Then an Interactive Chart Utility (ICU) session is started. During this session, you can print or save the graphic RMF report. To save this information for future use, you need to copy the data set "userid.RMFISPF.ADMGDF" into another data set. The next time you use ICU for the same report, the data saved in "userid.RMFISPF.ADMGDF(report name)" will be overwritten with new data. This data set is also erased every time you begin a Monitor III session.

To reenter the session from the point of interruption, press PF9. For more information on the Interactive Chart Utility, see the related GDDM publications.

Using Program Function Keys

Displaying Program Function Keys: To display the settings for the program function keys, enter the command:

```
Command ===> PFK
```

Figure 5-9 shows the default PFK settings. The PFK settings for PF13 through PF24 are identical to the settings for PF1 through PF12.

PFK KEY	DEFAULT SETTING
PF1	HELP
PF2	SPLIT
PF3	END
PF4	RETURN
PF5	RFIND
PF6	TOGGLE
PF7	UP
PF8	DOWN
PF9	SWAP
PF10	BREF
PF11	FREF
PF12	RETRIEVE
PF13	HELP
PF14	SPLIT
PF15	END
PF16	RETURN
PF17	RFIND
PF18	TOGGLE
PF19	UP
PF20	DOWN
PF21	SWAP
PF22	BREF
PF23	FREF
PF24	RETRIEVE

Figure 5-9. Default Settings of Program Function Keys

Note: You can also use the ISPF KEYS command.

When you press a program function key, RMF builds a command by using the program function key command string and adds any text in the input line. For example, if you specify T=10.05 on the input line and press PF10, RMF builds the command BREF T=10.05.

Changing Program Function Key Settings: To change the settings for any of the 24 program function keys, use the ISPF KEYS command to access the ISPF PFK screen. On that screen you can change the setting next to the PF key, and press ENTER. Changes remain in effect until you alter them again.

Note: PF key changes are not stored in RMF option sets. There is only one set of PF key definitions associated with your RMF session.

Using the PA Keys

PA1 (ATTENTION)

When the session is in GO mode, pressing PA1 (ATTENTION) changes the mode to STOP and displays the current screen.

Note: If you are running a reporter session in GO mode, the *only* way to get out of GO mode is to use the PA1 (ATTENTION) key. (On an IBM 3270 personal computer use either PA1 or Alt-Finish as set up by your installation.)

PA2

Pressing PA2 refreshes the currently displayed screen.

Resetting Entries on Option Panels

If you enter a value for an option and want to change it back to the original default shipped with RMF, issue the RESET command;

```
Command ===>  RESET
```

RESET sets the field values in the option panels to their original defaults, with the exception of DATE, TIME and RANGE.

Note: RESET does not work on the job report options panel.

If you change a value and want to change it back to the original value that appeared on the screen when you entered the panel, use the CANCEL command.

Retrieving the Last Command

To retrieve the last command you issued, enter:

```
Command ===>  RETRIEVE
```

RETRIEVE places the last command you issued with its parameters on the command line. The RETRIEVE command is usually assigned to PF12.

Activating Tabular mode

You can display reports in graphic or tabular form. If you are in GRAPHIC mode when you start a session, use the TABULAR command to switch modes:

```
Command ===>  TABULAR
```

RMF activates TABULAR mode, and you can display tabular reports. The default for TABULAR is ON. To return to a graphic display, you can specify on any command line:

```
Command ===> TABULAR OFF
```

Toggling Between Tabular and Graphic Display

To switch between tabular and graphic displays, press PF6 or enter the following command on the command line of any report on a terminal that supports graphics:

```
Command ===> TOGGLE
```

TOGGLE causes RMF to change the display format between graphic and tabular, maintaining the same scrolling position on the screen.

Displaying User-Written Reports

Monitor III includes a user exit for both the data gatherer and the data reporter session. Your system programmer must use the Report Format Definition Utility to create unique user reports and specify the report selection on the primary menu. See Chapter 7 for more information on user written reports.

Reference

Commands

The following table lists commands and their parameters that you can use during an RMF session. (For report and option panel commands see next table.)

COMMAND	RESULT	ABBREVIATION
BREF	Changes Date/Time/Range	
CANCEL	Restores options to state at panel entrance	
COMMANDS	Displays RMF help menu for commands	COM, CMD
CURRENT	Retrieves current data for display	CU
FIND	Searches for character string on report panels	
FREF	Changes Date/Time/Range	
GO	Switches to GO mode processing	
GRAPHIC ON / OFF	Entered on report panel, ON switches to graphic mode, OFF switches to tabular.	GR ON / OFF
HARDCOPY ON / OFF	ON prints all displayed reports, OFF prints no reports.	HC ON / OFF
HARDCOPY REPORT / SCREEN	REPORT prints tabular copy of reports, SCREEN prints a copy of the screen image.	HC REPORT / SCREEN
ICU	Sends report data to ICU and starts an ICU session	
PFK	Displays list of PF keys	
RESET	Resets options (excluding JOBNAME options) to default values shipped with RMF	
RETRIEVE	Displays last command issued in the command line	RE,RET
RFIND	Repeats the FIND command.	
TABULAR ON / OFF	ON switches to tabular display, OFF switches to graphic display.	TAB ON / OFF
TOGGLE	Switches between tabular and graphic display	TOG

Figure 5-10. Commands Table

Monitor III Report and Report Options Commands

The following table contains commands and abbreviations you can enter on any command line to display a report or option panel.

COMMAND	DISPLAYS	ABBREVIATION
COLOR	Color graphic options panel	CO
DELAY	Delays for all jobs	DEL,DLY,DL
DELAYJ	Delays for the specified job	DLJ,DJ,DELJ,DLYJ
DEV	DEV delays for all jobs	DD,DVD,DEV
DEVJ	DEV delays for specified job	DDJ
DEVR	DEV delays for resources	DR,DVR
DSINDEX	Data set index information	DS,DI
ENQ	ENQ delays for all jobs	ED
ENQJ	ENQ delays for the specified job	EJ
ENQR	ENQ delays for resources	ER
HSM	HSM delays for all jobs or a job group.	HD
HSMJ	HSM delays for the specified job	HJ
JES	JES delays for all jobs or a job group	JD
JESJ	JES delays for the specified job	JJ
LANGUAGE	Language option panel	LO
OPTIONS	Option selection panel	OP,OPT
OPTSET	Option set selection panel	OS
PARMLIB	Parmlib conversion panel	PO
PROC	Processor delays for all jobs or a job group	PD
PROCJ	Processor delays for the specified job	PJ
ROPTIONS	Report option panel for displayed report	RO
SESSION	Session options panel	SO
STOR	Storage delays for all jobs or a job group	SD
STORJ	Storage delays for a specified job	SJ
STORR	Storage space and page/swap activity for all system volumes	SR
SYSINFO	System information, total and by user groups	SY,SYS,SI
WFEX	Workflow/exceptions screen	WE,WF

Figure 5-11. Report and Report Options Commands

Fields on Option panels

This table includes the fields and their possible values as they appear on the various option panels. They are listed alphabetically according to the option panel they appear on.

OPTION	PANEL	ENTRIES
DSINDEX ORDER	Session Options	ASCEND or DESCEND
FIRST SCREEN	Session Options	Report or Screen name
HARDCOPY	Session Options	ON or OFF
MODE	Session Options	GO or STOP
OUTPUT DATA SET	Session Options	Data set name
RANGE	Session Options	Seconds or minutes
REFRESH	Session Options	Seconds or minutes
REPORT FORMAT	Session Options	GRAPHIC or TABULAR
SYSOUT	Session Options	Class for printed output
TIME LIMIT	Session Options	Minutes or hours
COLOR	Color Graphics	Number (1-7)
ID	Color Graphics	Number(1-27)
NAME	Color Graphics	Field name
PATTERN	Color Graphics	Number (0-16)
DESCRIPTION	Option Set/Parmlib	Text Describing Option Set
NAME	Option Set/Parmlib	Name for Option Set
SELECT	Option Set	S or D
DATA SET NAME	Parmlib Conversion	PREALLOCATED or name of PARMLIB dataset
MEMBER NAME	Parmlib Conversion	Name of Parmlib Member
SESSION OPTIONS	Parmlib Conversion	YES or NO
WFEX OPTIONS	Parmlib Conversion	YES or NO
DATE FORMAT	Language Options	Month date and year order for input/output
DATE SEPARATOR	Language Options	(/ or . or -)
DECIMAL POINT	Language Options	(. or ,)
TIME SEPARATOR	Language Options	(. or - or :)
CLASS	Delay report options	ALL, TSO, BATCH, STC
CRITERION	Delay report options	Minimum delay percentage
GROUP	Delay report options	ALL or any selection
JOBS	Delay report options	YES NO
SUMMARY	Delay/SYSINFO report options	YES or NO
JOBNAME	Job report options	Any jobname
MAJOR	ENQR report options	ALL or any ENQ major name
VOLSER	DEVR report options	ALL or any volume

Figure 5-12. Option Fields Table

Chapter 6. Reporting Data with Data Set Support

This chapter describes RMF Monitor III data set support. It includes the following:

- Description of the data set index (DSINDEX) screen
- Description of the preallocation of data sets for use during a reporter session

RMF Monitor III Primary Menu

After the Monitor III reporter session starts, the first screen RMF usually displays is the primary menu.

```
                 RMF Monitor III Primary Menu

Select one of the following items or enter command.  Press ENTER.

  1 DELAY   Delays (DLY)                   13 DELAYJ   Job delay (DLYJ)
  2 DEV     Device delays (DD)             14 DEVJ     Job device (DDJ)
  3 ENQ     ENQ delays (ED)                15 ENQJ     Job ENQ (EJ)
  4 HSM     HSM delays (HD)                16 HSMJ     Job HSM (HJ)
  5 JES     JES delays (JD)                17 JESJ     Job JES (JJ)
  6 PROC    Processor delays (PD)          18 PROCJ    Job processor (PJ)
  7 STOR    Storage delays (SD)            19 STORJ    Job storage (SJ)
  8 SYSINFO System information (SI)        DI DSINDEX  Dataset index
  9 WFEX    Workflow exceptions (WE)       OP OPTIONS  Option selection
 10 DEVR    Device resource (DR)            T TUTORIAL Tutorial aid
 11 ENQR    ENQ resource (ER)               X EXIT     End display session
 12 STORR   Storage resource (SR)


 Selection ===>
```

Figure 6-1. RMF Monitor III Primary Menu

Selections 1-19 are for RMF reports, selection OP allows you to select options that control your RMF session and specify options for your RMF reports, and selection T displays the RMF Monitor III tutorial that contains basic information about RMF Monitor III.

The remaining selection (DI) on the primary menu allows you to select the RMF **data set index (DSINDEX) screen**, which displays the dates and times of the data available during a reporter session.

Display DSINDEX Screen

The **data set index (DSINDEX) screen** displays information about data sets allocated for a Monitor III session. To display the data set index screen select it on the primary menu or enter the following command on any command line.

```
Command ===> DSINDEX
```

If you have not preallocated data sets for the reporter session, the screen lists all data sets and the RMF storage buffer for the currently active data gatherer session. If you have preallocated data sets for a reporter session, the screen lists only the preallocated data sets. For more information on preallocating data sets, see "Data Set Support and Preallocated Data Sets", later in this chapter.

Figure 6-2 shows a DSINDEX screen for a reporter session without preallocated data sets. Figure 6-3 shows a DSINDEX screen for a reporter session with preallocated data sets.

The header information for the DSINDEX screen displays the system id of the system that collected the data contained in the first dataset. Preallocated data sets must all be from the same system. If a preallocated data set does not share the same system id as the other data sets on the screen, an error message appears below the data set name to indicate the system id and that dataset is not available for use. The header also contains the number of samples, the date and time of the data that will be displayed when you request a report, and the range value in seconds for the session.

Both screen samples list for the session the DD name and data set name of every user-defined data set for the session. Data sets appear on the screen in ascending or descending chronological order. (You can specify the order of data sets for the DSINDEX screen on the session options panel, described in Chapter 5, "Monitor III Options and Commands") The DSINDEX screen also lists empty data sets and invalid data sets.

The headings and their meanings for both screen samples are:

--DATE-- --TIME--
The beginning and end time of the sampled data contained in the data gatherer's local storage buffer or in the data sets available during the reporter session. If the beginning and end date are the same, RMF displays only the beginning date. If the data set is empty or invalid, the field is blank.

DDNAME
For a DSINDEX screen without preallocated data sets, the system-generated DD name for the data set that has been dynamically allocated during the data reporter session.

For a DSINDEX screen with preallocated data sets, the DD name is the same as the file name specified in RMFDSxx on the ALLOCATE command issued before the reporter session.

DATA SET NAME
The VSAM data set containing RMF data.

The rightmost columns of both DSINDEX screens might contain the following information about the data set(s):

***** CURRENTLY ACTIVE ***** The currently active data set for the Monitor III data gatherer session (appears only on the DSINDEX screen for a reporter session without preallocated data sets)

***** IN STORAGE BUFFER***** The local storage buffer entry of the Monitor III data gatherer (appears only on the DSINDEX screen for a reporter session without preallocated data sets)

***** EMPTY ***** Data set with no usable data. For a session without preallocated data sets, data set recording might not be active and RMF cannot find the LRECL or CI SIZE for the data sets. For a session with preallocated data sets, the data set might be empty or contain other than sampled data gathered during a Monitor III data gatherer session.

***** NOT FOUND ***** Uncataloged data set specified on the DATASET option of the Monitor III data gatherer session (the data set is unusable)

***** INVALID REC SIZE ***** Data set specified with an invalid record size (the data set is unusable)

***** INVALID CI SIZE ***** Data set specified with an invalid control interval size (the data set is unusable)

***** OPEN ERROR ***** Error in opening the data set (the data set is unusable)

***** CLOSE ERROR ***** Error in closing the data set (the data set is unusable)

***** VSAM ERROR ***** Error in reading the VSAM data set (the data set is unusable)

***** DYNALLOC ***** Dynamic allocation error (the data set is unusable)

***** UNALLOC ***** Data set unallocated (the data set is unusable)

***** SAMPLE TIME EXCEEDS CURRENT TIME *****
Data set with a sample time that is later than the current system time. The system time has probably been incorrectly set. (This message does not appear on the screen with preallocated data sets.)

Note:

The DSINDEX screen for an RMF reporter session **without preallocated data sets** is refreshable in GO mode.

For an RMF session **with preallocated data sets**, GO mode is not possible.

If a Monitor III data gatherer session runs without data sets, the DSINDEX screen is blank.


```
                        RMF Data Set Index -- AQXA                  Line    1 of 5
              Samples: 100   Time: 08/07/86 at 15:28:40    Range +       100 Sec
 --DATE--  --TIME--      -DDNAME-   -----------DATA SET NAME------------------
 08/06/86  20:41:00      SYS00017  SYS1.RMFXA03
 08/07/86  09:21:00

 08/07/86  09:21:00      SYS00019  SYS1.RMFXA01
           11:49:40

 08/07/86  11:49:40      SYS00016  SYS.RMFXA04
           14:32:00

 08/07/86  14:32:00      SYS00020  SYS1.RMFXA02
           15:30:20                     * * * CURRENTLY  ACTIVE * * *

 08/07/86  15:19:40                    * * *  IN-STORAGE BUFFER  * * *
           15:30:20




Command ===>                                                  Scroll ===> CSR
```

Figure 6-2. Data set Index Screen (DSINDEX) without Preallocated Data Sets

```
                        RMF Data Set Index -- AQXA                  Line    1 of 5
              Samples: 100   Time: 08/07/86 at 15:28:40    Range +       100 Sec
 --DATE--  --TIME--      -DDNAME-   -----------DATA SET NAME------------------
 08/06/86  20:41:00      RMFDS00   RMF.M3.XXXX.DATASET.NMBR01
 08/07/86  09:21:00

 08/07/86  09:21:00      RMFDS01   RMF.M3.XXXX.DATASET.NMBR02
           11:49:40

 08/07/86  11:49:40      RMFDS02   RMF.M3.XXXX.DATASET.NMBR03
           14:32:00

                         RMFDS03   RMF.M3.XXXX.DATASET.NMBR04
                                        * * *  EMPTY  * * *






 Command ===>                                                  Scroll ===> CSR
```

Figure 6-3. Data set Index Screen (DSINDEX) with Preallocated Data sets

Data Set Support and Preallocated Data Sets

During a Monitor III data gatherer session, you can save sample data that RMF has recorded on VSAM data sets. These data sets might contain information from an earlier Monitor III data gatherer session or information gathered on a different system. In order to request report data from these data sets, you must preallocate them before you start a Monitor III display session.

A Monitor III display session that uses preallocated data sets is independent of the system on which RMF gathers data. As a result, when you request reports that make use of data from preallocated data sets, you do not require an active Monitor III data gatherer session.

Sending VSAM Data Sets to a Different System

Suppose you have collected data in several VSAM data sets during a gatherer session. You want to send the data sets to another location where they can be preallocated on a different system and then analyzed during a reporter session. You can use the following procedure to prepare and send the data sets:

1. In this example, suppose each VSAM data set contains 750 tracks. Create a sequential data set with these characteristics:

   ```
   Volume serial:            TS0010
   Device type:              3380
   Organization:             PS
   Record format:            VB
   Record length:            32756
   Block size:               32760
   1st extent Tracks:        900
   Secondary Tracks:         15
   ```

2. Use the following Access Method Services to copy the old VSAM data set to the new sequential data set.

   ```
   LISTCAT ENT(VSAM dsname)  ALL
   ALLOC FI(IFILE) DA(VSAM dsname)  SHR
   ALLOC FI(OFILE) DA(sequential dsname)  SHR
   REPRO IFILE(IFILE)  OFILE(OFILE)
   ```

   (See *Integrated Catalog* GC26-4019, or *VSAM Catalog* GC26-4075, for more information on these commands.)

3. If the method you use to transfer data cannot handle very large data sets, you may want to separate the new sequential data set into smaller data sets for transmission. Then transmit the separated data sets to the remote system where the analysis is to be performed. Use the commands/methods that are appropriate for your system.

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Receiving the Data Sets at the Analyzing System

To receive the data sets and prepare them for display, perform the following steps:

1. Receive the data set (if you separated it into smaller data sets, combine them into one sequential data set) using the appropriate commands/methods for your system.

2. Define a VSAM data set to contain the new sequential data set with the following characteristics:

```
DEFINE    CLUSTER    (NAME(new VSAM dsname)
                      VOLUMES(TSO012)
                      TRK(750   15)
                      RECSZ(32752  32752)
                      BUFSP(65536)
                      CISZ(32768)
                      NUMBERED
                      REUSE
                      SHR(2  3))
```

3. Use the Access Method Services to copy the data from the new sequential data set into the VSAM data set just defined.

```
LISTCAT   ENT(new VSAM dsname)    ALL
ALLOC  FI(IFILE)  DA(new sequential dsname)      SHR
ALLOC  FI(OFILE)  DA(new VSAM dsname)      SHR
REPRO IFILE(IFILE)    OFILE(OFILE)
```

4. Preallocate the VSAM data sets on the display system.

```
ALLOC FI(RMFDS00) DA(New VSAM dsname) SHR
```

Note: The user's LOGON procedure for TSO users defines the maximum number of concurrently allocated data sets allowed in a given TSO session. If a user exceeds the control limit number, allocation may fail and the user must then deallocate an existing data set. For more information, see <u>TSO Extensions Guide to Writing a Terminal Monitor Program or a Command Processor</u>.

5. Begin the Monitor III display session:

```
RMFWDM
```

6. Use Monitor III to analyze the measurements in each preallocated VSAM data set. To find out the date, time and range when sampled data was stored in data sets, enter the DSINDEX command, which issues a screen that lists chronologically all the data sets you have preallocated. For an example of the DSINDEX screen with preallocated data sets, see Figure 6-3 on page 6-5. After ending the reporter session, deallocate the preallocated data set with the command:

```
FREE FI(RMFDS00)
```

See Chapters 4 and 5 for more information about an RMF Monitor III display session.

Chapter 7. Procedures for Adding User Functions

RMF provides user exits to collect and report data relevant to your installation. For the data gatherer, you replace the Monitor III supplied module ERB3GUSR with your data gatherer user exit routine. Monitor III invokes your routine at each cycle. For the data reporter, you supply a program or a command CLIST to modify or create reports that you can display with ISPF. The Monitor III data reporter invokes your routine when you enter your command during an RMF ISPF Monitor III display session. You must be familiar with ISPF, Dialog Management Services, and RMF to create and implement your own exit routines.

Monitor III Session

This section describes procedures for adding Monitor III user reports to your installation.

User Reports

RMF generates a Monitor III session report by invoking a data gatherer module and a data reporter module. RMF invokes the data gatherer at each CYCLE and the data reporter at each REFRESH/RANGE period.

To provide your own data gatherer routine, replace the RMF dummy module ERB3GUSR. RMF will then invoke your data gatherer routine at each CYCLE. During separate processing **phases** of the reporter session, RMF makes use of ISPF tables to create and display reports. To provide your own data reporter routine, replace the appropriate phases among 4 phases available for report processing and display. When the terminal user selects the report, RMF will invoke your data reporter with the help of ISPF SELECT. The process is described later in this chapter under "Coding a User Report."

The data gatherer module and the data reporter module communicate through control blocks that contain data from a set of samples. The data gatherer collects data, and the data reporter uses the data to generate a formatted report for printing or display.

Note: For a description of how Monitor III maintains a set of samples when VSAM data sets are used with data set support, see Appendix B "Monitor III Data Set Support Record Structure"

Data Gatherer Sample Structure

RMF uses a *sample* to record data that the user data gatherer routine collects at each CYCLE. RMF combines these samples into a *set of samples* in the data gatherer's address space for each MINTIME period. After RMF constructs each set of samples, it moves the data into a wrap around area in local storage. The data reporter retrieves the data from this storage area, reduces it, and formats it for output.

Figure 7-1 shows the layout of three data areas that are common to all Monitor III data gatherers, whether coded by a user or provided by RMF. These areas are the set of samples header, the sample header, and the resource data record. Offset fields in the sample header and resource data record refer to offsets from the start of the control block containing the offset field. For example, the address of the first user record is the address of the REDG3 plus the offset to the first user record. All of these areas are maintained by RMF, specifically by the mainline data gathering module (ERB3GMFC). Figure 7-1 also shows the relationship between the data collected by the data gatherer user exit routine and the sample structure maintained by RMF.

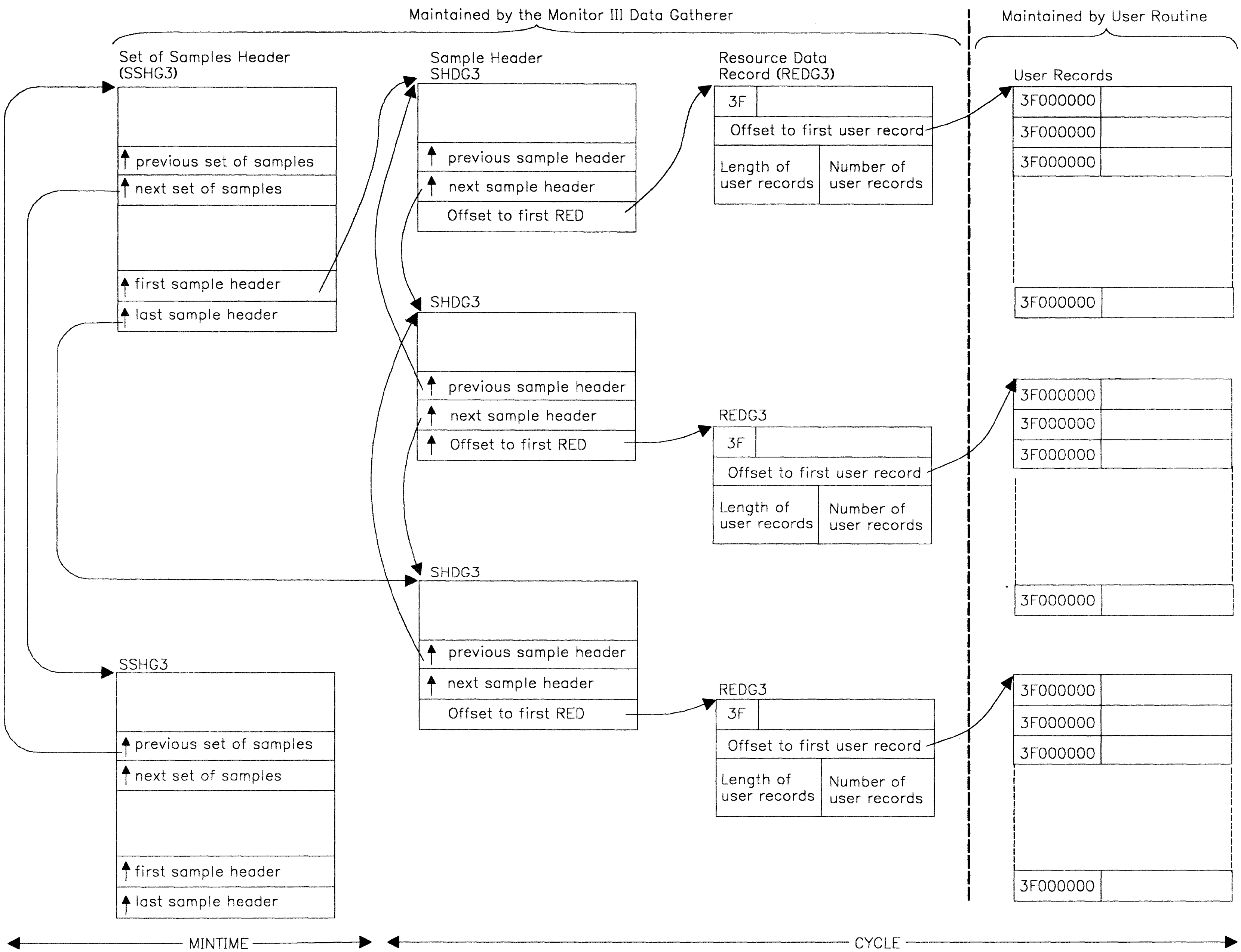

Figure 7-1. Data Gatherer Sample Structure

Figure 7-2 describes the fields in the set of samples header control block, the sample header, and the resource data record. These data areas are mapped by the RMF macros ERBSSHG3, ERBSHDG3, and ERBREDG3.

```
                             SET OF SAMPLES HEADER
**********************  (ERBSSHG3 MAPPING MACRO)  ********************
SSHG3       DSECT             SAMPLE HEADER
            DS      0D        ALIGN ON DWORD BOUNDARY
SSHSSHG3    DS      XL5       ACRONYM SSHG3
SSHRMFV     DS      XL1       SSHG3 CONTROL BLOCK VERSION '02'X
SSHLEN      DS      H         LENGTH OF SSHG3
SSHRMFVN    DS      XL3       RMF VERSION NUMBER
            DS      XL1       RESERVED
SSHPREVP    DS      A         POINTER TO PREVIOUS SSH
SSHNEXTP    DS      A         POINTER TO NEXT SSH
            DS      4F        RESERVED
SSHSHDFP    DS      A         POINTER FIRST SAMPLE HEADER
SSHSHDLP    DS      A         POINTER TO LAST SAMPLE HEADER

                              SAMPLE HEADER
**********************  (ERBSHDG3 MAPPING MACRO)  ********************
SHDG3       DSECT             SAMPLE HEADER
            DS      0F        ALIGN ON WORD BOUNDARY
SHDSHDG3    DS      XL5       ACRONYM 'SHDG3'
SHDRMFV     DS      XL1       SHDG3 CONTROL BLOCK VERSION NUMBER X'02'
SHDLEN      DS      XL1       LENGTH OF SHDG3
SHDFLAG1    DS      XL1       SAMPLE FLAG 1
SHDINVAL    EQU     X'80'     SAMPLE IS INVALID
SHDPREVP    DS      A         POINTER TO PREVIOUS SAMPLE
SHDNEXTP    DS      A         POINTER TO NEXT SAMPLE
SHDREDOF    DS      A         OFFSET TO FIRST RED RECORD

                             RESOURCE DATA RECORD
**********************  (ERBREDG3 MAPPING MACRO)  ********************
REDG3       DSECT             RESOURCE RECORD
            DS      0F        ALIGN ON WORD BOUNDARY
REDREDID    DS      XL1       RED ID
REDUSRCB    EQU     X'3F'     RES ID FOR USER EXIT
REDFLAG1    DS      XL1       RED FLAG1
REDINVAL    EQU     X'80'     USER EXIT DATA ARE INVALID FOR THIS SAMPLE
REDRETRY    DS      H         NR OF RETRIES OF THE USER EXIT ROUTINE
REDFUWDO    DS      F         OFFSET TO FIRST USER EXIT RECORD
REDUSERL    DS      H         LENGTH OF USER EXIT RECORD
REDUSERN    DS      H         NUMBER OF USER EXIT RECORDS
```

Figure 7-2. Mapping Macros of ERBSSHG3, ERBSHDG3 and ERBREDG3

Set of Samples Header Control Block (SSHG3)

The set of samples header control block represents all samples collected during a MINTIME interval. This control block contains pointers to the previous and next set of samples header control blocks, as well as pointers to the first and last sample header control blocks. A set of samples is the smallest amount of data that the data reporter can retrieve. RMF maintains and updates all fields in this control block as needed.

Sample Header Control Block (SHDG3)

This control block identifies a single sample taken at the end of a CYCLE. RMF identifies each sample with a sequence number and increments the sequence number at every CYCLE. This sample header contains forward and backward pointers to other sample header control blocks in the chain, as well as a pointer to the resource data record. RMF maintains and updates all fields in this control block as needed.

Resource Data Record (REDG3)

There is one resource data (RED) record for each defined resource in the system. RMF maintains and updates all fields in this record as needed. RMF uses RED records to access USER/WAIT records (in the case of the Monitor III data gatherer) or user records (in the case of a data gathering user exit routine). RED records are fixed in length, and contain X'3F' in the resource identifier (REDREDID) field when RMF invokes your data gatherer user exit routine. RMF uses this identifier to locate your user records, which also must have the same hexadecimal identifier. The RED record also contains the offset to the first user record (REDFUWDO), the length of your user exit records (REDUSERL), and the number of user exit records (REDUSERN) created during a CYCLE. While RMF maintains all the fields in the RED record, it obtains the length and number of user records from values you provide in the interface area used by the Monitor III data gatherer and your user routine. When RMF invokes your user exit, the second input parameter points to this interface area (see "Coding a User Report" later in this section).

User Record

A user record contains the information your data gathering routine collects at each CYCLE. The user record must be fixed in length and the first four bytes must contain the identifier X'3F000000'. You define the remaining fields in the user record and fill them in with the data you collect. The format of the data in the user record depends on the report you are generating. You set the format that best meets your needs.

Data Gatherer

The data gatherer runs in the Monitor III data gatherer address space in problem state, with a key of 8, and in 31-bit addressing mode. The data gatherer must be coded as reentrant. It receives control by a BALR instruction and must save the registers when it receives control and restore the registers when it returns control. Register 13 contains the address of the register save area; register 14 contains the return address; and register 15 contains the entry address.

Upon entry to the data gatherer, register 1 points to a contiguous list of three addresses that point to three input parameters. The first address points to the first parameter, the second address points to the second parameter, and the third address points to the third parameter. The input parameters are:

First Parameter

An area containing the management fields for the Monitor III data gatherer and the user data gatherer exit routine. The GGDMODAR DSECT (global data gatherer control block) is mapped by the ERBGGDG3 macro and describes the dynamic storage obtained when your data gatherer routine issues the GETMAIN macro. When RMF invokes your routine for the first time, it provides information in the following fields:

GGDMODNA The module name, which is ERB3GUSR.

GGDAUSBP The subpool number from which your routine must obtain storage via the GETMAIN macro.

GGDREDID The resource identifier, which is X'3F'.

You must fill in the address and the length of the storage area (within the user subpool) you obtain via the GETMAIN macro so that the Monitor III data gatherer can free this area when the data gatherer session terminates. The fields in the global data gatherer control block that you must fill in are:

GGDAULEN The length of the storage area.
GGDAUPTR The address of the storage area.

All other fields in the GGDMODAR control block are set to zeroes. The contents of the fields in GGDMODAR are not changed by RMF between calls to your user exit routine.

Second Parameter

The interface area between the Monitor III data gatherer and the user exit routine. The interface area is reinitialized by RMF before each call to the exit. The interface area is four fullwords in length and contains the following:

- The first fullword contains the user subpool number from which the user exit routine must obtain storage via the GETMAIN macro if additional storage is required.

- The second fullword contains the address of the retry work area (RETSTACK DSECT) used in error recovery. The ERBGGDG3 macro maps this retry work area. RMF provides this address, and your routine must not destroy it. The RETSTACK DSECT contains information that the Monitor III data gatherer error recovery module (ERB3GESA) uses if an error occurs in your data gatherer exit routine. Because RMF provides a recovery environment, it is not necessary to provide an ESTAE exit for your routine. If you choose to use the ESTAE and/or SPIE macro, you must not alter the Monitor III error recovery environment. You might choose to have your exit routine get control as a retry routine in the event of an abend. For example, if a control block chain changes while you data gatherer routine is scanning it, then your exit routine might abend. You must set up several fields in the retry work area at each invocation of your user exit routine so that the Monitor III data gatherer can return control to your routine. These fields are:

  RETADDR Contains the retry entry point address in your routine. The data gatherer returns control to the user exit routine at this address when attempting to retry after an error. In cases where the number of retries is exhausted, the error recovery module (ERB3GESA) returns control to the main data gatherer module (ERB3GMFC) and not the data gatherer exit routine.

  RETCOUNT Contains the number of times the user exit routine can be retried during one invocation. The RMF error recovery routine decrements the number in this field each time it gets control.

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RETRUBFL Specifies registers that must be restored by the recovery termination manager (RTM) before returning control to the address in your routine specified in the RETADDR field. This field should contain X'FFFF', indicating that all registers must be restored after error recovery processing completes.

RETREGSA A 16-word storage area used to store the contents of the registers specified in the RETRUBFL field.

- The third fullword is the address of an area containing the data the user exit routine collects. Your routine must supply this address each time it is invoked. RMF uses this address to move the collected data from the exit routine's storage area into the data gatherer's wrap around storage area.
- The fourth fullword consists of two halfwords that the user exit routine must provide at each invocation. The first halfword must contain the length of the user record, and the second halfword must contain the number of user records collected during the current cycle. RMF places the length and number of user records in the resource data (RED) record. All user records must be fixed in length and must start with a fullword hexadecimal identifier of X'3F000000'.

Third Parameter
The address of the return code of the user exit routine. The return code must be X'00' if the user exit routine successfully completes, and X'10' if it should no longer be invoked.

The processing your data gathering routine performs depends largely on the nature of the report for which you are gathering data. The first time RMF invokes your data gatherer routine, it provides a subpool number (in the GGDAUSBP field) that you must use when issuing the GETMAIN macro. After issuing a GETMAIN for the dynamic storage it needs to execute in, your routine must place the address and length of the storage obtained in the GGDAUPTR and GGDAULEN fields, respectively. (The GGDAUPTR and GGDAULEN fields contain zeroes when RMF invokes your routine for the first time.) When RMF makes subsequent calls to your routine, these two fields still contain the address and length of your dynamic storage. You do not have to issue another GETMAIN and you can reuse the storage obtained on the first call. This function eliminates the overhead of a GETMAIN for dynamic storage each time RMF invokes your routine. Depending on the amount of data you collect, you may need to obtain additional storage to hold your user records.

Your data gatherer routine must also set up several fields in the retry work area for use in error recovery processing. You must provide the address of the retry entry point for your routine in the RETADDR field, and the number of times you want RMF to retry your user exit routine in the RETCOUNT field. To allow the status of your routine to be restored when an error occurs, you must specify the registers to be restored in the RETRUBFL field and save these registers in the RETREGSA save area.

You must define the length of your user record and the fields within the user record. The first four bytes in the record must be X'3F000000'. You must also provide the length and number of user records collected in the current CYCLE in the interface area. RMF uses this information to move your collected data into the wrap around storage buffer.

If your user exit routine successfully gathers all the data needed for your report, set a return code of X'00' in the area pointed to by the third parameter in the parameter list. RMF will invoke your user exit routine at the next CYCLE. If you do not want RMF to invoke your routine again, set a return code of X'10'. Return to the caller by branching on the contents of register 14.

Data Reporter

To display a report, RMF makes use of ISPF tables that contain information about the report. You can control four phases to modify these tables and generate and display your own reports for an RMF session. (RMF uses two of these phases to generate and display standard RMF reports.)

The four phases and the activities performed in each are as follows:

- Phase 1: RMF generates an ISPF table that contains display data for every RMF report
- Phase 2: RMF invokes your routine to modify the ISPF table generated in phase 1 in order to change an existing report or create a new report. RMF does not use this phase; you supply your own routine.
- Phase 3: RMF formats the ISPF table created in phase 1 or modified in phase 2 and displays the tabular or graphic version of the report through the ISPF service TBDISPL.
- Phase 4: RMF invokes your routine to perform various clean-up operations (for example, frees resources allocated for use in previous phases). RMF does not use this phase; you supply your own routine.

Note: If you decide to replace any of these phases, you must conform to the standards and externals described in this manual. If you do not, the results are unpredictable. See "Installing Your Own Phases" later in this chapter.

Coding a User Report

To help you modify or create RMF reports for your installation, you can use the RMF report format definition utility. The utility consists of a series of ISPF panels. These panels allow you to modify ISPF tables that RMF uses during the four phases.

The three ISPF tables used to control RMF report formatting and display are as follows:

- The phase driver table ERBPHDS3, which contains all RMF-supplied report definitions to generate reports during phase 1
- The tabular report format table ERBFMTS3, which contains the information used to format each RMF tabular report during phase 3
- The graphic parameter report table ERBPTGS3, which contains entries for the graphic version of each RMF report during phase 3

Appendix B contains samples of each table and table entries.

You should be familiar with ISPF and TSO to use the report panel definition utility. For the names of relevant ISPF and TSO publications, see the preface of this manual.

Report Utility Panel Flow

Figure 7-3 shows the panel sequence for the report format definition utility.

To exit any panel, you can enter CANCEL on the command line or press END (PF3). If you enter CANCEL, the report format definition utility displays the report definition initialization panel (ERB3RD1) but saves none of your changes. If you press END on any panel, RMF displays the previous panel but does not save changes you have made. To continue viewing panels in sequence, press ENTER.

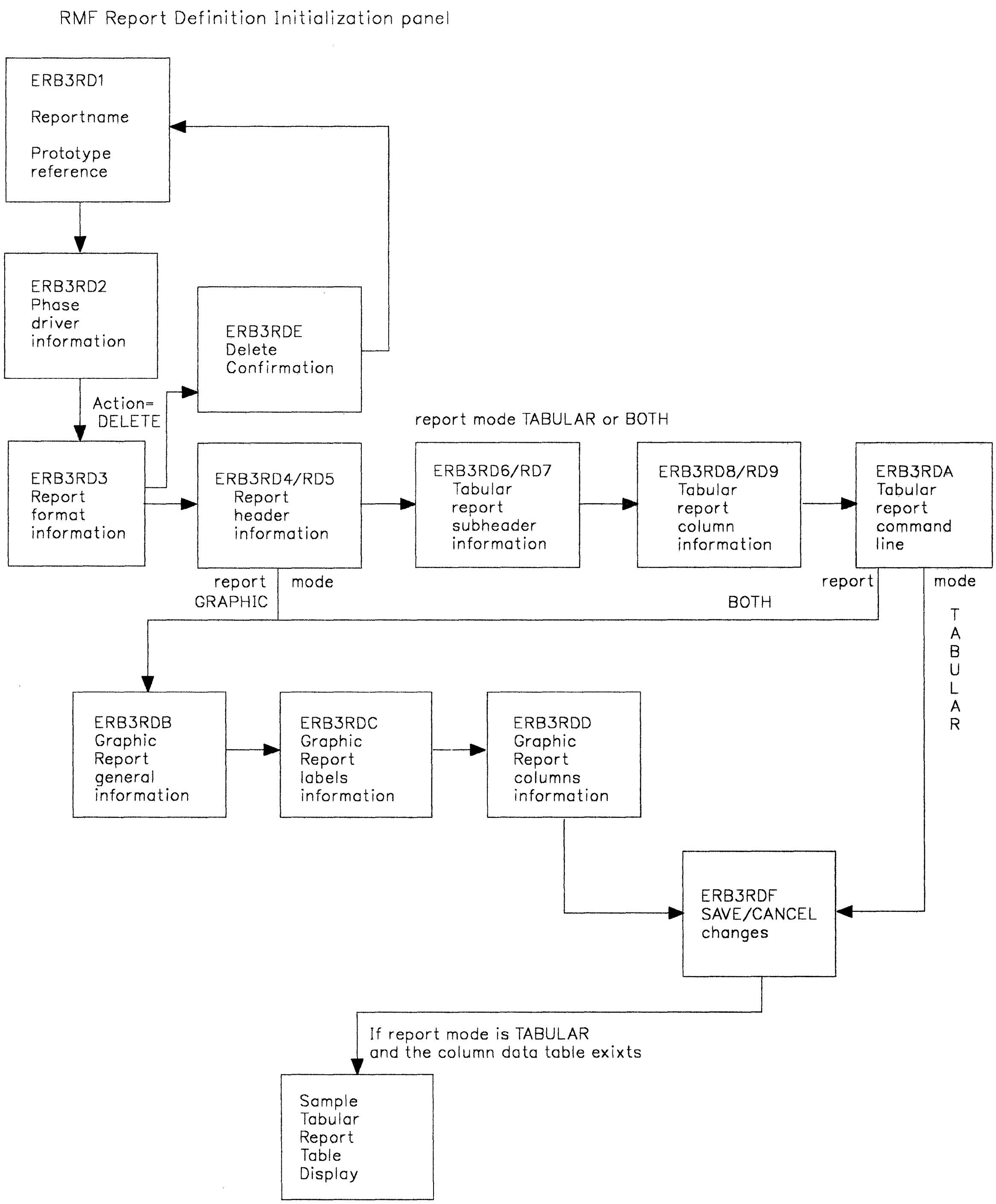

Figure 7-3. Panel Sequence for the Report Definition Utility (ERB3RDUT)

Before You Start the Utility

Do not use the RMF distribution table library as your ISPF output library (ERBTABL); you could destroy standard RMF report formats as a result. Allocate ERBTABL as part of a private user table library. You can concatenate this private library to the beginning of the RMF input table library (ERBTLIB) and can safely delete the ISPF tables you have modified or created (ERBPHDS3, ERBFMTS3, and ERBPTGS3) for your own reports.

You can merge your own libraries with RMF libraries. If you want to change the data set names and the allocations, modify CLIST ERBRMF3X. CLIST ERBRMF3X allocates the RMF ISPF libraries from the following distribution libraries:

- panels from SYS1.RMFPNL
- tables from SYS1.RMFTBL
- messages from SYS1.RMFMSG

These CLISTs are available in SYS1.RMFCLS, which must be concatenated to your SYSPROC library.

Starting the Report Utility

To start the report format definition utility, enter from TSO READY mode:

```
ERBRMFU
```

You can also select option 6 (TSO commands) on the ISPF Main Menu to enter the ERBRMFU command.

Note: Do not try to access the report format definition utility in split screen mode when you are in an active RMF Monitor III reporter session.

The Report Format Definition Panel (ERB3RD1)

After you issue ERBRMFU, the report format definition utility displays the **report definition initialization panel** (ERB3RD1). On this panel, you can specify whether you want to create a new report or modify or delete an existing one. You can also select the name of an existing RMF report to use as a prototype for the new report.

Figure 7-4 is an example of a report format definition panel that specifies MODIFY for the resource-oriented storage (STORR) report.

Note: The information that appears on the panels in this section shows the standard RMF variables and headings for the STORR report. For examples of how to use the report format definition panels to create or modify a report, see "Examples Using the Report Format Definition Utility Panels" later in the chapter.

```
ERB3RD1                  RMF Report Format Definition

 Enter the following information.  To continue press ENTER.
 To exit enter CANCEL or press the END key.

 ACTION          ===> MODIFY          MODIFY, CREATE or DELETE

 REPORT NAME     ===> STORR           Name of report

 PROTOTYPE NAME  ===>                 Name of existing report to be
                                      used as a prototype (optional)

 Command ===>
```

Figure 7-4. Report Definition Initialization Panel ERB3RD1

The panel fields and their meanings are:

ACTION
Specifies the action you want RMF to perform as follows:

MODIFY - to change an existing RMF report

CREATE - to create a new report

DELETE - to delete an existing report

REPORT NAME
Specifies the name of the report that RMF is to modify, create, or delete. The report name must conform to ISPF naming conventions.

PROTOTYPE NAME
When you enter CREATE for ACTION, specifies the name of an existing RMF report to use as a prototype or model for your report. RMF provides you those report values, which you can change when you modify or create your report.

When you enter MODIFY or DELETE for ACTION, you can ignore this field.

The Phase Driver Information Panel (ERB3RD2)

Press ENTER to display the next panel, the **phase driver information panel** (ERB3RD2).

On this panel, you can specify the selection character(s) to use for the new or modified report on the primary menu of a report session. You can also specify for each reporter phase the program or CLIST to modify, create, or print your report, or perform clean-up services and routines.

If you want to modify an existing RMF report without changing the layout or header information, you can provide your own program or CLIST for phase 2 on this panel. (You can use ISPF services and commands like TBSORT, TBDELETE, or TBCREATE to perform these modifications during phase 2. See "Special Considerations for Modifying Reports" and "Examples Using the Report Format Definition Utility." Appendix C lists sample user-created CLISTS used in the examples.)

If you want to modify an existing RMF report format or layout (without adding or deleting lines from a report), you can specify the name of the RMF report you want to modify for phase 1 (optionally for phase 2) and the name of the standard program that RMF uses to format RMF reports for phase 3. (See PHASE 3 STRING in Figure 7-5.) You can then use the remaining report format definition utility panels to make the header and layout changes for the modified report.

If you want to create a report, you should use a prototype (see Figure 7-4 for the report format definition panel) and make sure to include the report selection on the Primary Menu for the RMF report session.

Figure 7-5 is an example of a phase driver information panel that contains information about the resource-oriented storage (STORR) report:

```
ERB3RD2                  RMF Report Format Definition

 Report Name: STORR                         Section 1: Phase Driver Information

 Enter the following information.  To continue press ENTER.
 To quit enter CANCEL. To go backwards press END.

 Select Strings format is: PGM(nnnnnnnn) PARM(mmm) or CMD(nnnnnnnn mmm)

 SELECTION CHARACTERS ===> 12          Selection on Primary Option Panel

 PHASE 1 SELECT STRING ===> PGM(ERB3RPH1) PARM(STORR)
         TABLE  NAME   ===> ERBSRRT3   Name of reporter phase 1 result table

 PHASE 2 SELECT STRING ===>
         TABLE  NAME   ===> ERBSRRT3   Optional name of phase 2 result table

 PHASE 3 SELECT STRING ===> PGM(ERB3RDSP)

 PHASE 4 SELECT STRING ===>


 Command ===>
```

Figure 7-5. Phase Driver Information Panel (ERB3RD2)

The panel fields and their meanings are as follows:

SELECTION CHARACTERS
Specifies a 1 to 8 character alphanumeric value that RMF uses as a selection value on the primary menu of a report session.

If you enter a selection that is currently used on the primary menu of a report session, RMF displays the report that you modify or create on this panel when you make the selection.

See "Examples Using the Report Format Definition Utility."

PHASE 1 SELECT STRING
Specifies the name of the program or CLIST that the reporter control module (ERB3RDPC) uses to generate the ISPF report table during phase 1. You must specify a CLIST for CMD or program for PGM. (Follow the rules for ISPF SELECT services.) If you are modifying an existing RMF report or creating a new report using a prototype, you must specify for PGM the program name ERBRPH1, and for PARM the command name of the RMF report that you are modifying or using as a prototype. If you are creating a new report, be sure to include the report as a selection on the Primary Menu.

See the RMF supplied phase driver table (ERBPHDS3) in Appendix C for a list of the RMF program and PARM names.

PHASE 1 TABLE NAME
Specifies the name of the ISPF table that results when your program or CLIST is invoked during phase 1. You must specify this parameter if you have specified PHASE 1 SELECT STRING.

For a list of the RMF report data tables (PHDRTAB1) in the RMF supplied phase driver table (ERBPHDS3), see Appendix B

PHASE 2 SELECT STRING
Specifies the name of the program or CLIST used to modify the ISPF report data table created in phase 1. If you are creating a new report without having specified a prototype, you must enter the name of your CLIST to create the new report. (Follow the rules for ISPF SELECT services.) If you are modifying only the report header or layout of an existing RMF report, you do not need to enter a PHASE 2 SELECT STRING.

PHASE 2 TABLE NAME
Specifies the name of the ISPF table that results after phase 2. If you have entered a value for PHASE 2 SELECT STRING, you must specify a valid phase 2 table name.

If you are modifying the report header or layout of an existing RMF report, you can enter the same name you entered for PHASE 1 TABLE NAME.

PHASE 3 SELECT STRING
Specifies the program or CLIST that RMF uses to initiate phase 3 to format your report.

If you do not provide a program or CLIST for this field, RMF skips the remaining report format definition utility panels and displays the report definition initialization panel ERB3RD1. When you invoke your report during an RMF session, RMF does not display the report.

If you are creating a report and you want RMF to display it, specify PGM(ERB3RDSP), the standard RMF display module.

PHASE 4 SELECT STRING
Specifies the program or CLIST that ERB3RDPC uses to initiate phase 4. This field is optional.

The Report Format Information Panel (ERB3RD3)

If you have entered a name for PHASE 3 SELECT STRING on ERB3RD2, RMF next displays the **report format information panel** (ERB3RD3). This panel is the first in a series of panels that allows you to change the header and subheader layout of an RMF report.

On this panel (ERB3RD3), you can specify tabular or graphic, or both the tabular and graphic displays for the report, the panel name of the tabular version of the report, or specify the name of a report help panel.

Figure 7-6 is an example of a report format information panel for the resource-oriented storage (STORR) report:

```
ERB3RD3                 RMF Report Format Definition


 Report Name: STORR                        Section 2: Report Format Information

 Enter the following information.  To continue press ENTER.
 To quit enter CANCEL. To go backwards press END.


 REPORT MODE          ===> BOTH         TABULAR, GRAPHIC or BOTH


 PANEL NAME           ===> ERB3SRR      Name of tabular report panel


 HELP PANEL NAME      ===> ERB3SRR0     Name of HELP panel


 LOGICAL LINE NUMBER  ===> SRRDTLLN     Name of table variable
 SEQUENCE NUMBER      ===> SRRDTPSN     Name of table variable







 Command ===>
```

Figure 7-6. Report Format Information Panel (ERB3RD3)

The panel fields and their meanings are as follows:

REPORT MODE
Specifies the display mode for the report Valid values are as follows:

TABULAR

GRAPHIC

BOTH

PANEL NAME
When you enter TABULAR or BOTH for REPORT MODE, specifies the name of the ISPF display panel for the tabular version of the report.

For a tabular report, you must specify the name of the display panel that is to contain the report information. RMF-supplied panel names that you can use are ERB3DSI (if you are modifying or using the DSINDEX screen as a prototype), ERB3SRR (if you are modifying or using the STORR delay report as a protype), ERB3SYS (if you are modifying or using the SYSINFO report as a protype), ERB3WFX (if you are modifying or using the WFEX report as a protype), or ERB3CMN (if you are modifying or using any other report as a prototype).

If you specify the name of your own panel, make sure that the panel includes the following information:

- Output fields for 2 standard header lines (DSPHDR1 and DSPHDR2)
- Output fields for up to 5 subheader lines (DSPSUBH1 - DSPSUBH5) contained in the RMF report you want to modify
- Output fields for up to 3 column header lines (FMTCOLH1 -FMTCOLH3) contained in the RMF report you want to modify. For a description of the report format table ERBFMTS3, see Appendix B.
- Up to 3 model line variables (FMTMODL1 - FMTMODL3) contained in the model section of the RMF report you want to modify. For a description of the the entries in the report format table ERBFMTS3, see Appendix B.
- The command line (defined by variable ZCMD) and scroll amount field (defined by variable AMT)

Also, ensure that the user-defined panel for your report includes an initialization (INIT), reinitialization (REINIT), and processing (PROC) section as in the RMF-supplied panels. For an example of a user-defined panel based on ERB3CMN, see Figure C-2 in Appendix C.

If you enter GRAPHIC for REPORT MODE, leave PANEL NAME blank.

HELP PANEL NAME
When you enter a value for PANEL NAME, specifies the name of the ISPF help panel that contains help information for your report. The field is optional.

LOGICAL LINE NUMBER/SEQUENCE NUMBER

Specifies the name of key variables in the data table of the RMF report you are modifying. A logical line number identifies a logical group of related data rows within a report; a line sequence number identifies each physical table row that belongs to the logical group.

For example, in the STORR report, a logical group might include the data row for volume serial and device type and the related space type information. In the graphic version of the report, volume serial and device type appear on one line while the related space type appears on the second line for that volume serial.

The logical line number (that identifies the entire data group) is 1; the sequence number (the number of physical lines that belong to the logical group and include the volume serial/device type on one line and the space type on the second line of the graphic report) is 2 or more.

When you toggle between tabular and graphic reports, RMF uses these variables to synchronize the line or bar displayed on the screen (the beginning of a logical group of data table rows). For examples of RMF report data tables, see Appendix B.

Report Header Layout Panels (ERB3RD4 and ERB3RD5)

Press ENTER to display the next panel, ERB3RD4, the **report header layout panel.**

Each RMF report contains report headings, subheadings, and columns that you can modify. The report header layout panels (ERB3RD4 and ERB3RD5) allow you to change up to 2 header lines for the tabular and graphic versions of the report.

On the first of these panels (ERB3RD4), you can specify the header lines and header variables for your report. At the bottom of the panel, enter the header lines exactly as you want them to appear on your report. You can use the variables listed on the panel to appear in the headings of your report. (Panel ERB3RD4 lists variables from header data table ERBHDRS3. For an example of ERBHDRS3, see Appendix B.)

If a variable name is too long to enter in the header line, you can use a placeholder (&Z). After you press ENTER, you define these placeholders with variable names on the next panel.

Figure 7-7 is an example of a report format definition panel ERB3RD4 that shows you the headings and variables for the resource-oriented storage (STORR) report.

```
ERB3RD4                  RMF Report Format Definition

 Report Name: STORR                            Section 3: Report Header Layout

 Enter or change the report header lines.  To continue press ENTER.
 To quit enter CANCEL. To go backwards press END.

 You may intermix: text, variables, and variable placeholders (&Z).
 If you specify variable placeholders (&Z) the next panel will ask you
 to specify the variable name that is to replace each &Z.

 The following variables are available for use in the header:
   &ERBSID      &ERBHCTXT
   &ERBSAMPL    &ERBDATE
   &ERBTIME     &ERBRANGE

 Enter or change up to two report heading lines:

                    RMF Storage Resource Delays -- &Z
 &ERBHCTXT     Samples: &Z       Time: &ERBDATE at &ERBTIME   Range + &Z     Sec




 Command ===>
```

Figure 7-7. Report Header Layout Panel (ERB3RD4)

In Figure 7-7, two report header lines appear at the bottom of the panel; six variable names are available for the header lines. In this example, the variable &ERBHCTXT is specified at the beginning of the second header line, and &ERBDATE and &ERBTIME are specified for **Time**. Placeholders (Z) for the other variables (&ERBSID for session id, &ERBSAMPL for samples, and &ERBRANGE for range) appear in the appropriate fields of the header lines and indicate that the variable names they represent might not fit in the space provided. These placeholders can be defined on the next panel.

Press ENTER to display the second **report header layout panel** (ERB3RD5).

On ERB3RD5, you can specify variable names for any Z placeholders you have used. The headings, variables names, and placeholders as you entered them on ERB3RD4 appear at the top of the panel. The variable names appear under the headings in the order specified on ERB3RD4. You can specify your own variable names in the spaces provided; however, in order for RMF to display the user-specified variables during a report session, they must be in the function pool for phase 3 or in the shared ISPF variable pool. Otherwise, blanks appear in the report. See "Installing Your Own Phases" and "Examples Using the Report Format Definition Utility" later in the chapter.

You must specify a number for each Z placeholder and its corresponding variable. Numbers must start with 1 and continue in sequence. There must be a one-to-one correspondence between placeholders and variable names, each pair with a unique number assigned to indicate the order of placement of the variable.

Figure 7-8 is an example of report header layout panel ERB3RD5 that defines the placeholders used on the previous panel. If you do not have placeholders to define, press enter to get the next panel.


```
ERB3RD5                  RMF Report Format Definition


 Report Name: STORR                               Section 3: Report Header Layout

 The following report header lines have been specified:
                    RMF Storage Resource Delays -- Z1
 &ERBHCTXT     Samples: Z2        Time: &ERBDATE at &ERBTIME   Range + Z3      Sec

 Specify the placeholder (Z) number next to the variable name to replace each Z
 above.To continue press ENTER.To go backwards press END.To quit enter CANCEL.


      &ERBSID    ===> 1            &ERBHCTXT ===> --            &ERBSAMPL ===> 2
      &ERBDATE   ===> --           &ERBTIME  ===> --            &ERBRANGE ===> 3
 ===> --------- ===> --       ===> -------- ===> --        ===> --------- ===> --
 ===> --------- ===> --       ===> --------- ===> --       ===> --------- ===> --










 Command ===>
```

Figure 7-8. Report Header Layout Panel (ERB3RD5)

The variable name &ERBSID that contains the session id replaces Z1 in the first header line of the report; the variable name &ERBSAMPL that contains the number of samples replaces Z2, and &ERBRANGE that contains the range value replaces Z3 in the second header line.

Report Subheader Panels (ERB3RD6 and ERB3RD7)

If you specified TABULAR or BOTH for report mode, RMF displays the **report subheader information panel** ERB3RD6. (If you specified GRAPHIC and press ENTER on panel ERB3RD4, RMF displays the graphic parameter definition panel ERB3RDB. See Figure 7-14 for an example of this panel.)

The report subheader layout panel (ERB3RD6) displays up to five subheader lines of an existing RMF report. (Subheader lines are any lines in an RMF report that appear between the two standard header lines and the column headings.) ERB3RD6 also lists the variables that are available for use in the subheader lines of the modified report.

At the bottom of ERB3RD6, you enter the subheader lines exactly as you want them to appear on your report. You can use the variables listed on the panel to appear in the subheadings of your report. (Panel ERB3RD6 lists variables from header data table ERBHDRS3.)

If a variable name is too long to appear in the header line, you can use a placeholder (&Z). After you press ENTER, you define these placeholders with variable names on the next panel.

Figure 7-9 is an example of a report subheader layout panel ERB3RD6 that shows the subheadings of the resource-oriented storage (STORR) report.

```
ERB3RD6                  RMF Report Format Definition

 Report Name: STORR                             Section 4: Report Subheader Layout

 Enter or change the report subheader lines.  To continue press ENTER.
 To quit enter CANCEL. To go backwards press END.

 You may intermix: text, variables, and variable placeholders (&Z).
 If you specify variable placeholders (&Z) the next panel will ask you
 to specify the variable name that is to replace each &Z.

 The following variables are available for use in the subheader:
   &SRRRHUIC     &SRRRSTOR     &SRRRNUC      &SRRRSQA      &SRRRCOMM     &SRRRACTV
   &SRRRIDLE     &SRRRAVAL     &SRREMAGE     &SRRESTOR     &SRRECOMM     &SRREACTV
   &SRREIDLE     &SRREAVAL

 Enter or change up to five report subheading lines:
 ------------------------------ STORAGE SUMMARY ------------------------------
                  AVG HI UIC/     FRAMES                     % FRAMES
    STORAGE        MIGR AGE       ONLINE     NUC    SQA   COMM  ACTV   IDLE  AVAIL
    Real (Main)    &SRRRHUIC      &SRRRSTOR  &Z     &Z     &Z    &Z     &Z     &Z
    Extended       &SRREMAGE      &SRRESTOR                &Z    &Z     &Z     &Z




 Command ===>
```

Figure 7-9. RMF Report Subheader Information Panel (ERB3RD6)

In Figure 7-9, on the report subheader layout panel, subheader lines appear at the bottom of the panel and fourteen variable names from the STORR report are available. You can modify these subheader lines and indicate where you want the available variables to appear in them.

Press ENTER to display the next panel **ERB3RD7**, the second report subheader layout panel.

On this panel, you can specify variable names for any Z placeholders you have used. For a description of how to replace placeholders with variable names, see the report header layout panel (Figure 7-8).

Figure 7-10 shows a report subheader layout panel ERB3RD7 that defines placeholders used on the previous panel.

```
ERB3RD7                  RMF Report Format Definition


 Report Name: STORR                           Section 4: Report Subheader Layout

 The following report subheader lines have been specified:
 ------------------------------ STORAGE SUMMARY ------------------------------
                      AVG HI UIC/   FRAMES                  % FRAMES
    STORAGE            MIGR AGE     ONLINE    NUC   SQA  COMM  ACTV  IDLE  AVAIL
    Real (Main)        &SRRRHUIC    &SRRRSTOR  Z1    Z2    Z3    Z4    Z5     Z6
    Extended           &SRREMAGE    &SRRESTOR              Z7    Z8    Z9    Z10

 Specify the placeholder (Z) number next to the variable name to replace each Z
 above. To continue press ENTER. To go backwards press END.To quit enter CANCEL.

      &SRRRHUIC ===> --        &SRRRSTOR ===> --          &SRRRNUC  ===> 1
      &SRRRSQA  ===> 2         &SRRRCOMM ===> 3           &SRRRACTV ===> 4
      &SRRRIDLE ===> 5         &SRRRAVAL ===> 6           &SRREMAGE ===> --
      &SRRESTOR ===> --        &SRRECOMM ===> 7           &SRREACTV ===> 8
      &SRREIDLE ===> 9         &SRREAVAL ===> 10      ===> --------- ===> --
 ===> --------- ===> --    ===> --------- ===> --      ===> --------- ===> --
 ===> --------- ===> --    ===> --------- ===> --      ===> --------- ===> --
 ===> --------- ===> --    ===> --------- ===> --      ===> --------- ===> --



 Command ===>
```

Figure 7-10. RMF Report Subheader Information Panel (ERB3RD7)

Report Column Layout Panels (ERB3RD8 and ERB3RD9)

Press ENTER to display the next panel, ERB3RD8, the report subheader first **report column layout panel**.

On this panel, you can modify report columns. You can enter up to three column header lines as you want them to appear in the report.

You can specify up to three model lines for your columns by using an attribute character followed by a variable name or placeholder (Z). (See DATA ATTRIBUTE CHARACTERS described below.)

You can use the variable names listed at the bottom of the panel to appear in the columns of your report. This panel also allows you to specify a placeholder (Z) for any variable name you want to use. (Panel ERB3RD8 lists variables from the data table of the RMF report you are modifying. All variables might not appear on the first page of the panel. Scroll through the panel and select the variable names you need. For examples of RMF report data tables, see Appendix B.) You can define placeholders for variable names on the next panel.

Figure 7-11 is an example of ERB3RD8 that shows report column headings for the STORR report.

```
ERB3RD8                  RMF Report Format Definition              Line 1 of
3

 Report Name: STORR                                 Section 5: Report Column Layout

 Enter or change the following information. To continue press ENTER.
 To quit enter CANCEL. To go backwards press END.

 DATA ATTRIBUTE CHARACTERS ===> -?|     Define meaning in attribute section
                                        of associated table display (ERB3SRR).

 Enter or change up to three column header lines:
 ---------------------------- PAGE/SWAP ACTIVITY ----------------------------
 VOLUME DEV    NUM  USG  ACT  CON  DSC  PND  DLY  DLY  SPACE    AVG ACTIVE USERS
 SERIAL TYPE   EXP   %    %    %    %    %   DB%  CU%   TYPE  TOTL LOCL SWAP COMM

 Enter or change up to three model lines:
 ?Z     ?Z     ?Z  ?Z   ?Z   ?Z   ?Z   ?Z   ?Z   ?Z    ?Z     ?Z   ?Z   ?Z   ?Z
 -------------------------------------------------------------------------------
 -------------------------------------------------------------------------------

 The following variables are available for use in the model lines:
   SRRVOLVC     SRRDEVTY     SRREXPCT     SRRUSVC     SRRA1VC     SRRA2VC



 Command ===>                                                  Scroll ===> PAGE
```

Figure 7-11. RMF Report Column Layout Panel (ERB3RD8)

DATA ATTRIBUTE CHARACTERS

Specifies the ISPF characters used to indicate the start of a data field. Specify the data attribute characters before each variable name or placeholder (Z) used in the model lines.

You must specify the name of a panel for the tabular version of a new or modified report. For RMF-supplied panels, the attribute characters appear as follows:

- a question mark (?) indicates that the output display characters appear unhighlighted (low intensity) in turquoise
- a slash (|) indicates that the output display characters appear highlighted (high intensity) in white
- a blank indicates that the input display characters appear unhighlighted (high intensity) in green

For user-defined panels, be sure that the data attribute characters match the characters in the attribute section of your ISPF display panel. See PANEL NAME on the report format information panel (ERB3RD3).

Press ENTER to display the next panel, **ERB3RD9**, the second report column layout panel.

On this panel, you can specify variable names for any Z placeholders you have used. The variable names available on the previous panel are listed at the bottom; you can add your own variable names in the spaces provided. If your variable names are not available when you invoke the report, blanks will appear instead of data. See the report header information panel (ERB3RD5) in Figure 7-8 for a description of how to replace placeholders with variable names.

All variable names do not appear on the first page of the panel; scroll through the remaining pages of the panel to see all available variable names.

Figure 7-12 is an example of report column layout panel ERB3RD9 that defines placeholders used on the previous panel.

```
ERB3RD9                 RMF Report Format Definition              Line 1 of
8

 Report Name: STORR                                Section 5: Report Column Layout

 The following report column header and model lines have been specified:
 ---------------------------- PAGE/SWAP ACTIVITY -----------------------------
 VOLUME DEV   NUM  USG  ACT  CON  DSC  PND  DLY  DLY  SPACE   AVG ACTIVE USERS
 SERIAL TYPE  EXP   %    %    %    %    %   DB%  CU%   TYPE  TOTL LOCL SWAP COMM
 Z1     Z2     Z3  Z4   Z5   Z6   Z7   Z8   Z9   Z10  Z11    Z12  Z13  Z14  Z15


 Specify the placeholder (Z) number next to the variable name to replace each Z
 above. To continue press ENTER. To go backwards press END.To quit enter CANCEL.

      SRRVOLVC ===> 1           SRRDEVTY ===> 2           SRREXPCT ===> 3
      SRRUSVC  ===> 4           SRRA1VC  ===> 5           SRRA2VC  ===> 6
      SRRA3VC  ===> 7           SRRA4VC  ===> 8           SRRA5VC  ===> 9
      SRRA6VC  ===> 10          SRRSPTVC ===> 11          SRRAUTOT ===> 12
      SRRAULOC ===> 13          SRRAUSWP ===> 14          SRRAUCOM ===> 15
      SRRDTLLN ===> --          SRRDTPSN ===> --     ===> -------- ===> --
 ===> -------- ===> --     ===> -------- ===> --     ===> -------- ===> --



 Command ===>                                                Scroll ===> PAGE
```

Figure 7-12. RMF Report Column Layout Panel (ERB3RD9)

Report Command Line Information Panel (ERB3RDA)

Press ENTER to display the next panel, ERB3RDA, the **command line layout panel**.

On this panel, you can specify the format of the command line and scroll line as you want them to appear on the hardcopy of the tabular report. You must also define the command line and scroll line on the display panel of the tabular report.

See PANEL NAME in the field descriptions for the report format information panel (ERB3RD3).

You can also replace any Z placeholders for COMMAND or SCROLL on this panel.

Figure 7-13 is an example of report command line information panel ERB3RDA.

```
ERB3RDA                  RMF Report Format Definition

 Report Name: STORR                               Section 6: Command Line Layout

 Enter or change the following information.  To continue press ENTER.
 To quit enter CANCEL. To go backwards press END.

 You may intermix: text, variables, and variable placeholders (&Z).

 The following variables are available for use in the command line:
   &ZCMD          &AMT

 Enter or change the command line:

 COMMAND ===> &ZCMD                                            SCROLL ===> &AMT

 Specify a variable name in each of the entry fields to replace each Z above.

 Z1 ===>
 Z2 ===>
 Z3 ===>



 Command ===>
```

Figure 7-13. Report Command Line Information Panel (ERB3RDA)

Graphic Parameter Definition Panels (ERB3RDB, ERB3RDC, ER3RDD)

If you specified BOTH or GRAPHIC for report mode on ERB3RD3, RMF displays the first **graphic report parameter panel**, ERB3RDB.

On this panel, you can specify general information about the graphic version of the report.

Note: If you specified TABULAR for report mode on the report format information panel (ERB3RD1) or used DSINDEX or WFEX as a prototype, the report format definition utility displays panel ERB3RDF. This panel allows you to save your changes and view the tabular report you have created or cancel your changes. See "Saving or Cancelling Changes on Panel ERB3RDF" later in the chapter.

Figure 7-14 is an example of graphic parameter definition panel ERB3RDB that specifies general information for the graphic version of the resource-oriented storage (STORR) report:

```
ERB3RDB                 RMF Report Format Definition

 Report Name: STORR                      Section 7: Graphic Parameter Definition

 Enter the following information.  To continue press ENTER.
 To quit enter CANCEL. To go backwards press END.

                               GENERAL INFORMATION


 NAME FOR HELP PANEL ===> ERBGSRRO     Name of HELP PANEL, if any

 TITLE FOR Y-AXIS    ===> Average Number of Active Users

 MINIMUM AXIS RANGE  ===> 10           Axis will contain at least this
                                       number of data points
 SELECTION RULE      ===> 3            Specify 0, 1, 2 or 3




 Command ===>
```

Figure 7-14. Graphic Parameter Definition Panel (ERB3RDB)

The fields and their meanings follow:

NAME FOR HELP PANEL
Specifies the name of the help panel that you provide for the graphic report. The field is optional.

TITLE FOR Y-AXIS
Specifies a line of text (maximum of 50 characters) to appear as a label for the bar graph in the graphic version of the report. Sample lines that appear in the graphic parameter table (ERBPTGS3) are:

- Percentage of Each User's Time
- Percentage of the User's Time
- Average Number of Active Users

For an example of the graphic parameter table (ERBPTGS3), see Appendix B.

MINIMUM AXIS RANGE
Specifies the length of the bar graph depending on the text specified in TITLE FOR Y-AXIS as follows. For each line of text listed in the previous example, the minimum axis range is as follows:

- 100 for "Percent of Each User's Time"
- 100 for "Percent of the User's Time"
- 1 for "Average Number of Active Users"

If the length of the largest bar in the report exceeds the value, you specify, RMF uses the length of the largest bar.

For an example of the graphic parameter table (ERBPTGS3), see Appendix B.

SELECTION RULE
Specifies how the lines of the tabular report appear as bar graphs on the graphic version of the report. You can select one of the following values:

- 0 - One bar corresponds to one line of the RMF tabular report (for example, DELAYJ)
- 1 - One bar corresponds to one line of the RMF tabular report with sequence number 1 (for example, DEV, HSM, JES, STOR, PROC, DELAY, SYSINFO, and ENQ)
- 2 - One bar corresponds to the summary of logical lines of the report (for example, ENQR, DEVR reports)
- 3 - Two bar types can result from all logical lines of a logical block in the RMF tabular report (for example, STORR report) as follows:
  - Bar type 1 corresponds to a line of the tabular report with sequence number 1
  - bar type 2 corresponds to each additional line of the logical block for a tabular report with a sequence number greater than 1

For an example of the graphic parameter table (ERBPTGS3), see Appendix B. For a description of logical line number and sequence number, see the panel field description for ERB3RD3 (Figure 7-6).

Press ENTER to display the next panel, ERB3RDC, the second **graphic parameter definition panel**.

On this panel, you can specify labels for the graphic bars in the report. You can specify variable names for bar type 1 labels and bar type 2 labels.

Figure 7-15 is an example of the graphic parameter panel ERB3RDC.

```
ERB3RDC                  RMF Report Format Definition

 Report Name: STORR                        Section 7: Graphic Parameter Definition

 Enter the following information.  To continue press ENTER.
 To quit enter CANCEL. To go backwards press END.

                          LABEL INFORMATION FOR BAR TYPE I

 PRIMARY LABEL       ===> SRRVOLVC  Variable name containing label
 SECONDARY LABEL     ===> SRRDEVTY  Variable name containing label
 PRIMARY COMPOSITE   ===> -----     Prefix of label
 SECONDARY COMPOSITE ===> -----     Prefix of label

                         LABEL INFORMATION FOR BAR TYPE II

 PRIMARY LABEL       ===> SRRSPTVC  Variable name containing label
 SECONDARY LABEL     ===>           Variable name containing label
 PRIMARY COMPOSITE   ===>           Prefix of label
 SECONDARY COMPOSITE ===>           Prefix of label




 Command ===>
```

Figure 7-15. Graphic Parameter Definition Panel (ERB3RDC)

The panel fields and their meanings are as follows:

PRIMARY LABEL/SECONDARY LABEL

Specifies an 8 character variable name for a data value in the graphic version of the report. You can use the variable names that appear in the ISPF data table of the corresponding tabular report.

For example, in Figure 7-15, the primary label will appear as a volume serial number (SRRVOLVC) and the secondary label as the device type on the graphic version of the resource-oriented storage (STORR) report.

See Appendix B for examples of the graphic parameter table (ERBPTGS3) and the RMF report data tables.

PRIMARY COMPOSITE/SECONDARY COMPOSITE

Specifies up to 5 characters of text as a prefix to the variable label specified in PRIMARY/SECONDARY LABEL. In Figure 7-15, no composite labels appear in the resource-oriented storage (STORR) delay report. However, if you were modifying the single job delay report (DELAYJ), you might want to include composite labels. In that case, you can specify a prefix (like DMN for domain or PG for performance group) to appear in the graphic version of the report. The prefix is concatenated to the rightmost contents of the report table variable specified in PRIMARY/SECONDARY label.

See Appendix B for examples of the graphic parameter table (ERBPTGS3) and the RMF report data tables.

BAR TYPE refers to the number of bars used in the report depending on the logical line and sequence numbers. For the STORR report, BAR TYPE 1 corresponds to the volume serial and device type, which appear in the first logical line of a logical data group in the graphic report; BAR TYPE 2 corresponds to space type, which appears as the second physical line in the report related to that volume serial and device type.

See LOGICAL LINE/SEQUENCE NUMBER in the field descriptions for ERB3RD3 (Figure 7-6).

Press ENTER to display the next panel, ERB3RDD, the third **graphic parameter definition panel**.

On this panel, you can specify data columns that you want to appear in the graphic version of the report.

Figure 7-16 is an example of the graphic parameter panel ERB3RDD.

```
ERB3RDD                  RMF Report Format Definition

 Report Name: STORR                      Section 7: Graphic Parameter Definition

 Enter the following information. To continue press ENTER.
 To quit enter CANCEL. To go backwards press END.

                      COLUMN SPECIFICATION FOR GRAPHIC BAR TYPES

          NAME               LEGEND ID           TRANS ID            BAR TYPE ID

  1. ===> SRRA2VC        ===> 04             ===> 0              ===> 2
  2. ===> SRRA3VC        ===> 05             ===> 0              ===> 0
  3. ===> SRRA4VC        ===> 06             ===> 0              ===> 0
  4. ===> SRRAULOC       ===> 12             ===> 0              ===> 2
  5. ===> SRRAUSWP       ===> 16             ===> 0              ===> 2
  6. ===> SRRAUCOM       ===> 07             ===> 0              ===> 2
  7. ===> --------       ===> --             ===> -              ===> -
  8. ===> --------       ===> --             ===> -              ===> -
  9. ===> --------       ===> --             ===> -              ===> -
 10. ===> --------       ===> --             ===> -              ===> -

 Command ===>
```

Figure 7-16. RMF Graphic Parameter Definition Panel (ERB3RDD)

The panel fields and their meanings are as follows:

NAME
Specifies an 8 character variable name for a data value from the corresponding tabular report. This value will appear as a bar column in the graphic version of the report. The bar column can be a single bar (bar type 1) or a stacked bar (bar type 2) depending on what you specify for BARTYPE ID. See Appendix B for examples of RMF report data tables.

LEGEND ID
Specifies a number that corresponds to the color, pattern and the text of the graphic chart legend. Variables specified for NAME will appear in the color specified for LEGEND ID. You can specify a decimal value from 04 to 27; the numbers must match the color ID entries on the Color Graphic Option panels. (For an example of the Color Graphic Option panel, see Chapter 5. Figure 5-4 and Figure 5-5.

TRANS ID
Specifies a number that controls how the values for the variable in NAME are scaled on the bar graph in the graphic version of the report.

- 0 - value appears as is; no division is performed
- n - value is divided by 10^n where **n** equals an integer from 1 to 9.

For example, in Figure 7-16 a TRANS ID of 0 appears for the variable name SRRAULOC (average active users for LOCAL); each value for the variable will appear as is on the bar graph scale of the column in the graphic version of the report. If the value for SRRAULOC equals 100, it appears on the graph as 100.

A TRANS ID of 2 appears for the variable name SRRA2VC (percentage of device connect time); each value for that variable will appear at 1/100th of its value on the bar graph scale of the column or:

$value / 10^2$

If the value for SRRA2VC equals 100, it appears on the graph as 1.

See Appendix B for examples of RMF report data tables.

BARTYPE ID
Specifies a value that indicates where the data value for the variable in NAME appears for bar types in the graphic version of the report:

- 0 - indicates the value appears in both bar types
- 1 - indicates the value occurs in bar type 1
- 2 - indicates the value occurs in bar type 2

If you specified label information for only bar type 1 on the report parameter definition panel (ERB3RDC), you must specify bar type 1.

Saving or Cancelling Changes on Panel ERB3RDF

Once you have created or modified a report using the report format definition utility panels, RMF displays panel ERB3RDF, which allows you to confirm or cancel your changes.

Note: If you want to see the sample report, press ENTER. If you have defined the report correctly, you will see the sample report. To view the report you must press enter before you save it. Press END to return to ERB3RDF.

Enter SAVE to save the report or CANCEL to cancel your changes and return to the report definition initialization panel (ERB3RD1). If you save the report, RMF redisplays panel ERB3RD1 with a message that tells you the report has been modified or created. To exit the sample report panel and return to panel ERB3RDF, press END.

Deleting a User-Defined Report

If you specify DELETE for a report on the report format definition panel, RMF displays panel ERB3RDE. To confirm the deletion of the report, press ENTER and the report is deleted. To cancel the deletion, type CANCEL and press ENTER. RMF returns you to ERB3RD1.

Note:

You can only delete a user-defined report. RMF does not allow you to delete an existing RMF report.

Ending the Report Utility

You can end the report format definition utility session by pressing END (PF3) on the report format definition panel (ERB3RD1) or by specifying CANCEL on any panel.

Special Considerations for Modifying Reports

If you want to add or delete lines in an existing RMF report or sort lines of a report without modifying the report heading, consider the following when you use the report format definition utility:

- Each RMF report data table (PHDRTAB1 in the phase driver table) contains the ISPF key type variables for the logical line number and line sequence number for the report. Each data table lists the logical lines and the sequence number(s) for logical lines of data in the report in ascending order. Sequence numbers for each logical line begin with 1. When you add, delete, or sort lines of an RMF report, be sure that the output table of your report (PHASE 1 or 2 TABLE on phase driver information panel ERB3RD2) arranges logical line and sequence numbers in ascending order.
- If you delete a line of a report with sequence number 1, you must also delete the logical line number of the report from the data table.
- If you want to rearrange the lines of an RMF report, you can use the ISPF service TBSORT as part of the CLIST you specify for phase 2. You can specify the CLIST with TBSORT on the phase driver information panel (ERB3RD2) as follows:

  ```
  CMD(mysort)
  ```

  where "mysort" is the name of your CLIST.

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Installing Your Own Phases

When you select a report during a reporter session, RMF uses ISPF SELECT services to generate report data tables and display the reports. You can supply your own routines for any of the 4 phases to produce user-defined reports. (See "Data Reporter" earlier in this chapter for a description of the phases RMF invokes.)

Phase 1

If you want to use your own program for phase 1, you must ensure that the ISPF shared pool variable PHDRPH1 contains the name of your program or CLIST. This variable appears in the phase driver table (ERBPHDS3) as an ISPF SELECT string. For RMF reports, the PARM value of the string matches the name of the RMF report command. You can use the report definition format utility to specify your own PHASE 1 SELECT STRING. For an example of the phase driver table (ERBPHDS3) entries and how they are specified, see Appendix B.

The following ISPF shared variables contain information that RMF uses to generate a report during phase 1:

ERBREPC The ISPF shared pool variable that contains the current command or report selection. RMF uses this variable as a key to ERBPHDT3, the phase driver table. This table has an entry (in the table field PHREPNA) for each RMF command or report selection. RMF retrieves the necessary information to generate the report during phase 1 from ERBPHDT3 (a copy of ERBPHDS3).

ERBCMDC,ERBPARC
The ISPF shared pool variables that contain the current command (ERBCMDC) and any command parameters (ERBPARC).

ERBSSHG3 The ISPF shared pool variable that contains the address of the set-of-samples header (SSHG3). This control block contains the addresses of the sample data that correspond to the time and range values specified during the Monitor III data gatherer session. (See Figure 7-2 for an example of ERBSSHG3.)

ERBSUPP The ISPF shared pool variable that contains the number of the subpool that non RMF functions must use for GETMAINS.

During phase 1, the phase driver module (ERB3RPH1) uses the information in the report row entry of ISPF table ERBPHDT3 (a copy of ERBPHDS3) to produce the RMF report. If you supplied your own program or CLIST for phase 1, that routine gets control.

Upon completion, phase 1 must provide the following output:

ERBREPC The ISPF shared pool variable that should be restored to its value at entry to phase 1.

PHDRET1 The ISPF shared pool variable that should contain your return code from the program or CLIST used in phase 1.

For RMF supplied reports, ERB3RPH1 creates the report in phase 1 and returns one of the following return codes:

- 0 - ISPF table successfully generated for the report
- 4 - ISPF table generated for the report has some data, but errors have occurred
- 8 - ISPF table generated for the report has no data, and an error has occurred

For your own routine, you might want to use the same return codes.

PHDRTAB1 The ISPF shared pool variable that contains the name of the ISPF data table generated in phase 1. If you omit phase 2, you must ensure that PHDRTAB2 contains the same name as PHDRTAB1. See phases 2 and 3 described later.

You can define your own ISPF shared pool variables to contain information that you want to include for phase 1. To ensure that no interference with RMF created variables occurs, the first three characters of user-defined variables should appear as follows:

USR

Phase 2

For phase 2, you supply a program or CLIST to modify the ISPF table created for the report in phase 1.

The following ISPF shared variables contain information for phase 2:

ERBREPC The ISPF shared pool variable that should contain the current command or report selection.

ERBCMDC,ERBPARC
The ISPF shared pool variables that should contain the current command (ERBCMDC) and any command parameters (ERBPARC).

PHDRET1 The ISPF shared pool variable that should contain your return code from the program or CLIST used in phase 1.

For RMF supplied reports, ERB3RPH1 creates the report in phase 1 and returns one of the following return codes:

- 0 - ISPF table successfully generated for the report
- 4 - ISPF table generated for the report has some data, but errors have occurred
- 8 - ISPF table generated for the report has no data, and an error has occurred

For your own routine, you might want to use the same return codes.

PHDRTAB1 The ISPF shared pool variable that contains the name of the ISPF data table generated in phase 1.

Upon completion, phase 2 must provide the following output:

ERBREPC The ISPF shared pool variable that should be restored to its value at entry to phase 1.

PHDRET2 The ISPF shared pool variable that should contain the return codes from the RMF program or CLIST used to create the report in phase 2.

PHDRTAB2 The ISPF shared pool variable that should contain the name of the ISPF data table generated in phase 2. You can use the same table name as for PHDRTAB1.

Phase 3

For phase 3, RMF formats the ISPF table generated in phase 1 or 2 and displays the report. To format the ISPF report data tables, RMF uses the tabular report format table (ERBFMTS3), the RMF header table (ERBHDRS3), and the graphic parameter table (ERBPTGS3). The RMF display phase module (ERB3RDSP) displays the report by means of the ISPF TBDISPL service.

The following ISPF shared variables contain information that you can use to format and display a report during phase 3:

ERBREPC The ISPF shared pool variable that contains the current command or report selection. The variable is a key to obtain formatting information for the tabular report in the report format table (ERBFMTS3) or the graphic report in the graphic parameter table (ERBPTGS3). For examples of these tables, see Appendix B.

ERBCMDC,ERBPARC
The ISPF shared pool variables that contain the current command (ERBCMDC) and any command parameters (ERBPARC).

PHDRET1,PHDRET2
The ISPF shared pool variables that should contain return codes from phase 1 and 2.

PHDRTAB2 The ISPF shared pool variable that should contain the name of the ISPF data table generated in phase 1 and/or phase 2.

SESRPFU3 The ISPF shared pool variable that contains the report mode (TABULAR or GRAPHIC).

ERBDATE,ERBTIME
The ISPF shared pool variables that contain the beginning and end time of the display data.

ERBRANGE The ISPF shared pool variable that contains the range time of the display data.

ERBSID The ISPF shared pool variable that contains the id of the system on which the data was collected.

ERBSAMPL The ISPF shared pool variable that contains the number of data samples for the time range.

RMF uses module ERB3RDSP to display the reports. The module dynamically constructs a panel from information in the format tables. It builds header and model lines and constructs the graphic area within the panel and uses the ISPF data table whose name appears in the ISPF shared pool variable PHDRTAB2.

Upon completion phase 3 must provide the following output:

ERBREPC The ISPF shared pool variable that should be restored to its value at entry to phase 1.

PHDRET3 The ISPF shared pool variable that should contain the return code from the program or CLIST used to format and display the report.

If you decide to replace the RMF module ERB3RDSP with your own routine, you must consider the following:

- To obtain a display of your reports in GO mode, you must invoke the ISPF service CONTROL LOCK before the ISPF service TBDISPL is performed.
- Your module must handle all ISPF PASSTHRU commands.

Phase 4

For phase 4, you provide a program that can perform cleanup services for resources you might have used during previous phases. For example, if you have used ISPF TBCREATE with the WRITE SHARE option to create an ISPF table, you can use ISPF TBEND to delete the table during phase 4. Or use TBEND to save and then delete the table. See the ISPF publications that describe these services for more information.

The following ISPF shared variables contain information that you can use to format and display a report during phase 4:

ERBREPC The ISPF shared pool variable that contains the current command or report selection.

ERBCMDC,ERBPARC
The ISPF shared pool variables that contain the current command (ERBCMDC) and any command parameters (ERBPARC).

ERBSUPP The ISPF shared pool variable that contains the number of the subpool used for GETMAINS.

PHDRET1,PHDRET2,PHDRET3
The ISPF shared pool variables that should contain return codes from phase 1, 2, and 3.

Upon completion, phase 4 must provide the following output:

ERBREPC The ISPF shared pool variable that should be restored to its value at entry to phase 1.
PHDRET4 The ISPF shared pool variables that should contain return codes from phase 4.

Examples Using the Report Format Definition Utility Panels

Two examples that show typical tasks you can perform using the report format definition utility follow. In example 1, you **create** a new report for a single job based on the resource oriented device delay (DEVR) report. In example 2, you **modify** that report to include information taken from the single-job processor delay (PROCJ) and single-job storage delay (STORJ) reports.

Each example includes an overview of the report generation phases that RMF uses to build, modify, and display the reports, and the report format definition panels you can use to enter the changes.

Appendix C lists all the sample CLISTs and panel code changes you need to make for each example.

Example 1 - Creating a Report

This example shows how you can create your own single-job device usage report (MYDEVJ) based on information from the RMF resource-oriented device delay (DEVR) report.

In order to produce your report, you can create a CLIST that RMF will use during phase 2 of the 4 report generation phases. You specify this CLIST as input on report format definition panel ERBRD2 and modify the report headings, subheadings, and graphic version of your report on the other utility panels.

When you invoke your report, RMF uses CLIST MYDEVJ during phase 2 to extract the information about a single job from the DEVR ISPF data table for DEVR created during phase 1. Figure C-4 in Appendix C shows you CLIST MYDEVJ.

Before you use the panels to create your report, do the following:

1. Copy CLIST MYDEVJ as a member into your private CLIST Library.
2. Modify the panel code for the primary menu (ERB3PRM) to include your report (MYDEVJ) as a selection. Figure C-1 in Appendix C shows the modified panel code that allows RMF to display MYDEVJ when you select DEVJ (selection 14) on the primary menu. Note that as a result of these modifications, RMF will no longer display the standard DEVJ report.
3. Create a panel USR3CMN using the RMF supplied panel ERB3CMN as a skeleton. This panel contains the panel code necessary to display the tabular version of MYDEVJ. The heading and subheading modifications you will make on the utility panels must be recorded in the panel code for USR3CMN.

   Figure C-2 on page C-7 in Appendix C shows ERB3CMN with the changes you need to make.

Next, you can modify the report format definition utility panels to generate the phases RMF requires to produce the tabular and graphic versions of your report. "Panel Sequence for Example 1" shows you which panels you need to modify.

Overview of the RMF report generation for example 1: The following summarizes each of the phases RMF uses to produce your report when you invoke MYDEVJ as a selection on the primary menu or as a report command:

- Phase 1 - RMF invokes ERB3RPH1, the standard RMF report builder, to build the ISPF data table for DEVR (ERBDVRT3).
- Phase 2 - RMF invokes CLIST MYDEVJ. MYDEVJ obtains the necessary information for the job from the DEVR ISPF data table (ERBDVRT3) created in phase 1. (The CLIST searches the table for information relating to the specified jobname and obtains the jobname from the ISPF shared pool variable ERBPARC, if the jobname is provided as a parameter on the command. If ERBPARC is blank, the CLIST obtains the jobname specified on the report option panel for DEVJ. In the CLIST, the jobname is stored in ISPF shared pool variable USR7. For more information about ISPF shared pool variables, see "Installing Your Own Phases" described earlier in this chapter.)

  The CLIST then builds an ISPF table (USRDVRT3) with the jobname information about device delay (VOLSER, USING percentage, and DELAY percentage for the job). Note that ISPF table USRDVRT3 must remain open at the exit of CLIST MYDEVJ.
- Phase 3 - RMF invokes ERB3RDPH, the standard module to display the new report MYDEVJ.

In this example, RMF does not use phase 4, the clean-up phase. When an RMF session ends, the output table USRDVTR3 that contains the report data is deleted.

Panel Sequence for Example 1 - Creating a New Report

Invoke the report format definition utility:

```
===> ERBRMFU
```

```
ERB3RD1                  RMF Report Format Definition

Enter the following information.  To continue press ENTER.
To exit enter CANCEL or press the END key.


ACTION          ===> CREATE         MODIFY, CREATE or DELETE


REPORT NAME     ===> MYDEVJ         Name of report


PROTOTYPE NAME  ===> DEVJ           Name of existing report to be
                                    used as a prototype (optional)









Command ===>
```

Specify the name of the new report (MYDEVJ) and the action (CREATE). The prototype is the DEVJ report.

Press ENTER to continue.

```
ERB3RD2                RMF Report Format Definition

Report Name: MYDEVJ                          Section 1: Phase Driver Information

Enter the following information.  To continue press ENTER.
To quit enter CANCEL. To go backwards press END.

Select Strings format is:PGM(nnnnnnnn) PARM(mmm) or CMD(nnnnnnnn mmm)

SELECTION CHARACTERS  ===> 14        Selection on Primary Option Panel

PHASE 1 SELECT STRING ===> PGM(ERB3RPH1) PARM(DEVR)
        TABLE  NAME   ===> ERBDVRT3   Name of reporter phase 1 result table

PHASE 2 SELECT STRING ===> CMD(MYDEVJ)

        TABLE  NAME   ===> USRDVRT3   Optional name of phase 2 result table

PHASE 3 SELECT STRING ===> PGM(ERB3RDSP)

PHASE 4 SELECT STRING ===>


Command ===>
```

On ERB3RD2, specify 14 for SELECTION CHARACTERS. Because you have changed the panel code on ERB3PRM (primary menu), when you invoke the single-job device delay (DEVJ) report on the primary menu (selection 14), RMF will display your new report (MYDEVJ) instead of the RMF standard DEVJ report.

Specify the standard RMF program (ERB3RPH1) with the parameter DEVR to build the prototype ISPF DEVR data table for your report during phase 1. For phase 1, specify ERBDVRT3, the standard ISPF DEVR output data table. CLIST MYDEVJ will use this table as input during phase 2.

Specify CMD (MYDEVJ) that obtains the information about the job from ERBDVRT3 during phase 2. For phase 2, specify USRDVRT3, the ISPF output data table for the new report.

Specify the standard RMF program (ERB3RDSP) that displays the new MYDEVJ report during phase 3. In this example, phase 4 is blank.

Press enter for the next panel.

```
ERB3RD3                   RMF Report Format Definition

Report Name: MYDEVJ                           Section 2: Report Format Information

Enter the following information.  To continue press ENTER.
To quit enter CANCEL. To go backwards press END.


REPORT MODE          ===> BOTH         TABULAR, GRAPHIC or BOTH


PANEL NAME           ===> USR3CMN      Name of tabular report panel


HELP PANEL NAME      ===>              Name of HELP panel


LOGICAL LINE NUMBER  ===> USR1         Name of table variable
SEQUENCE NUMBER      ===> USR2         Name of table variable





Command ===>
```

On ERB3RD3, specify that you want to create both the tabular and graphic version of MYDEVJ.

Specify the name of your panel (USR3CMN) that will handle the display of the tabular version of the report. Be sure you have defined the five subheader lines used in the new report on USR3CMN (See Figure C-2 in Appendix C.).

Specify USR1 for LOGICAL LINE NUMBER and USR2 for SEQUENCE NUMBER. (For MYDEVJ report, the logical line and sequence number equal 1.)

Press ENTER for the next panel.

```
ERB3RD4                 RMF Report Format Definition

Report Name: MYDEVJ                            Section 3: Report Header Layout

Enter or change the report header lines.  To continue press ENTER.
To quit enter CANCEL. To go backwards press END.

You may intermix: text, variables, and variable placeholders (&Z).
If you specify variable placeholders (&Z) the next panel will ask you
to specify the variable name that is to replace each &Z.

The following variables are available for use in the header:
  &ERBSID     &ERBHCTXT
  &ERBSAMPL   &ERBDATE
  &ERBTIME    &ERBRANGE

Enter or change up to two report heading lines:

                        MY Device Usage Report-- &Z
&ERBHCTXT     Samples: &Z      Time: &ERBDATE at &ERBTIME   Range + &Z     Sec



Command ===>
```

On ERB3RD4, specify for the first report heading line "My Device Usage Report". The variables and the second heading line of the DEVR prototype report remain the same.

Because you do not need to change the heading variables in this example, continue to press enter until you obtain ERB3RD6, the report subheader layout panel.

```
ERB3RD5                  RMF Report Format Definition

Report Name: MYDEVJ                                 Section 3: Report Header Layout

The following report header lines have been specified:
                         MY Device Usage Report-- Z1
&ERBHCTXT     Samples: Z2       Time: &ERBDATE at &ERBTIME   Range + Z3     Sec

Specify the placeholder (Z) number next to the variable name to replace each Z
above.To continue press ENTER.To go backwards press END.To quit enter CANCEL.


     &ERBSID   ===> 1            &ERBHCTXT ===> --            &ERBSAMPL ===> 2
     &ERBDATE  ===> --           &ERBTIME  ===> --            &ERBRANGE ===> 3
===> --------- ===> --      ===> --------- ===> --       ===> --------- ===> --
===> --------- ===> --      ===> --------- ===> --       ===> --------- ===> --







Command ===>
```

Press enter.

```
ERB3RD6                 RMF Report Format Definition

Report Name: MYDEVJ                          Section 4: Report Subheader Layout

Enter or change the report subheader lines.  To continue press ENTER.
To quit enter CANCEL. To go backwards press END.

You may intermix: text, variables, and variable placeholders (&Z).
If you specify variable placeholders (&Z) the next panel will ask you
to specify the variable name that is to replace each &Z.

The following variables are available for use in the subheader:


Enter or change up to five report subheading lines:
***********************************************************************
*                                                                     *
*                   Jobname: &USR7                                    *
*                                                                     *
*                                                                     *
***********************************************************************



Command ===>
```

On ERB3RD6, specify the subheading lines for the new report. Note that CLIST MYDEVJ places the selected jobname in the ISPF shared pool user variable USR7, defined in the CLIST.

Because you do not need to change the variables for the subheading lines, continue to press enter until you obtain ERB3RD8, the report column layout panel.

```
ERB3RD7                  RMF Report Format Definition

Report Name: MYDEVJ                               Section 4: Report Subheader Layout

The following report subheader lines have been specified:
******************************************************************************
*                                                                            *
*                  Jobname: &USR7                                            *
*                                                                            *
******************************************************************************

Specify the placeholder (Z) number next to the variable name to replace each Z
above. To continue press ENTER. To go backwards press END.To quit enter CANCEL.

===> _________ ===> __     ===> _________ ===> __     ===> _________ ===> __
===> _________ ===> __     ===> _________ ===> __     ===> _________ ===> __
===> _________ ===> __     ===> _________ ===> __     ===> _________ ===> __
===> _________ ===> __     ===> _________ ===> __     ===> _________ ===> __
===> _________ ===> __     ===> _________ ===> __     ===> _________ ===> __
===> _________ ===> __     ===> _________ ===> __     ===> _________ ===> __
===> _________ ===> __     ===> _________ ===> __     ===> _________ ===> __
===> _________ ===> __     ===> _________ ===> __     ===> _________ ===> __


Command ===>
```

Press ENTER.


```
ERB3RD8                RMF Report Format Definition                Line 1 of 1

Report Name: MYDEVJ                               Section 5: Report Column Layout

Enter or change the following information. To continue press ENTER.
To quit enter CANCEL. To go backwards press END.

DATA ATTRIBUTE CHARACTERS ===> -?|    Define meaning in attribute section
                                      of associated table display (USR3CMN).

Enter or change up to three column header lines:
             USG  DLY
VOLSER        %    %
-------------------------------------------------------------------------------

Enter or change up to three model lines:
?Z           ?Z   ?Z
-------------------------------------------------------------------------------
-------------------------------------------------------------------------------

The following variables are available for use in the model lines:


Command ===>                                                      Scroll ===> PAGE
```

On ERB3RD8, specify three column heading lines (VOLSER, USG%, and DLY %) for the new report.

Specify the three placeholder variables (?Z) for each new column heading. You can define these placeholder variables on the next panel.

Press ENTER for the next panel.

```
ERB3RD9                 RMF Report Format Definition                Line 1 of 6

Report Name: MYDEVJ                                Section 5: Report Column Layout

The following report column header and model lines have been specified:
             USG  DLY
VOLSER        %    %

Z1           Z2   Z3



Specify the placeholder (Z) number next to the variable name to replace each Z
above. To continue press ENTER. To go backwards press END.To quit enter CANCEL.

     USR3     ===> 1          USR4     ===> 2          USR5     ===> 3
===> -------- ===> --     ===> -------- ===> --     ===> -------- ===> --
===> -------- ===> --     ===> -------- ===> --     ===> -------- ===> --
===> -------- ===> --     ===> -------- ===> --     ===> -------- ===> --
===> -------- ===> --     ===> -------- ===> --     ===> -------- ===> --
===> -------- ===> --     ===> -------- ===> --     ===> -------- ===> --


Command ===>                                                  Scroll ===> PAGE
```

On ERB3RD9, erase the variables that appear on the panel for DEVJ. Specify the user-defined variables (USR3, USR4, and USR5) defined in CLIST MYDEVJ. (These user variables appeared as placeholders on the previous panel.) Note that CLIST MYDEVJ creates the ISPF table using these variable names as entries.

Because you do not need to change the command line layout, continue to press enter until you obtain ERB3RDB.

```
ERB3RDA                    RMF Report Format Definition

Report Name: MYDEVJ                                  Section 6: Command Line Layout


Enter or change the following information.  To continue press ENTER.
To quit enter CANCEL. To go backwards press END.

You may intermix: text, variables, and variable placeholders (&Z).

The following variables are available for use in the command line:
  &ZCMD          &AMT

Enter or change the command line:

COMMAND ===> &ZCMD                                         SCROLL ===> &AMT

Specify a variable name in each of the entry fields to replace each Z above.

Z1 ===>
Z2 ===>
Z3 ===>


Command ====>
```

Press enter.

```
ERB3RDB                 RMF Report Format Definition

Report Name: MYDEVJ                     Section 7: Graphic Parameter Definition

Enter the following information.  To continue press ENTER.
To quit enter CANCEL. To go backwards press END.


                              GENERAL INFORMATION


NAME FOR HELP PANEL ===> --------      Name of HELP PANEL, if any

TITLE FOR Y-AXIS    ===> Percent of the User's Time

MINIMUM AXIS RANGE  ===> 100           Axis will contain at least this
                                       number of data points
SELECTION RULE      ===> 0             Specify 0, 1, 2 or 3



Command ===>
```

The next three panels let you specify the layout of the graphic version of MYDEVJ. On ERB3RDB, erase the default help panel name. Specify 0 for SELECTION RULE; on the graphic version of your report, one data row will appear as a single bar. The other fields remain as they already appear on the panel.

Press ENTER for the next panel.


```
ERB3RDC                  RMF Report Format Definition

Report Name: MYDEVJ                        Section 7: Graphic Parameter Definition

Enter the following information.  To continue press ENTER.
To quit enter CANCEL. To go backwards press END.


                         LABEL INFORMATION FOR BAR TYPE I

PRIMARY LABEL       ===> USR3      Variable name containing label
SECONDARY LABEL     ===> --------  Variable name containing label
PRIMARY COMPOSITE   ===> -----     Prefix of label
SECONDARY COMPOSITE ===> -----     Prefix of label

                        LABEL INFORMATION FOR BAR TYPE II

PRIMARY LABEL       ===> --------  Variable name containing label
SECONDARY LABEL     ===> --------  Variable name containing label
PRIMARY COMPOSITE   ===> -----     Prefix of label
SECONDARY COMPOSITE ===> -----     Prefix of label



Command ===>
```

On ERB3RDC, change the primary label variable for the first bar type (your graphic MYDEVJ report contains only one bar type) to USR3 (defined as VOLSER).

Press ENTER for the next panel.

```
ERB3RDD                 RMF Report Format Definition

Report Name: MYDEVJ                     Section 7: Graphic Parameter Definition

Enter the following information. To continue press ENTER.
To quit enter CANCEL. To go backwards press END.


                  COLUMN SPECIFICATION FOR GRAPHIC BAR TYPES

         NAME              LEGEND ID          TRANS ID           BAR TYPE ID

 1. ===> USR4          ===> 18            ===> 0             ===> 1
 2. ===> USR5          ===> 08            ===> 0             ===> 1
 3. ===> --------      ===> --            ===> -             ===> -
 4. ===> --------      ===> --            ===> -             ===> -
 5. ===> --------      ===> --            ===> -             ===> -
 6. ===> --------      ===> --            ===> -             ===> -
 7. ===> --------      ===> --            ===> -             ===> -
 8. ===> --------      ===> --            ===> -             ===> -
 9. ===> --------      ===> --            ===> -             ===> -
10. ===> --------      ===> --            ===> -             ===> -


Command ===>
```

On ERB3RDD, specify for USR4 (USING %) and USR5 (DLY %) BAR TYPE 1; in the graphic report, these values are stacked together in one bar. LEGEND ID remains the same as in the DEVJ report. Note that the color graphic option panel shows the available LEGEND IDs you can use to specify the color and pattern of the bar type. See the color graphic option panels (Figure 5-4 and Figure 5-5) in Chapter 5.

Press ENTER for the next panel.

```
ERB3RDF                  RMF Report Format Definition

This is a confirmation/cancellation panel for report: MYDEVJ


The following commands are allowed:

       Type  SAVE   command to save report
       Type  CANCEL command to cancel processing
       Press END    key to go one step backwards
       Type  ENTER  key to see the sample report



Command ===>
```

On ERB3RDF, press ENTER to see the sample report. Then press END to return to ERB3RDF and enter SAVE on that panel:

```
ERB3RDF                  RMF Report Format Definition

This is a confirmation/cancellation panel for report: MYDEVJ


The following commands are allowed:

       Type  SAVE   command to save report
       Type  CANCEL command to cancel processing
       Press END    key to go one step backwards
       Type  ENTER  key to see the sample report



Command ===> SAVE
```

RMF saves the new MYDEVJ report and issues a message on panel ERB3RD1 to indicate that it has updated the ISPF tables for the report. (RMF has saved the three tables for MYDEVJ, ERBPHDS3, ERBFMTS3, and ERBPTGS3 on the ISPF user output library; the ERBRMFU3 CLIST has allocated the storage for the tables.)

```
ERB3RD1                  RMF Report Format Definition

Enter the following information.  To continue press ENTER.
To exit enter CANCEL or press the END key.


ACTION          ===> CREATE         MODIFY, CREATE or DELETE


REPORT NAME     ===>                Name of report


PROTOTYPE NAME  ===> DEVJ           Name of existing report to be
                                    used as a prototype (optional)










Report MYDEVJ added to the tables.
Command ===>
```

Press END to exit the report format definition utility.

When you start an RMF session, you can invoke MDEVJ by selecting 14 on the primary menu or by specifying the following command:

```
DEVJ jobname
```

where jobname is the name of the job for which you want to investigate device activity.

The following is a sample of the new MYDEVJ report. It displays the job SWE$FM specified on the job selection report option for the single-job device delay (DEVJ) report:

```
USR3CMN                 MY Device Usage Report-- AKX4              Line 1 of 6

               Samples:    100   Time: 12/11/86 at 15.28.20   Range +    100 Sec

*******************************************************************************
*                                                                             *
*                   Jobname: SWE$FM                                           *
*                                                                             *
*******************************************************************************

              USG  DLY
VOLSER         %    %

MS8WK3        42   26
MS8WK5         2    2
US8011         1    0
US8002         1    0
US8009         1    0
MS8S27         1    0


Command ===>                                                 Scroll ===> HALF
```

Example 2 - Modifying a Report

This example shows how you can modify the single-job device usage report (MYDEVJ) from example 1 to include information from the resource-oriented device delay (DEVR), the single-job processor delay (PROCJ), and single-job storage (STORJ) delay reports. Your report will include device activity information about a single job and contain headings and information for TCB + SRB taken from the PROCJ report and average active frames taken from the STORJ report.

To modify MYDEVJ, you can create two CLISTs that RMF uses during 2 of the 4 report generation phases. When you invoke your modified report, RMF uses the CLISTs to create ISPF data tables for DEVR, PROCJ, and STORJ during phase 1, extract the information about a single job from these report tables, and combine the information into the modified MYDEVJ report during phase 2.

To build the ISPF tables for DEVR, PROCJ, and STORJ during phase 1, you can use sample CLIST MYDEVJ1. (Figure C-5 on page C-16 in Appendix C shows you CLIST MJDEVJ1.) To extract the necessary information about the job from DEVR, PROCJ and STORJ during phase 2, you can use CLIST MYDEVJ2. (Figure C-3 in Appendix C shows you CLIST MYDEVJ2.)

Before you use the panels to create the modified report, copy CLIST MYDEVJ1 and MYDEVJ2 as members into your CLIST Library. (You have already modified the primary menu to invoke MYDEVJ. As a result, you do not need to make any changes to it for this example; however, when you invoke your report, RMF will no longer display the MYDEVJ report you created in example 1.)

Next, you can modify the report format definition utility panels to generate the phases RMF requires to produce your modified report. "Panel Sequence for Example 2" shows you which panels you need to modify.

Overview of the RMF report generation for example 2: The following summarizes each of the phases RMF uses to produce your report when you invoke your modified MYDEVJ report:

- Phase 1 - RMF invokes CLIST MYDEVJ1. MYDEVJ1 invokes ERB3RPH1, the standard RMF report builder, to build ISPF data tables for DEVR (ERBDVRT3), PROCJ (ERBPRJT3), and STORJ (ERBSRJT3).
- Phase 2 - RMF invokes CLIST MYDEVJ2. MYDEVJ2 obtains the necessary information for the job from the ISPF data tables (ERBDVRT3, ERBPRJT3, ERBSRJT3) and builds the new report MYDEVJ in ISPF table USRDVTR3. As in example 1, the CLIST obtains the jobname from ERBPARC if a jobname is specified on the DEVJ command or from the report option selection panel for DEVJ.
- Phase 3 - RMF invokes ERB3RDPH, the standard module to display the modified MYDEVJ report.

In this example, RMF does not use phase 4, the clean-up phase. When an RMF session ends, the output table USRDVTR3 that contains the report data is deleted.

Panel Sequence for Example 2 - Modifying an Existing Report

Invoke the report format definition utility:

```
===> ERBRMFU
```

Note: If you want the panel id to appear on each panel, issue PANELID.

```
ERB3RD1                    RMF Report Format Definition

Enter the following information.  To continue press ENTER.
To exit enter CANCEL or press the END key.


ACTION          ===> MODIFY          MODIFY, CREATE or DELETE


REPORT NAME     ===> MYDEVJ          Name of report


PROTOTYPE NAME  ===>                 Name of existing report to be
                                     used as a prototype (optional)









Command ===> PANELID
```

On ERB3RD1, specify that you want to modify the report MYDEVJ created in example 1.

Press enter for the next panel.


```
ERB3RD2                  RMF Report Format Definition

Report Name: MYDEVJ                          Section 1: Phase Driver Information

Enter the following information.  To continue press ENTER.
To quit enter CANCEL. To go backwards press END.

Select Strings format is:PGM(nnnnnnnn) PARM(mmm) or CMD(nnnnnnnn mmm)

SELECTION CHARACTERS  ===> 14          Selection on Primary Option Panel

PHASE 1 SELECT STRING ===> CMD(MYDEVJ1)
        TABLE  NAME   ===> ERBDVRT3   Name of reporter phase 1 result table

PHASE 2 SELECT STRING ===> CMD(MYDEVJ2)
        TABLE  NAME   ===> USRDVRT3   Optional name of phase 2 result table

PHASE 3 SELECT STRING ===> PGM(ERB3RDSP)

PHASE 4 SELECT STRING ===>



Command ===>
```

On ERB3RD2, specify 14 for SELECTION CHARACTERS. When you invoke MYDEVJ as a selection on the primary menu, RMF displays the modified report. You do not need to change the panel code for ERB3PRM; however, when you select DEVJ on the primary menu, RMF no longer displays the report MYDEVJ that you created for example 1.

Specify CMD(MYDEVJ1), the CLIST that builds ISPF data tables for DEVR, PROCJ, and STORJ during phase 1. Specify ERBDVRT3, the DEVR output table for phase 1. The CLIST will put the information from the three ISPF tables into it. CLIST MYDEVJ2 will use this table as input during phase 2.

Specify CMD(MYDEVJ2), the CLIST that extracts information about the specified job from DEVR, PROCJ, and STORJ in ERBDVRT3 and builds the modified MYDEVJ report during phase 2. Specify USRDVRT3, the modified MYDEVJ output table for phase 2.

Specify the standard RMF module (ERB3RDSP) that displays the modified MYDEVJ report. In this example, phase 4 is blank.

Because you are modifying an existing report, you do not need to change the report format information panel (ERB3RD3) or header information panels (ERB3RD4 and ERB3RD5). Continue to press ENTER until you obtain ERB3RD6, which allows you to modify report subheader lines.


```
ERB3RD6                 RMF Report Format Definition

Report Name: MYDEVJ                           Section 4: Report Subheader Layout

Enter or change the report subheader lines.  To continue press ENTER.
To quit enter CANCEL. To go backwards press END.

You may intermix: text, variables, and variable placeholders (&Z).
If you specify variable placeholders (&Z) the next panel will ask you
to specify the variable name that is to replace each &Z.

The following variables are available for use in the subheader:




Enter or change up to five report subheading lines:
*******************************************************************************
* Jobname: &USR7                                                              *
*                TCB+SRB Time   : &USR6                                       *
*                Avg Actv Frames: &USR8                                       *
*                                                                             *
*************************************************************************** ***

Command ===>
```

On ERB3RD6, specify for the first subheader line "Jobname: &USR7". Specify for the second subheader line "TCB+SRB Time" with the variable &USR6 (taken from the PROCJ report) and the for the third subheader line "Avg Actv Frames" with the variable &USR8 (taken from the STORJ report).

These variables are defined in CLIST MYDEVJ2.

Because you are modifying an existing report, you do not need to change panels ERB3RD7, ERB3RD8, ERB3RD9, ERB3RDA, ERB3RDB, ERB3RDC, or ERB3RDD. Continue to press ENTER until you obtain panel ERB3RDF

On ERB3RDF, press ENTER to see the sample report. Then press END to return to ERB3RDF and enter SAVE on that panel:

```
ERB3RDF                    RMF Report Format Definition

This is a confirmation/cancellation panel for report: MYDEVJ


The following commands are allowed:

       Type  SAVE   command to save report

       Type  CANCEL command to cancel processing

       Press END    key to go one step backwards

       Press ENTER  key to see the sample report



Command ===> SAVE
```


RMF saves the modified MYDEVJ report and issues a message on ERB3RD1 to indicate that it has modified the report.

```
ERB3RD1                  RMF Report Format Definition

Enter the following information.  To continue press ENTER.
To exit enter CANCEL or press the END key.


ACTION          ===> CREATE         MODIFY, CREATE or DELETE


REPORT NAME     ===>                Name of report


PROTOTYPE NAME  ===> DEVJ           Name of existing report to be
                                    used as a prototype (optional)








Command ===> Report MYDEVJ has been modified.
```

Press END to exit the report format definition utility.

When you start an RMF session, you can invoke the modified MDEVJ by selecting 14 on the primary menu or by specifying the following command:

```
DEVJ jobname
```

where jobname is the name of the job for which you want to investigate device activity.

The following is a sample of the modified MYDEVJ report. It displays the job MAL specified on the job selection report option for the single-job device delay (DEVJ) report:

```
USR3CMN                 MY Device Usage Report-- AKX4               Line 1 of 6

              Samples:    100   Time: 12/11/86 at 15.28.20   Range +    100 Sec

*******************************************************************************
* Jobname: MAL                                                                *
*                TCB+SRB Time    : 1.3                                        *
*                Avg Actv Frames: 19                                          *
*                                                                             *
*******************************************************************************

             USG  DLY
VOLSER        %    %

MS8WK3       42   26
MS8WK5        2    2
US8011        1    0
US8002        1    0
US8009        1    0
MS8S27        1    0


Command ===>                                                   Scroll ===> HALF
```

TSO Terminal User Authorization

All the data collected and reported by RMF during a Monitor III display session is obtained from commonly addressable storage that is not fetch protected. However, if your installation wants to limit the use of the command that starts an RMF Monitor III (RMFWDM) session under TSO, one method available is to replace the RMF control section with your own module. For Monitor III you replace the control section ERB3SOCK. Your routine will then be invoked as part of the RMF response to the RMFWDM command.

ERB3SOCK (Monitor III) runs in problem state with a key of 8. When this control section gets control, register 1 points to a two-word address list. The first address points to the seven-byte userid of the user who has issued the RMFWDM command. The second word points to the PSCB. Figure 7-17 illustrates the input parameter structure.

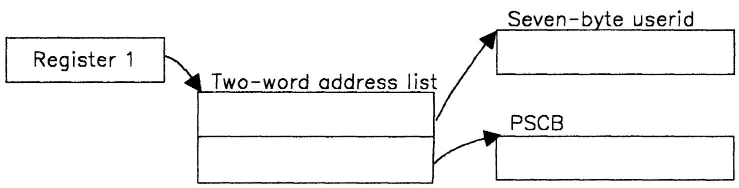

Figure 7-17. ERB3SOCK Input Parameter Structure

The module that you code to replace ERB3SOCK must be reenterable. It receives control by a BALR instruction and must save the registers when it receives control and restore the registers when it returns control. Register 13 contains the address of the register save area; register 14 contains the return address; and register 15 contains the entry address.

The processing your module performs depends on the method you choose to validate the user. Possible methods include issuing a RACHECK, prompting the user for a password, or checking the userid against a list of valid userids. Information on the TSO services available to perform these functions, such as TGET or TPUT, can be found in *TSO Guide to Writing a Terminal Monitor Program or a Command Processor.*

You can also use the PSCB bits defined for user use. This field (PSCBATR2 in the PSCB) comes from the UADS and can be updated by the USERDATA keyword of the ADD and CHANGE subcommands of the ACCOUNT command. See *System Programming Library: TSO* for further information.

When your routine has completed its processing, set a return code of 0 in register 15 to indicate to RMF that the user is authorized to issue RMFWDM. Set a return code of 4 in register 15 to indicate to RMF that the user is not authorized to issue RMFWDM. In response to this return code, RMF will display a message at the display station. No session will be started. After setting the appropriate return code, return control by branching on the contents of register 14.

For the Monitor III TSO session, the user authorization exit routine (ERB3SOCK) is part of the RMF load module that contains the RMFWDM command. This module resides is SYS1.LINKLIB as load module RMFWDM; its entry point is ERB3RTSO. Before your authorization routine can execute, you must link edit it with RMFWDM; the control statements required are:

```
(ERB3SOCK object deck)
INCLUDE ddname(RMFWDM)
ENTRY ERB3RTSO
NAME RMFWDM(R)
```

Appendix A. Monitor III Data Set Support

This appendix describes the data set structure and content for the Monitor III data set support function. It also lists in table form the record fields and table entries associated with data set support. See Chapter 2 "Monitor III Data Gatherer Session" for more information about data set support and recording.

Data Set Record Structure

With the data set support function, RMF uses VSAM relative record data sets (RRDS) to record measurement information during a Monitor III gatherer session. Each data set is a string of fixed-length records and each record is identified by a relative record number. RMF data can be accessed directly by relative record number or sequentially.

During data set recording RMF collects measurement data in the form of one set of samples for each MINTIME and records the samples on the VSAM data sets. Because RMF treats the data it records on the data set as a linear address space, it writes the logical records as a contiguous stream of sampled data with little dependency on the record size. To allow direct retrieval of the data, an index relates the time stamp of every MINTIME set of samples with the offset of the set of samples within the data set; therefore, you can determine the relative record number of any given set of samples within a data set by dividing the offset of the set of samples by the record length, which is 32,752 bytes. (Note: VSAM does not maintain the index.)

The first record on every VSAM data set is the data set header and index record (see ERBDSIG3 in "Monitor III Data Set Record and Table Formats"). RMF builds one index entry for each MINTIME set of samples in the data set. When no more entries can fit into the index, RMF closes the data set.

Records 2 through **n** of the data set contain the measurements of each MINTIME set of samples (see ERBSSHG3). RMF stores data on the data set as follows:

- contiguously arranges MINTIME sets of samples in chronological order
- stores the data so that one MINTIME may cross record boundaries

Figure A-1 shows how these records are arranged on a Monitor III VSAM data set.

```
Header
and Index|  MINTIME 1  | MINTIME 2  | MINTIME n  |
|*********|************|***********|....********|
|         |       |       |       |       |       |
|Record 1 |Record 2 |Record 3 |Record 4 |  .....  |Record n|
```

Figure A-1. Monitor III Data Set Record

Sequential processing may begin with either record 1 or record 2. Relative record processing requires reading the header and index (record 1) to obtain the offset and length of a selected MINTIME set of samples. The record(s) containing the MINTIME sets of samples must be read into contiguous storage before RMF can process them. MINTIME 2 starts in record 3 and ends in record 4. Note that before MINTIME processing can begin, both records 3 and 4 must be read into contiguous storage.

Data Set Content

A MINTIME set of samples collected during the Monitor III gatherer session can be formatted and displayed during a Monitor III reporter display session. Each MINTIME set of samples is independent of other MINTIME sets of samples, and if you specify the same MINTIME value as that of the RANGE period for a display session, the report displays the information for that MINTIME set of samples collected during the gatherer session. Measurement values for each MINTIME set of samples are organized as tables or records, the formats of which appear at the end of this appendix. The types of measurement tables or records are:

- ERBDSIG3 - Data set header and index
- ERBSSHG3 - MINTIME set of samples header
- ERBASIG3 - ASID table
- ERBDVTG3 - Device table
- ERBENTG3 - Enqueue name table
- ERBGEIG3 - General information table
- ERBSHDG3 - Sample header
- ERBREDG3 - Resource record
- ERBUWDG3 - USE/WAIT record

Each is described in "Monitor III Data Set Record and Table Formats". Each offset is from the beginning of the table that contains the offset. Clock times are local from the time-of-day (TOD) clock.

Figure A-2 shows the relationships between the Monitor III data set support tables and records.

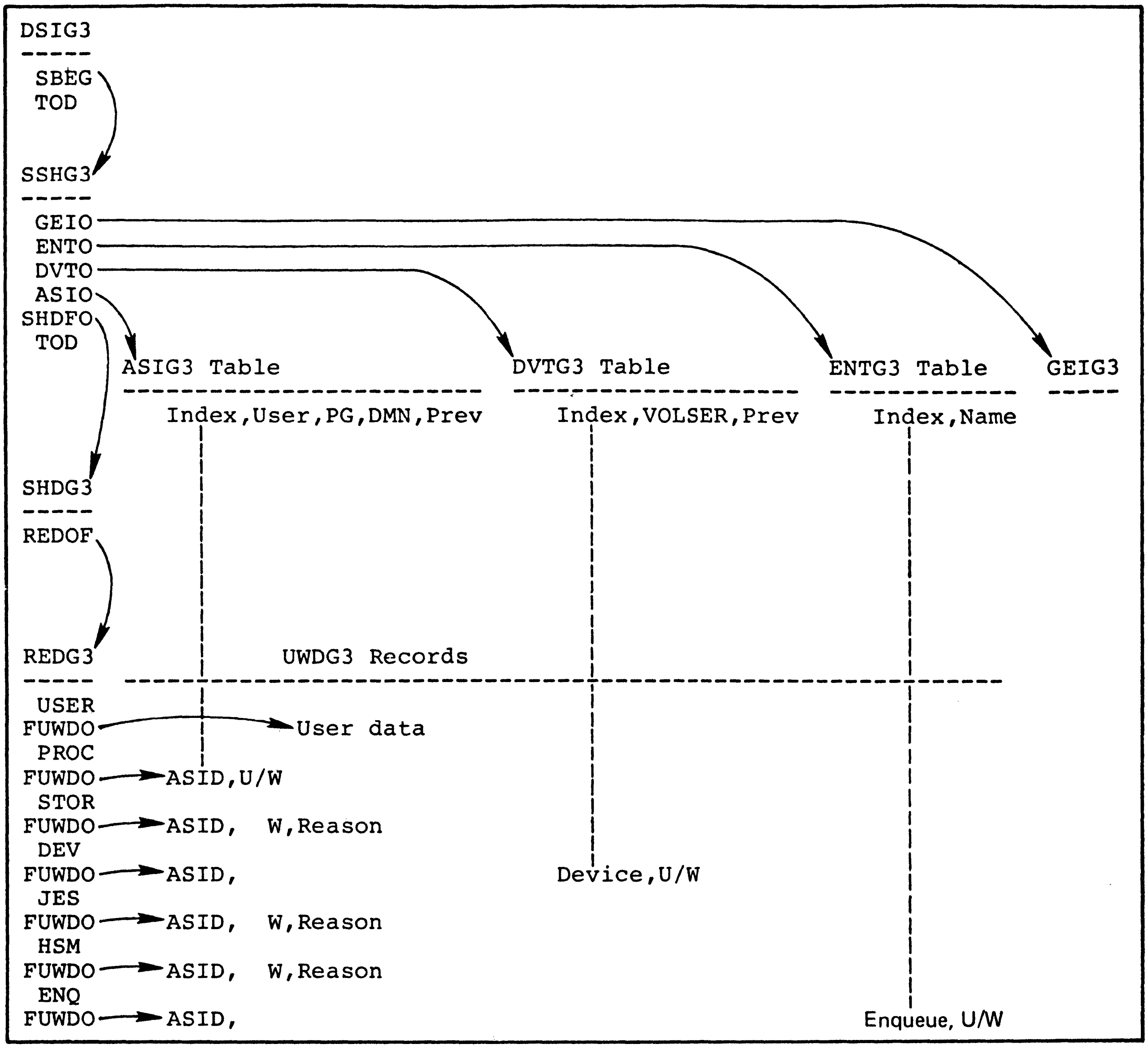

Figure A-2. Monitor III Measurement Table and Record Relationships

The data set header and index (ERBDSIG3) describes the available measurement times (MINTIME sets of samples) and the data set offsets of each MINTIME set of samples header (ERBSSHG3).

The MINTIME set of samples header (ERBSSHG3) contains offsets to the address space id table (ERBASIG3), the device table (ERBDVTG3), enqueue name table (ERBENTG3), the general information table (ERBGEIG3) and a group of sample headers (ERBSHDG3). These tables describe information about each MINTIME interval within a data set.

Each sample header (ERBSHDG3) describes one sample CYCLE, and sample headers (ERBSHDG3) within one MINTIME are chained together by offsets.

The resource records (ERBREDG3) contain information about sampling for each resource. RMF first samples each type of hardware and software resource; RMF then samples user-written exit routines. The sample header (ERBSHDG3) for user-written exit routines contains an offset to the first resource record.

RMF creates in sequence one USE/WAIT record (ERBUWDG3) for each entry it finds in the queue for each resource. The resource record (ERBREDG3) contains an offset to the first USE/WAIT record for each resource.

The address space id table (ERBASIG3) contains one entry for each ASID/job/performance group (PG)/domain (DMN) combination. Each table entry contains the ASID number, its own index, and the index of the previous table entry for the ASID. (During one MINTIME interval, a job could exit, then reenter the system and therefore be assigned the same ASID. In this case, the job could have two sets of table entries for that MINTIME.)

The device table (ERBDVTG3) contains an entry for each device/VOLSER combination. Each entry contains the device number, its own index, and the index of the previous table entry for the device.

RMF correlates USE/WAIT records with their current table entries also by index.

To obtain the offset of each entry within the ASIG3 or DVTG3 table, multiply the length of each table entry by the index (see Figure A-2).

```
Index x length of table entry.
```

For higher level languages, ASIG3 or DVTG3 arrays can be accessed with the index and an origin of 0.

To obtain the offset of each entry within the ENTG3 table, multiply the length of each table entry by the index (see Figure A-2) minus 1:

```
(Index - 1) x length of table entry.
```

For higher level languages, the ENTG3 array can be accessed with the index and an origin of 1.

Monitor III Data Set Record and Table Formats

This section describes each of the nine measurement records and tables used for the Monitor III data set support function.

Note: The following record and table mappings apply only to the current release and are subject to change for future releases.

ERBDSIG3 - Data Set Header and Index

The format is:

Offsets		Name	Length	Format	Description
Data Set Header Section					
0	0	DSIDSIG3	5	EBCDIC	Acronym 'DSIG3'
5	5	DSIGRMFV	1	binary	Control block version x'01'
6	6	DSIGID	4	EBCDIC	System identifier
10	A		2		Reserved for RMF use[1]
12	C	DSIGTODC	8	binary	Time data set was created
20	14	DSIGTODF	8	binary	Time stamp for first set of samples
28	1C	DSIGTODL	8	binary	Time stamp for last set of samples
36	24	DSIGFSPT	4	binary	Offset of first set of samples from ERBDSIG3
40	28	DSIGLSPT	4	binary	Offset of last set of samples from ERBDSIG3
44	2C		4		Reserved for RMF use
48	30	DSIGFIPT	4	binary	Offset of the first index entry from ERBDSIG3
52	34	DSIGLIPT	4	binary	Offset of the last index entry from ERBDSIG3
56	38		4		Reserved for RMF use
60	3C	DSIGILEN	4	binary	Length of an index entry
64	40		4		Reserved for RMF use
68	44		16		Reserved for RMF use
Data Set Index Section					
0	0	DSIGTOD1	8	binary	Time stamp for beginning set of samples
8	8	DSIGTOD2	8	binary	Time stamp for ending set of samples
16	10	DSIGSBEG	4	binary	Offset from beginning of the data set to the set of samples
20	14	DSIGSLEN	4	binary	Length of the set of samples
24	18		1		Reserved for RMF use
25	19		3		Reserved

[1] Fields that are reserved for RMF are used for debugging purposes, for maintaining the data areas, or do not contain RMF Monitor III report data.

ERBSSHG3 - MINTIME Set of Samples Header

The format is:

Offsets		Name	Length	Format	Description
Set of Samples Header Section:					
0	0	SSHSSHG3	5	EBCDIC	Acronym 'SSHG3'
5	5	SSHRMFV	1	binary	Set of samples header control block version number 'x02'
6	6	SSHLEN	2	binary	Length of set of samples header (SSHG3)
8	8	SSHRMFVN	3	EBCDIC	RMF version number
11	B		1		Reserved for RMF use
12	C		24		Reserved for RMF use
36	24	SSHSHDFO	4	binary	Offset of first sample header from ERBSSHG3
40	28	SSHSHDLO	4	binary	Offset of last sample header from ERBSSHG3
44	2C	SSHTOTLE	4	binary	Total length for this set of samples (including the set of samples header)
48	30		4		Reserved for RMF use
52	34		4		Reserved for RMF use
56	38	SSHSMPNR	4	binary	Number of valid samples
60	3C	SSHTIBEG	8	binary	Begin time for this set of samples
68	44	SSHTIEND	8	binary	End time for this set of samples
76	4C		16		Reserved for RMF use
92	5C	SSHASIO	4	binary	Offset of the ASID table from ERBSSHG3
96	60		4		Reserved for RMF use
100	64		4		Reserved for RMF use
104	68		4		Reserved
108	6C	SSHDVTO	4	binary	Offset of the DVT table from ERBSSHG3
112	70		4		Reserved
116	74		4		Reserved for RMF use
120	78	SSHENTO	4	binary	Offset of the ENT table from ERBSSHG3
124	7C		8		Reserved for RMF use
132	84		4		Reserved for RMF use
136	88		12		Reserved
148	94	SSHGEIO	4	binary	Offset of the general information table (GEIG3) from ERBSSHG3
152	98	SSHIOML	1	binary	Processor type on which data was created *Value Meaning* x'01' 308x/908x x'02' 4381 x'03' 3090
153	99	SSHEFLAG	1	binary	Extended storage indicators *Bit Meaning When Set* 0 Extended storage installed 1-7 Reserved
154	9A		2		Reserved

Offsets		Name	Length	Format	Description
Set of Samples Header (continued)					
156	9C	SSHGOCYC	4	binary	Gatherer CYCLE option
160	A0	SSHGOSTP	4	binary	Gatherer STOP option. (If the first bit is set to 0, NOSTOP is in effect.)
164	A4	SSHGOSYN	4	binary	Gatherer SYNC option . (If the first bit is set to 0, NOSYNC is in effect.)
168	A8	SSHGOMNT	4	binary	Gatherer MINTIME option
172	AC		3		Reserved
175	AF	SSHGOCLA	1	EBCDIC	Gatherer SYSOUT class option
176	B0		4		Reserved for RMF use
180	B4	SSHJESN	4	EBCDIC	Name of JES subsystem
184	B8	SSHGOWHL	4	binary	Gatherer DATASET WHOLD suboption
188	BC	SSHGOWST	4	binary	Gatherer WSTOR option
192	C0		40		Reserved for RMF use
232	E8	SSHSTDIF	8	binary	Difference between local time and Greenwich Mean Time where the difference equals local time minus Greenwich Mean Time
240	F0		24		Reserved for RMF use

ERBASIG3 - Address Space Identification Table

The format is:

Offsets		Name	Length	Format	Description
ASIG3 Header Section:					
0	0	ASIASIG3	5	EBCIDIC	Acronym 'ASIG3'
5	5	ASIVERG3	1	binary	Control block version x'04'
6	6	ASIHDRLE	1	binary	Length of ASIG3 header
7	7	ASIENTLE	1	binary	Length of each table entry
8	8	ASIENTMX	4	binary	Number of table entries
12	C	ASIENTNR	4	binary	Index of last table entry
ASIG3 Table Entry Section:					
0	0	ASIENIDX	2	binary	Index of this table entry
2	2	ASIPREVI	2	binary	Index of the previous table entry for the same address space (ASID)
4	4	ASIJOBNA	8	EBCDIC	Jobname for this address space id (ASID). This and the next 5 offsets describe the sort criteria for the address space (ASID). RMF creates a new entry whenever the JOBNAME, PG (performance group), or DMN (domain) changes for the address space.
12	C	ASINPG	2	binary	Control performance group
14	E		1		Reserved
15	F	ASIDMN	1	binary	Domain
16	10	ASIASINR	2	binary	ASID number
18	12	ASIFLAG1	2	binary	Job flags *Bit* *Meaning When Set* 0 Started task 1 Batch job 2 TSO ASID 3-15 Reserved
20	14	ASICPUTA	4	binary	Total TCB+SRB time (in milliseconds)[2]
24	18	ASIDCTIA	4	binary	Total channel connect time (in 128 microsecond units)[2]
28	1C	ASIFIXA	4	binary	Number of real fixed frames[2]
32	20	ASITRCA	4	binary	Total number of transactions[2]
36	24	ASIFMCT	4	binary	Number of frames for swapped-in users[2]
40	28	ASIFMCTI	4	binary	Number of frames for idle users[2]
44	2C	ASIESF	4	binary	Number of extended storage frames for swapped-in users[2]
48	30	ASIESFI	4	binary	Number of extended storage frames for idle users[2]
52	34	ASISMPCT	2	binary	Number of valid samples
54	36	ASISWAP	2	binary	Number of samples when job was physically swapped-out

[2] Sum of all values obtained at each sample. To obtain average values, divide by the number of valid samples (ASISMPCT).

Offsets		Name	Length	Format	Description
56	38	ASIIDLE	2	binary	Number of samples when job was idle
58	3A	ASISWAR	2	binary	Number of samples when job was swapped-out ready
60	3C		2		Reserved for RMF use
62	3E	ASIUKN	2	binary	Number of samples when job status was unknown
64	40	ASISUSEN	2	binary	Number of single state using samples
66	42	ASISUCPR	2	binary	Number of single state samples using processor (PROC)
68	44	ASISUCDV	2	binary	Number of single state samples using device (DEV)
70	46	ASISWAIN	2	binary	Number of single state samples delayed by any resource
72	48	ASISDCPR	2	binary	Number of single state samples delayed by the processor (PROC)
74	4A	ASISDCDV	2	binary	Number of single state samples delayed by device (DEV)
76	4C	ASISDCST	2	binary	Number of single state samples delayed by paging or swapping (STOR)
78	4E	ASISDCJE	2	binary	Number of single state samples delayed by JES
80	50	ASISDCHS	2	binary	Number of single state samples delayed by by HSM
82	52	ASISDCEN	2	binary	Number of single state samples delayed by ENQ
84	54	ASIVECTA	4	binary	Total accumulated vector processor time

ERBDVTG3 - Device Table

The format is:

Offsets		Name	Length	Format	Description
Device Table Header Section:					
0	0	DVTDVTG3	5	EBCIDIC	Acronym 'DVTG3'
5	5	DVTVERG3	1	binary	Control block version x'02'
6	6	DVTHDRLE	1	binary	Length of the device table (DVTG3) header
7	7	DVTENTLE	1	binary	Length of each table entry
8	8	DVTENTMX	4	binary	Number of table entries
12	C	DVTENTNR	4	binary	Index of last table entry
Device Table (DVTG3) Entry Section					
0	0	DVTVOLI	6	EBCDIC	VOLSER for this device
6	6	DVTENIDX	2	binary	Index of this table entry
8	8	DVTDEVNR	2	binary	Device number in hexadecimal format
10	A	DVTPREVI	2	binary	Index of the previous table entry for the same device
12	C		4		Reserved for RMF use
16	10		4		Reserved for RMF use
20	14	DVTFLAG1	1	binary	Device type indicator *Bit* *Meaning When Set* 0 Multiple exposure device 1 DASD device 2 TAPE device 3 MSC controller 4 Virtual DASD 5 Device has an alternate control unit address (for 3350P devices) 6-7 Reserved
21	15	DVTFLAG2	1	binary	Device storage indicator[3] *Bit* *Meaning When Set* 0 CONN/DISC/PEND time values at begin time available 1 CONN/DISC/PEND time values at end time available 2 DEV BUSY DELAY/CUB DELAY time values at begin time available 3 DEV BUSY DELAY/CUB DELAY time values at end time available 4 Device has PLPA page data sets 5 Device has COMMON page data sets 6 Device has LOCAL page data sets 7 Device has SWAP page data sets

[3] These flags indicate if the time values in offsets 22 through 40 are available.

Offsets		Name	Length	Format	Description
22	16	DVTMEXNR	2	binary	Number of exposures including the base exposure
24	18	DVTDISIF	4	binary	Device DISC time at begin of the MINTIME for this set of samples (in 128 microsecond units)
28	1C	DVTPETIF	4	binary	Device PEND time at begin of the MINTIME for this set of samples (in 128 microsecond units)
32	20	DVTCOTIF	4	binary	Device CONN time at begin of the MINTIME for this set of samples (in 128 microsecond units)
36	24	DVTDVBIF	4	binary	Device busy delay time at begin of the MINTIME for this set of samples (in 128 microsecond units)
40	28	DVTCUBIF	4	binary	Control unit busy delay time at begin of the MINTIME for this set of samples (in 128 microsecond units)
44	2C	DVTDISIL	4	binary	Device DISC time at end of the MINTIME for this set of samples (in 128 microsecond units)
48	30	DVTPETIL	4	binary	Device PEND time at end of the MINTIME for this set of samples (in 128 microsecond units)
52	34	DVTCOTIL	4	binary	Device CONN time at end of the MINTIME for this set of samples (in 128 microsecond units)
56	38	DVTDVBIL	4	binary	Device busy delay time at end of the MINTIME for this set of samples (in 128 microsecond units)
40	28	DVTCUBIL	4	binary	Control unit busy delay time at end of the MINTIME for this set of samples (in 128 microsecond units)
64	40	DVTTYP	4	binary	Device type mapped by the UCBTYP macro

ERBENTG3 - ENQUEUE Name Table

The format is:

Offsets		Name	Length	Format	Description
ENQUEUE Name Table Header Section:					
0	0	ENTENTG3	5	EBCIDIC	Acronym 'ENTG3'
5	5	ENTVERG3	1	binary	Control block version x'02'
6	6	ENTHDRLE	1	binary	Length of the ENQUEUE name table (ENTG3) header
7	7	ENTENTLE	4	binary	Length of each entry
8	8	ENTENTMX	1	binary	Number of table entries.
12	C	ENTENTNR	4	binary	Index of last table entry.
ENQUEUE Name Table Entry Section					
0	0	ENTENIDX	2	binary	Index of this table entry
2	2	ENTMAJNA	8	EBCDIC	MAJOR name of this resource
10	A	ENTMINNA	36	EBCDIC	MINOR name of this resource
46	2E	ENTSCOPE	1	binary	Scope of the resource. See *MVS/XA Supervisor Services and Macros* (GC28-1154) for a description of scop. *Bit* *Meaning When Set* 1 Systems scope (for systems with global resource serialization installed) 2 Step scope 3 Global resource 4-7 Reserved
47	2F		1		Reserved

ERBGEIG3 - General Information Table

The format is:

Offsets		Name	Length	Format	Description
0	0	GEIGEIGG3	5	EBCIDIC	Acronym 'GEIG3'
5	5	GEIVERG3	1	binary	Control block version x'02'
6	6	GEILEN	2	binary	Length of this control block (GEIG3)
8	8	GEIWTIMB	8	binary	Sum of wait time for all processors at the begin of this MINTIME interval
16	10	GEIWTIME	8	binary	Sum of wait time for all processors at the end of this MINTIME interval
24	18	GEIVERSN	1	binary	CPU version number
25	19		1		Reserved
26	1A	GEIFLAG	1	binary	Processor flags *Bit* *Meaning When Set* 0 Service processor architecture supported 1-7 Reserved
27	1B		1		Reserved
28	1C	GEIMODEL	2	packed	CPU model number (The value is not signed.)
30	1E	GEIIPSID	2	EBCDIC	Installation performance specification (IPS) member suffix
32	20	GEIOPTN	2	EBCDIC	Option (OPT) member suffix
34	22	GEIICSN	2	EBCDIC	Installation control specification (ICS) member suffix
36	24	GEISID	4	EBCDIC	SYSTEM name (SMF system id)
40	28	GEICPUOL	4	binary	Number of online processors[4]
44	2C	GEIAHUIC	4	binary	Highest system unreferenced interval count (HUIC)[4]
48	30	GEIRPOOL	4	binary	Number of online real storage frames[4]
52	34	GEIRCOMA	4	binary	Number of real storage COMMON frames[4]
56	38	GEIRSQAA	4	binary	Number of real storage SQA frames[4]
60	3C	GEIRAFC	4	binary	Number of available real storage frames[4]
64	40	GEINUCA	4	binary	Number of nucleus (NUC) frames (real nucleus plus extended storage nucleus frames)[4]
68	44		8		Reserved
76	4C	GEIEESPL	4	binary	Number of online extended storage frames[4]
80	50	GEIGAGE	4	binary	Extended storage migration age[4]
84	54	GEIECOME	4	binary	Number of extended storage COMMON frames[4]
88	58	GEIEAEC	4	binary	Number of available extended storage frames[4]
92	5C	GEIVECOL	4	binary	Number of online vector processors[4]

[4] Sum of values obtained at each sample. To obtain average values, divide by the number of valid samples (SSHSMPNR).

ERBSHDG3 - Sample Header

The format is:

Offsets		Name	Length	Format	Description
0	0	SHDSHDG3	5	EBCIDIC	Acronym 'SHDG3'
5	5	SHDRMFV	1	binary	SHDG3 control block version x'02'
6	6	SHDLEN	1	binary	Length of SHDG3 control block
7	7	SHDFLAG1	1	binary	Sample flags *Bit* *Meaning When Set* 0 Invalid sample 1-7 Reserved
8	8	SHDPREVO	4	binary	Offset to previous sample from ERBSHDG3
12	C	SHDNEXTO	4	binary	Offset to next sample from ERBSHDG3
16	10	SHDREDOF	4	binary	Offset to first resource data (RED) record from ERBSHDG3
20	14	SHDREDNR	2	binary	Number of RED records
22	16	SHDREDLE	2	binary	Length of each resource data record entry
24	18		4		Reserved for RMF use
28	1C		2		Reserved for RMF use
30	1E	SHSUWDNR	2	binary	Number of USE/WAIT records
32	20		8		Reserved for RMF use
40	28		8		Reserved for RMF use

ERBREDG3 - Resource Record

The format is:

Offsets		Name	Length	Format	Description
0	0	REDREDID	1	binary	Resource id *Value Meaning* X'01' PROC X'02' DEV X'03' STOR[5] X'04' JES2/JES3 X'06' HSM X'07' ENQ X'3F' user
1	1	REDFLAG1	1	binary	Resource data record flags *Bit Meaning When Set* 0 Invalid resource 1 USE records available 2 WAIT records available 3-7 Reserved
2	2		2		Reserved for RMF use
4	4	REDFUWDO	4	binary	Offset to first USE/WAIT record from ERBREDG3
The following three fields occur at the same offset. See REDREDID and REDFLAG1 to determine type of record data.					
8	8	REDUWDLE	2	binary	For USE/WAIT records (see REDREDID and REDFLAG1), the length of the record
8	8	REDUSERL	2	binary	For user records (see REDREDID and REDFLAG1), the length of the record
8	8	REDUWDL1	1	binary	For ENQ USE records (see REDREDID and REDFLAG1), the length of the record without SYSTEM/JOBNAME
9	9	REDUWDL2	1	binary	For ENQ USE records (indicated in REDREDID and REDFLAG1) the length of the record including SYSTEM/JOBNAME
The following two fields occur at the same offset. See REDREDID and REDFLAG1 to determine type of record data.					
10	A	REDUWDNR	2	binary	Number of USE/WAIT records (see REDFLAG1)
10	A	REDUSERN	2	binary	Number of user exit records (see REDREDID)

[5] The STORR (resource-oriented storage) report uses data from both the DEV and STOR reports.

ERBUWDG3 - USE/WAIT Record

The format is:

Offsets		Name	Length	Format	Description
0	0	UWDUWRID	1	binary	USE/WAIT record id *Bit* *Meaning When Set* 0 WAIT record 1 USE record 2-7 Resource identification
1	1	UWDASID	2	binary	Address space (ASIG3) table index
Extended Data for PROC Section (See resource id in UWDUWRID):					
3	3		1		Reserved for RMF use
Extended Data for DEV Section (See resource id in UWDUWRID):					
3	3	UWDDEVNR	2	binary	Device table (DVTG3) index
Extended Data for STOR Section (See resource id in UWDUWRID):					
3	3	UWDPDEVR	2	binary	Paging device DVTG3 index
5	5	UWDFLAGS	1	binary	Flag for storage status *Bit* *Meaning When Set* 0 Delayed for LOCAL request 1 Delayed for SWAP IN request 2 Delayed for COMMON request 3 Delayed for VIO request 4 Space type LOCL 5 Space type SWAP 6 Space type COMM 7 Space type PLPA
Extended Data for JES2/JES3 Section (See resource id in UWDUWRID):					
3	3	UWDJESFU	2	binary	JES2/JES3 function code
5	5	UWDJS3MO	1	binary	JES3 modification code
Extended Data for HSM Section (See resource id in UWDUWRID):					
3	3	UWDHSMFU	1	binary	HSM function code
4	4	UWDHSMMO	1	binary	HSM modification code
Extended Data for ENQ Section (See resource id in UWDUWRID):					
3	3	UWDENTID	2	binary	ENQUEUE name table (ENTG3) index
4	4	UWDFLAGE	1	binary	ENQUEUE flags *Bit* *Meaning When Set* 0 OFF = Request is EXCLUSIF ON = Request is SHARED 1 ON = Request from another system. (Fields UWDSYSNA/UWDJOBNA are valid.)
					2-7 Reserved
6	6	UWDSYSNA	8	EBCDIC	System name of requestor
14	E	UWDJOBNA	8	EBCDIC	Job name of requestor

Appendix B. Monitor III Data Reporter Tables

This appendix describes the data tables used by the Monitor III data reporter. It lists in table form the ISPF record fields and table entries associated with creating, formatting, and displaying RMF reports. For information on how to create user-defined reports, see Chapter 7 "Procedures for Adding User Functions".

RMF Tabular Report Format Table ERBFMTS3

Purpose

The RMF format table defines the layout of RMF reports for panel display and hardcopy printing. It should also ensure that each output function within RMF produces the same format.

This table contains one row for each report name and format. Each row contains information on how to edit header, subheader, column header and column data lines, and contains an example for each variable name.

The format is:

Variable Name	T	Variable Description	Example
FMTREPNA	K	Report name	DELAY
FMTFORMT	K	Report format identifier (not yet used)	ENGLISH
FMTRMODE	N	Report mode available (GRAPHIC/TABULAR/BOTH)	BOTH
FMTTPANL	N	Tabular report panel name	ERB3JDE
FMTTHLPP	N	Name of related help panel	ERB3JDE1
FMTLOGLN	N	Name of logical line number variable	JDEDTLLN
FMTSEQNR	N	Name of sequence number variable	JDEDTPSN
FMTCMDLN	N	Content of command line	COMMAND = = = > &ZCMD ...
FMTHDR1	N	Content of header line 1 (text and variables intermixed)	... RMF DELAYS &HDRSID ..
FMTHDR2	N	Content of header line 2 (text and variables intermixed)	... Samples: &Z TIME: .
FMTSUBH1	N	Content of subheader line 1 (text and variables intermixed)	
FMTSUBH2	N	Content of subheader line 2 (text and variables intermixed)	
FMTSUBH3	N	Content of subheader line 3 (text and variables intermixed)	
FMTSUBH4	N	Content of subheader line 4 (text and variables intermixed)	
FMTSUBH5	N	Content of subheader line 5 (text and variables intermixed)	
FMTCOLH1	N	Text for column header line 1	WFL USG
FMTCOLH2	N	Text for column header line 2	NAME C DMN % % ..
FMTCOLH3	N	Text for column header line 3	
FMTHVPRE	N	Prefix used in specifying variables in header lines	&
FMTHPLCH	N	Header line placeholder replacement variable names	HDRSAMPL HDRDATE HDRTIME
FMTSPLCH	N	Subheader line placeholder replacement variable names	

Variable Name	T	Variable Description	Example
FMTCPLCH	N	Command line placeholder replacement variable names	AMT
FMTMODL1	N	Definition of model line 1 (attribute characters followed by variable names or placeholder values(Z), variable names used must be elements of the report column data table)	|JDELDAN|Z|Z |Z
FMTMODL2	N	Definition of model line 2	
FMTMODL3	N	Definition of model line 3	
FMTMATTR	N	Attribute characters used in model lines	_|¢
FMTMPLCH	N	Model line placeholder replacement variable names (ZVARS)	JDETYPE JDELDMN JDELPGN
FMTHVMAX	N	Number of variables within header lines (maximum of 20)	6
FMTSVMAX	N	Number of variables within subheader lines (maximum of 30)	0
FMTMVMAX	N	Number of variables within model lines (maximum of 30)	16
FMTCVMAX	N	Number of variables within command line (maximum of 5)	
FMTHVNnn	S	Variable name used in header lines	HDRSID
FMTHVRnn	S	Number of header line where variable is used	1
FMTHVPnn	S	Variable position within line	52
FMTHVLnn	S	Maximum variable length	15
FMTSVNxx	S	Variable name used in subheader lines	
FMTSVRxx	S	Number of subheader line where variable is used	
FMTSVPxx	S	Variable position within line	
FMTSVLxx	S	Maximum variable length	
FMTMVNyy	S	Variable name used in model lines	JDELDAN
FMTMVRyy	S	Number of model line where variable is used	1
FMTMVPyy	S	Variable position within line	2
FMTMVLyy	S	Maximum variable length	8
FMTCVNzz	S	Variable name used in command line	ZCMD
FMTCVPzz	S	Variable position within line	14
FMTCVLzz	S	Maximum variable length	51

Note:

T = K: This is a table key variable.
T = N: This is a table name variable.
T = S: This is a table extension variable.
nn = unique number for each variable used in the header lines
xx = unique number for each variable used in the subheader lines
yy = unique number for each variable used in the model lines
zz = unique number for each variable used in the command line

RMF Header Data Table ERBHDRS3

Purpose

The RMF header data table provides the variable header and subheader information in one table row for each report. This table is used by the report format definition utility.

The format is:

Variable Name	T	Variable Description	Example
HDRREPNA	K	Report name	DELAY
ERBSID	N	System identifier	AQXA
ERBHCTXT	N	Hardcopy text constant	HARDCOPY
ERBSAMPL	N	Sample count	100
ERBDATE	N	Starting date	10/08/85
ERBTIME	N	Starting time	10.35.00
ERBRANGE	N	Time range value	100
		The variable data for subheader lines has to be kept in extension values of this table. Example for STORR report.	
SRRRMAGE	S	Migration age real storage	255
SRRRONLN	S	Frames online real storage	1.600

Note:

T = K: This is a table key variable.
T = N: This is a table name variable.
T = S: This is a table extension variable.

Tabular Report Data Table ERBDEVT3

RMF builds table ERBDEVT3 when using DEV as a report type.

The format is:

Name	T	Description of the Variable
DEVDTLLN	K	Logical line number
DEVDTPSN	K	Sequence number
DEVPJOB	N	Jobname
DEVPCLA	N	Class (T, B, or S)
DEVPDMN	N	Domain
DEVPPGN	N	Performance group
DEVPODEL	N	Overall delay percentage
DEVPOUSE	N	Overall usage percentage
DEVPCON	N	Connect time
DEV1SDEL	N	Delay percentage causes by volser1
DEV1VOLU	N	Volume serial number volser1
DEV2SDEL	N	Delay percentage caused by volser2
DEV2VOLU	N	Volume serial number volser2
DEV3SDEL	N	Delay percentage cause by volser3
DEV3VOLU	N	Volume serial number volser3
DEV4SDEL	N	Delay percentage caused by volser4
DEV4VOLU	N	Volume serial number volser4

Note:

K - KEY type variable
N - NAMES type variable

Tabular Report Data Table ERBDVJT3

RMF builds table ERBDVJT3 when using DEVJ as a report type.

The format is:

Name	T	Description of the Variable
DVJDTLLN	K	Logical line number
DVJDTPSN	K	Sequence number
DEVPJOB	N	Jobname
DEVPCLA	N	Class (T, B, or S)
DEVPDMN	N	Domain
DEVPPGN	N	Performance group
DEVPODEL	N	Overall delay percentage
DEVPOUSE	N	Overall usage percentage
DEVPCON	N	Connect time
DEV1SDEL	N	Delay percentage causes by volser1
DEV1VOLU	N	Volume serial number volser1
DEV2SDEL	N	Delay percentage caused by volser2
DEV2VOLU	N	Volume serial number volser2
DEV3SDEL	N	Delay percentage cause by volser3
DEV3VOLU	N	Volume serial number volser3
DEV4SDEL	N	Delay percentage caused by volser4
DEV4VOLU	N	Volume serial number volser4

Note:

K - KEY type variable
N - NAMES type variable

Tabular Report Data Table ERBDSIT3

RMF builds ERBDSIT3 when using DSINDEX as a report type.

The format is:

Name	T	Description of the Variable
DSIDTLLN	K	Logical line number
DSIDTPSN	K	Sequence number
DSI1DATE	N	Starting date
DSI1TIME	N	Starting time
DSI1DDNM	N	DD-name
DSI1DSNM	N	Data set name
DSI2DATE	N	Ending date
DSI2TIME	N	Ending time
DSI2MESS	N	Message field

Note:

K - KEY type variable
N - NAMES type variable

Tabular Report Data Table ERBDVRT3

RMF builds ERBDVRT3 when using DEVR as a report type.

The format is:

Name	T	Description of the Variable
DVRDTLLN	K	Logical line number
DVRDTPSN	K	Sequence number
DVRPVOLU	N	VOLSER
DVRPDEVN	N	Device number
DVRPIDEN	N	Device identification
DVRPSTAT	N	Status
DVRPEXP	N	Number of exposures
DVRPACTV	N	Percentage of active time
DVRPCONN	N	Percentage of connect time
DVRPDISC	N	Percentage of disconnect time
DVRPPEND	N	Percentage of pending time
DVRPDVBT	N	Percentage of device busy delay time
DVRPCUBT	N	Percentage of control unit busy delay time
DVRPJOBN	N	Jobname
DVRPCLA	N	Class (T, B, or S)
DVRPDMN	N	Domain
DVRPPGN	N	Performance group number
DVRPSUSE	N	Percentage of usage
DVRPSDEL	N	Percentage of delay

Note:

K - KEY type variable
N - NAMES type variable

Tabular Report Data Table ERBENQT3

RMF builds ERBENQT3 when using ENQ as a report type.

The format is:

Name	T	Description of the Variable
ENQDTLLN	K	Logical line number
ENQDTPSN	K	Sequence number
ENQPWJOB	N	Jobname of waiting job
ENQPODEL	N	Overall delay percentage
ENQPRDEL	N	Percentage of delay for the resource
ENQPWSTT	N	Status of waiting job
ENQPMAJS	N	Resource major name and scope or minor name
ENQPHDEL	N	Percentage of delay for the holding job
ENQPHJOB	N	Jobname of holding job or system name for holding job
ENQPHSTT	N	Status for the holding job

Note:

K - KEY type variable
N - NAMES type variable

Tabular Report Data Tables ERBEQJT3

RMF builds ERBEQJT3 when using ENQJ as a report type.

The format is:

Name	T	Description of the Variable
EQJDTLLN	K	Logical line number
EQJDTPSN	K	Sequence number
ENQPWJOB	N	Jobname of waiting job
ENQPODEL	N	Overall delay percentage
ENQPRDEL	N	Percentage of delay for the resource
ENQPWSTT	N	Status of waiting job
ENQPMAJS	N	Resource major name and scope or minor name
ENQPHDEL	N	Percentage of delay for the holding job
ENQPHJOB	N	Jobname of holding job or system name for holding job
ENQPHSTT	N	Status for the holding job

Note:

K - KEY type variable
N - NAMES type variable

Tabular Report Data Table ERBEQRT3

RMF builds ERBEQRT3 when using ENQR as a report type.

The format is:

Name	T	Description of the Variable
EQRDTLLN	K	Logical line number
EQRDTPSN	K	Sequence number
EQRPMAJS	N	Resource major name and scope or resource minor name
EQRPRDEP	N	Percentage of delay for the delayed job
EQRPWJOB	N	Jobname of delayed job
EQRPWSTT	N	Status of delayed job
EQRPHDEP	N	Percentage of delay for the holding job
EQRPHJOB	N	Jobname of holding job or system name
EQRPHSTT	N	Status of holding job

Note:

K - KEY type variable
N - NAMES type variable

Tabular Report Data Tables ERBHSMT3 and ERBHSJT3

RMF builds ERBHSMT3 and ERBHSJT3 when using HSM or HSMJ as a report type. The table variables are identical to the variables of the ERBJEST3 table; see the ERBJEST3 and ERBJSJT3 tables for more information.

Tabular Report Data Table ERBJEST3

RMF builds ERBJEST3 when using JES as a report type.

The format is:

Name	T	Description of the Variable
HJSDTLLN	K	Logical line number
HJSDTPSN	K	Sequence number
HJSPJOB	N	Job name
HJSPODEL	N	Overall delay percentage
HJS1FDEL	N	Delay percentage
HJS1FCNR	N	Function code
HJS1EXPL	N	Explanation
HJS2FDEL	N	Delay percentage
HJS2FCNR	N	Function code
HJS2EXPL	N	Explanation

Note:

K - KEY type variable
N - NAMES type variable

Tabular Report Data Table ERBJSJT3

RMF builds ERBJSJT3 when using JESJ as a report type.

The format is:

Name	T	Description of the Variable
HJSJTLLN	K	Logical line number
HJSJTPSN	K	Sequence number
HJSPJOB	N	Job name
HJSPODEL	N	Overall delay percentage
HJS1FDEL	N	Delay percentage
HJS1FCNR	N	Function code
HJS1EXPL	N	Explanation
HJS2FDEL	N	Delay percentage
HJS2FCNR	N	Function code
HJS2EXPL	N	Explanation

Note:

K - KEY type variable
N - NAMES type variable

Tabular Report Data Table ERBJDET3

RMF builds ERBJDET3 when using DELAY as a report type.

The format is:

Name	T	Description of the Variable
JDEDTLLN	K	Logical line number
JDEDTPSN	K	Sequence number
JDELDAN	N	Job name or summary
JDETYPE	N	Class (T, B, or S)
JDELDMN	N	Domain
JDELPGN	N	Performance group
JDELWFL	N	Work flow percentage
JDELUSG	N	Usage percentage
JDELDEL	N	Delay percentage
JDELIDL	N	Idle percentage
JDELUKN	N	Unknown percentage
JDELPROC	N	Processor delay percentage
JDELDEV	N	Device delay percentage
JDELSTOR	N	Storage delay percentage
JDELJES	N	JES delay percentage
JDELHSM	N	HSM delay percentage
JDELENQ	N	ENQ delay percentage
JDELREAS	N	Primary reason

Note:

K - KEY type variable
N - NAMES type variable

Tabular Report Data Table ERBJDJT3

RMF builds ERBJDJT3 when using DELAYJ as a report type.

The format is:

Name	T	Description of the Variable
JDJDTLLN	K	Logical line number
JDJDTPSN	K	Sequence number
JDJLDAN	N	Job name or summary
JDJCLASS	N	Class (T, B, or S)
JDJLDMN	N	Domain
JDJLPGN	N	Performance group
JDJLWFL	N	Work flow percentage
JDJLUSG	N	Usage percentage
JDJLDEL	N	Delay percentage
JDJLIDL	N	Idle percentage
JDJLUKN	N	Unknown percentage
JDJLPROC	N	Processor delay percentage
JDJLDEV	N	Device delay percentage
JDJLSTOR	N	Storage delay percentage
JDJLJES	N	JES delay percentage
JDJLHSM	N	HSM delay percentage
JDJLENQ	N	ENQ delay percentage
JDJLREAS	N	Primary reason

Note:

K - KEY type variable
N - NAMES type variable

Tabular Report Data Table ERBPRCT3

RMF builds ERBPRCT3 when using PROC as a report type.

The format is:

Name	T	Description of the Variable
PRCDTLLN	K	logical line number
PRCDTPSN	K	sequence number
PRCPJOB	N	Jobname
PRCPCLA	N	Class
PRCPDMN	N	Domain number
PRCPPGN	N	Performance group number
PRCPODEL	N	Overall delay percentage
PRCPOUSE	N	Using percentage
PRCPTST	N	TCB and SRB percentage
PRCPVEC	N	Vector ratio
PRC1SDEL	N	Delay percentage caused by jobname1
PRC1JOBN	N	Jobname1
PRC2SDEL	N	Delay percentage caused by jobname2
PRC2JOBN	N	Jobname2
PRC3SDEL	N	Delay percentage caused by jobname3
PRC3JOBN	N	Jobname3

Note:

K - KEY type variable
N - NAMES type variable

Tabular Report Data Table ERBPRJT3

RMF builds ERBPRTJT3 when using PROCJ as a report type.

The format is:

Name	T	Description of the Variable
PRJDTLLN	K	logical line number
PRJDTPSN	K	sequence number
PRCPJOB	N	Jobname
PRCPCLA	N	Class
PRCPDMN	N	Domain number
PRCPPGN	N	Performance group number
PRCPODEL	N	Overall delay percentage
PRCPOUSE	N	Using percentage
PRCPTST	N	TCB and SRB percentage
PRC1SDEL	N	Delay percentage caused by jobname1
PRC1JOBN	N	Jobname1
PRC2SDEL	N	Delay percentage caused by jobname2
PRC2JOBN	N	Jobname2
PRC3SDEL	N	Delay percentage caused by jobname3
PRC3JOBN	N	Jobname3

Note:

K - KEY type variable
N - NAMES type variable

Tabular Report Data Table ERBSRRT3

RMF builds ERBSRRT3 when using STORR as a report type.

The format is:

Name	T	Description of the Variable
SRRDTLLN	K	Logical line number
SRRDTPSN	K	Sequence number
SRRVOLVC	N	VOLUME SERIAL number
SRRDEVTY	N	Device type
SRREXPCT	N	Number of exposures
SRRUSVC	N	Percentage of Using
SRRA1VC	N	Percentage of active
SRRA2VC	N	Percentage of connect
SRRA3VC	N	Percentage of disconnect
SRRA4VC	N	Percentage of pending
SRRA5VC	N	Percentage of DLY-DB
SRRA6VC	N	Percentage of DLY-CUB
SRRSPTVC	N	SPACE type
SRRAUTOT	N	Average active users: TOTAL
SRRAULOC	N	Average active users: LOCAL
SRRAUSWP	N	Average active users: SWAP
SRRAUCOM	N	Average active users: COMM

Note:

K - KEY type variable
N - NAMES type variable

Tabular Report Data Table ERBSTRT3

RMF builds ERBSTRT3 when using STOR as a report type.

The format is:

Name	T	Description of the Variable
STRDTLLN	K	Logical line number
STRDTPSN	K	Sequence number
STRPJOB	N	Job name
STRPCLA	N	Class
STRPDMN	N	Domain number
STRPPGN	N	Performance group number
STRPODEL	N	Overall delay percentage
STR1SDEL	N	Delay percentage COMM
STR2SDEL	N	Delay percentage local
STR3SDEL	N	Delay percentage VIO
STR4SDEL	N	Delay percentage SWAP
STR5SDEL	N	Delay percentage OUTR
STRPACTV	N	Average ACTV frames
STRPFIXD	N	Average Fixed frames total
STRPIDLE	N	Average IDLE frames

Note:

K - KEY type variable
N - NAMES type variable

Tabular Report Data Table ERBSRJT3

RMF builds ERBSRJT3 when using STORJ as a report type.

The format is:

Name	T	Description of the Variable
SRJDTLLN	K	Logical line number
SRJDTPSN	K	Sequence number
STRPJOB	N	Job name
STRPCLA	N	Class
STRPDMN	N	Domain number
STRPPGN	N	Performance group number
STRPODEL	N	Overall delay percentage
STR1SDEL	N	Delay percentage COMM
STR2SDEL	N	Delay percentage local
STR3SDEL	N	Delay percentage VIO
STR4SDEL	N	Delay percentage SWAP
STR5SDEL	N	Delay percentage OUTR
STRPACTV	N	Average ACTV frames
STRPFIXD	N	Average Fixed frames total
STRPIDLE	N	Average IDLE frames

Note:

K - KEY type variable
N - NAMES type variable

Tabular Report Data Table ERBSYST3

RMF builds ERBSYST3 when using SYSINFO as a report type.

The format is:

Name	T	Description of the Variable
SYSDTLLN	K	Logical line number
SYSDTPSN	K	Sequence number
SYSNAMVC	N	Group name
SYSWFLVC	N	Workflow percentage
SYSTUSVC	N	Average number of total users
SYSAUSVC	N	Average number of active users
SYSTRSVC	N	Transactions / sec
SYSAFCVC	N	Active frames percentage
SYSVECVC	N	Vector utilization
SYSAUPVC	N	Average number using PROC
SYSAUDVC	N	Average number using DEV
SYSADPVC	N	Average number delayed PROC
SYSADDVC	N	Average number delayed DEV
SYSADSVC	N	Average number delayed STOR
SYSADJVC	N	Average number delayed JES
SYSADHVC	N	Average number delayed HSM
SYSADEVC	N	Average number delayed ENQ

Note:

K - KEY type variable
N - NAMES type variable

Tabular Report Data Table ERBWFXT3

RMF builds ERBWFXT3 when using WFEX as a report type.

The format is:

Name	T	Description of the Variable
WFXDTLLN	K	Logical line number
WFXDTPSN	K	Sequence number
WFXLNAM	N	Resource, user, or job name
WFXLGRA	N	graphic area
WFXLCLSS	N	Class
WFXLDMN	N	Domain
WFXLPGN	N	Performance group
WFXLDAN	N	Name
WFXLDAWP	N	Workflow %
WFXLDAE	N	Except
WFXLDADP	N	Delay %
WFXLDAR	N	Reason

Note:

K - KEY type variable
N - NAMES type variable

Graphic Report Parameter Table ERBPTGS3

The graphic report parameter table defines the layout of RMF graphic report for panel display and hardcopy printing. The first part describes general information about the graphic report. The second part describes information about labels per bar. The third part describes the column layout.

The format for general information is:

Name	T	Description of the Variable	Example
PTGREPNA	K	Report name (must be specified)	DEV HSM JES
PTGRHELP	N	Name for help panel – See name convention for HELP panels	
PTGRMINY	N	Length of Y-scale, if there is no bar exceeding this length. 1 for average number of user's time, 100 for percentage values	1 100
PTGRAXTI	N	Title of the axis • Percentage of Each User's Time • Percentage of The User's Time • Average Number of Active Users	1 100
PTGRSERU	N	Selection rule for bars: 0 : One bar corresponds to one line 1 : One bar corresponds to one line with the sequence number 1 2 : One bar corresponds to the summary of logical lines 3 : Two bar-types result from all logical lines of a logical block • Bar type 1 corresponds to sequence number 1 • Bars of bar type 2 correspond to each line of the logical block	0 1 2 3 DELAYJ DEV, HSM, JES DEVR, ENQR STORR
PTGRBRNM	N	Number of bar types '1' and '2', represented by the character before the last character in the following variables.	1 2

Note:

K - KEY type variable
N - NAMES type variable

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The format for labels per bar is:

Variable Name	T	Variable Description	Example
PTGRLB10	N	Number of labels per bar for bar type 1	1 2
PTGRCL11 PTGRAP11 PTGRCL12 PTGRAP12	N N N N	ISPF COLUMN DATA TABLE variable, which contains the label 1 (must be specified) Alpha part of the label 1, which will be composed by this part and the last 3 digits of the data value. The alpha part is limited to 5 characters. (corresponding to PTGRCL11 for label 2) (must be specified, if PTGRLB10='2') (corresponding to PTGRAP11 for label 2)	 'DMN', 'PG' in DELAYJ
PTGRLB20	N	Number of labels per bar for bar type 2	1 2
PTGRCL21 PTGRAP21 PTGRCL22 PTGRAP22	N N N N	(corresponding to PTGRCL11) (corresponding to PTGRAP11) (corresponding to PTGRCL12) (corresponding to PTGRAP12)	

Note:

N - NAMES type variable

The format for columns is:

Variable Name	T	Variable Description	Example
PTGRCPNM	N	Number of data columns to be selected for the bar types. = number of color-pattern-text combin. (0, 1, 2, ... 9, represented by the last character of the variable.	0 1 ... 9
PTGRTV1	N	ISPF Column Table variable. This variable contains a specific data value of the tabular report after a TBGET to a row of the Data Column Table. (Must be specified)	
PTGRLD1	N	Legend ID, to specify a particular color-pattern-text combination of the Color-Pattern Table. The ID specifies the legend (color, pattern and subheader) for this data value.	1 2 ... see color-pattern option table
PTGRAL1	N	Transformation ID 0 : don't divide 1 : divide by 10 2 : divide by 100	0 2
PTGRDC1	N	bartype col ; If '0', the data value 0 : reports value in both bar types 1 : reports value in first bar type 2 : reports value in second bar type	0 1 2
PTGRTV2 PTGRLD2 PTGRAL2 PTGRDC2	N N N N	(corresponding to ptgrtv1) (corresponding to PTGRLD1) (corresponding to PTGRAL1) (corresponding to PTGRDC1)	
PTGRTV3 PTGRLD3 PTGRAL3 PTGRDC3	N N N N	(corresponding to ptgrtv1) (corresponding to PTGRLD1) (corresponding to PTGRAL1) (corresponding to PTGRDC1)	
PTGRTV4 PTGRLD4 PTGRAL4 PTGRDC4	N N N N	(corresponding to ptgrtv1) (corresponding to PTGRLD1) (corresponding to PTGRAL1) (corresponding to PTGRDC1)	
PTGRTV5 PTGRLD5 PTGRAL5 PTGRDC5	N N N N	(corresponding to ptgrtv1) (corresponding to PTGRLD1) (corresponding to PTGRAL1) (corresponding to PTGRDC1)	
PTGRTV6 PTGRLD6 PTGRAL6 PTGRDC6	N N N N	(corresponding to ptgrtv1) (corresponding to PTGRLD1) (corresponding to PTGRAL1) (corresponding to PTGRDC1)	
PTGRTV7 PTGRLD7 PTGRAL7 PTGRDC7	N N N N	(corresponding to ptgrtv1) (corresponding to PTGRLD1) (corresponding to PTGRAL1) (corresponding to PTGRDC1)	
PTGRTV8 PTGRLD8 PTGRAL8 PTGRDC8	N N N N	(corresponding to ptgrtv1) (corresponding to PTGRLD1) (corresponding to PTGRAL1) (corresponding to PTGRDC1)	
PTGRTV9 PTGRLD9 PTGRAL9 PTGRDC9	N N N N	(corresponding to ptgrtv1) (corresponding to PTGRLD1) (corresponding to PTGRAL1) (corresponding to PTGRDC1)	

Variable Name	T	Variable Description	Example
PTGRTV10	N	(corresponding to ptgrtv1)	
PTGRLD10	N	(corresponding to PTGRLD1)	
PTGRAL10	N	(corresponding to PTGRAL1)	
PTGRDC10	N	(corresponding to PTGRDC1)	

Note:

T: Type of ISPF table variable
T = K: ISPF table KEY variable
T = N: ISPF table NAME variable

RMF Phase Driver Table ERBPHDS3

The RMF supplied phase driver table has rows for each command and selection.

The format is:

Variable Name	T	Variable Description
PHDREPNA	K	Name of the command or the long form of the report selection.
PHDREPSE	N	Selection string to be created. This string will be passed to the primary option panel to perform the command function.
PHDRPH1	N	Function to be performed for Phase 1. The string if not null, will be selected.
PHDRPH2	N	Function to be performed for Phase 2. The string if not null, will be selected.
PHDRPH3	N	Function to be performed for Phase 3. The string if not null, will be selected.
PHDRPH4	N	Function to be performed for Phase 4. The string if not null, will be selected.
PHDRET1	N	Return code passed from Phase 1. The Phase 2 and Phase 3 are executed only if the return code from this Phase is zero.
PHDRET2	N	Return code passed from Phase 2. The Phase 3 is executed only if the return code from this Phase is zero.
PHDRET3	N	Return code passed from Phase 3.
PHDRET4	N	Return code passed from Phase 5.
PHDRTAB1	N	Name of the ISPF table created by Phase 1. This table is input for Phase 2.
PHDRTAB2	N	Name of the ISPF table created by Phase 2. This table is input to Phase 3.

Note:

T = K: This is a table key variable.
T = N: This is a table name variable.

This table lists the report commands, selections, and the variables used for each phase (1,2,3,4). Phase 2 and 4 are null.

The format is:

PHDREPNA	PHDREPSE	PHDRPH1	PHDRPH3	PHDRTAB1
DELAY	1	PGM(ERB3RPH1) PARM(DELAY)	PGM(ERB3RDSP)	ERBJDET3
DEV	2	PGM(ERB3RPH1) PARM(DEV)	PGM(ERB3RDSP)	ERBDEVT3
ENQ	3	PGM(ERB3RPH1) PARM(ENQ)	PGM(ERB3RDSP)	ERBENQT3
HSM	4	PGM(ERB3RPH1) PARM(HSM)	PGM(ERB3RDSP)	ERBHSMT3
JES	5	PGM(ERB3RPH1) PARM(JES)	PGM(ERB3RDSP)	ERBJEST3
PROC	6	PGM(ERB3RPH1) PARM(PROC)	PGM(ERB3RDSP)	ERBPRCT3
STOR	7	PGM(ERB3RPH1) PARM(STOR)	PGM(ERB3RDSP)	ERBSTRT3
SYSINFO	8	PGM(ERB3RPH1) PARM(SYSINFO)	PGM(ERB3RDSP)	ERBSYST3
DSINDEX	DI	PGM(ERB3RHP1) PARM(DSINDEX)	PGM(ERB3RDSP)	ERBDSIT3
WFEX	9	PGM(ERB3RPH1) PARM(WFEX)	PGM(ERB3RDSP)	ERBWFXT3
DEVR	10	PGM(ERB3RPH1) PARM(DEVR)	PGM(ERB3RDSP)	ERBDVRT3
ENQR	11	PGM(ERB3RPH1) PARM(ENQR)	PGM(ERB3RDSP)	ERBEQRT3
STORR	12	PGM(ERB3RPH1) PARM(STORR)	PGM(ERB3RDSP)	ERBSRRT3
DELAYJ	13	PGM(ERB3RPH1) PARM(DELAYJ)	PGM(ERB3RDSP)	ERBJDJT3
DEVJ	14	PGM(ERB3RPH1) PARM(DEVJ)	PGM(ERB3RDSP)	ERBDVJT3
ENQJ	15	PGM(ERB3RPH1) PARM(ENQJ)	PGM(ERB3RDSP)	ERBEQJT3
HSMJ	16	PGM(ERB3RPH1) PARM(HSMJ)	PGM(ERB3RDSP)	ERBHSJT3
JESJ	17	PGM(ERB3RPH1) PARM(JESJ)	PGM(ERB3RDSP)	ERBJSJT3
PROCJ	18	PGM(ERB3RPH1) PARM(PROCJ)	PGM(ERB3RDSP)	ERBPRJT3
STORJ	19	PGM(ERB3RPH1) PARM(STORJ)	PGM(ERB3RDSP)	ERBSRJT3

Appendix C. CLISTs and Code for the RMF Utility

The CLISTs and panel code described in this appendix are examples that you can refer to when using the report format definition utility. The examples that use these CLISTs are in Chapter 7 "Procedures for Adding User Functions".

Adding a Report as a Selection on the Primary Menu

Figure C-1 shows the modifications made to include the report MYDEVJ as a selection on the RMF primary menu panel, ERB3PRM. The modifications made in this example cause MYDEVJ to be invoked instead of the RMF DEVJ report. The modified ERB3PRM panel should be placed as a member in your private panel library. You can modify the CLIST ERBRMF3X to do the necessary allocations. The modifications made for the examples in chapter 7 are marked by an arrow.

```
)attr default(!+_)
/* ************************************************************************ */
/*              NAME: ERB3PRM                                               */
/*              5665-274                                                    */
/*              (C) COPYRIGHT IBM CORP. 1986                                */
/*              ALL RIGHTS RESERVED                                         */
/*              LICENSED MATERIALS - PROPERTY OF IBM                        */
/*              REFER TO COPYRIGHT INSTRUCTIONS FORM NUMBER G120-2083       */
/* ************************************************************************ */
/*              MESSAGES:  ERB568I, ERB573I                                 */
   _ type(input)  intens(high) color(green) caps(on)
   ! type(text)   intens(high) color(white)
   + type(text)   intens(low)  color(blue)  skip(on)
   < type(text)   intens(low)  color(turq)
)body expand("") cmd(zcmd)
+         !                 RMF Monitor III Primary Menu
!Selection ===    _zcmd  " " +
!
<Select one of the following items or enter command. Press ENTER.
!
!  1<DELAY  +Delays (DLY)            ! 13<DELAYJ  +Job delay (DLYJ)
!  2<DEV    +Device delays (DD)      ! 14<DEVJ    +Job device (DDJ)
!  3<ENQ    +ENQ delays (ED)         ! 15<ENQJ    +Job ENQ (EJ)
!  4<HSM    +HSM delays (HD)         ! 16<HSMJ    +Job HSM (HJ)
!  5<JES    +JES delays (JD)         ! 17<JESJ    +Job JES (JJ)
!  6<PROC   +Processor delays (PD)   ! 18<PROCJ   +Job processor (PJ)
!  7<STOR   +Storage delays (SD)     ! 19<STORJ   +Job storage (SJ)
!  8<SYSINFO+System information (SI) ! DI<DSINDEX +Dataset index
!  9<WFEX   +Workflow exception (WE) ! OP<OPTIONS +Options selection
! 10<DEVR   +Device resource (DR)    !  T<TUTORIAL+Tutorial aid
! 11<ENQR   +ENQ resource (ER)       !  X<EXIT    +Terminate RMF
! 12<STORR  +Storage resource (SR)
```

Figure C-1 (Part 1 of 6). ERB3PRM

```
)INIT
   &zprim = 'YES'
   &ZHTOP = ERB3PRM0           /* Top help panel
 /* sets command line position to bottom *************************** */
   &prmzpl = &zplace
   &zplace = BOTTOM
   vput zplace profile
 /* sets up corresponding help panel ******************************* */
   &erbhelp = 'ERB3PRM0'
   .HELP = &erbhelp            /* INSERT NAME OF TUTORIAL PANEL     */
 /* handles retrieve command *************************************** */
   if (&prmcmdc = RETRIEVE)
      &zcmd = &erbrtv
      &prmcmdc = &z
   &ERBCMDX = &Z               /* Resets 'command-set-by-ERB3RXRT   */
)reinit
 /* sets command line position to bottom *************************** */
   &zplace = BOTTOM
   vput zplace profile
 /* handles retrieve command *************************************** */
   if (&prmcmdc = RETRIEVE)
      &zcmd = &erbrtv
      &prmcmdc = &z
   refresh zcmd
   &ERBCMDX = &Z               /* Resets 'command-set-by-ERB3RXRT   */
)proc
 /* resets command line position *********************************** */
   &zplace = &prmzpl
   vput zplace profile
 /* separates command and parms ************************************ */
   &point = '.'
   &erbzcmd = &zcmd
   &erbcmdc = trunc(&erbzcmd,' ')
   &trl0 = .trail
   &erbcmdc = trunc(&erbcmdc,&erbsepc)
   &zcmd = &erbcmdc
   &trl1 = .trail
   &erbparc = '&trl1. &trl0'
   &erbcmdc = trunc(&erbcmdc,&point)
   &trail2 = .trail
 /* translate abbreviated or numbered selections to standard string * */
```

Figure C-1 (Part 2 of 6). ERB3PRM


```
/*******************************************************************/
/* The following code should be translated for NLS.               */
/* For NLS change left side only.                                  */
/*******************************************************************/
   &erbcmdc=trans(&erbcmdc
                  1,'DELAY'
              DELAY,'DELAY'
                DLY,'DELAY'
                  2,'DEV'
                DEV,'DEV'
                 DD,'DEV'
                  3,'ENQ'
                ENQ,'ENQ'
                 ED,'ENQ'
                  4,'HSM'
                HSM,'HSM'
                 HD,'HSM'
                  5,'JES'
                JES,'JES'
                 JD,'JES'
                  6,'PROC'
               PROC,'PROC'
                 PD,'PROC'
                  7,'STOR'
               STOR,'STOR'
                 SD,'STOR'
                  8,'SYSINFO'
            SYSINFO,'SYSINFO'
                 SI,'SYSINFO'
                  9,'WFEX'
               WFEX,'WFEX'
                 WE,'WFEX'
                 10,'DEVR'
               DEVR,'DEVR'
                 DR,'DEVR'
                 11,'ENQR'
               ENQR,'ENQR'
                 ER,'ENQR'
                 12,'STORR'
              STORR,'STORR'
                 SR,'STORR'
```

Figure C-1 (Part 3 of 6). ERB3PRM

```
       13,'DELAYJ'
   DELAYJ,'DELAYJ'
     DLYJ,'DELAYJ'
       14,'DEVJ'
     DEVJ,'DEVJ'
      DDJ,'DEVJ'
       15,'ENQJ'
     ENQJ,'ENQJ'
       EJ,'ENQJ'
       16,'HSMJ'
     HSMJ,'HSMJ'
       HJ,'HSMJ'
       17,'JESJ'
     JESJ,'JESJ'
       JJ,'JESJ'
       18,'PROCJ'
    PROCJ,'PROCJ'
       PJ,'PROCJ'
       19,'STORJ'
    STORJ,'STORJ'
       SJ,'STORJ'
       DI,'DSINDEX'
  DSINDEX,'DSINDEX'
       OP,'OPTIONS'
  OPTIONS,'OPTIONS'
 TUTORIAL,'TUTORIAL'
      TUT,'TUTORIAL'
        T,'TUTORIAL'
        X,'EXIT'
        Z,'EXIT'
     EXIT,'EXIT'
       GR,'GRAPHIC'
    GRAPH,'GRAPHIC'
  GRAPHIC,'GRAPHIC'
 GRAPHICS,'GRAPHIC'
```

Figure C-1 (Part 4 of 6). ERB3PRM


```
                 CANCEL,'CANCEL'
                   FIND,'FIND'
                    ICU,'ICU'
                     HC,'HARDCOPY'
               HARDCOPY,'HARDCOPY'
                  RESET,'RESET'
                     RE,'RETRIEVE'
                    RET,'RETRIEVE'
               RETRIEVE,'RETRIEVE'
                  RFIND,'RFIND'
                    TAB,'TABULAR'
                  TABLE,'TABULAR'
                TABULAR,'TABULAR'
                    TOG,'TOGGLE'
                 TOGGLE,'TOGGLE'
                      *,*)
   if (&erbcmdc = RETRIEVE)
       &prmcmdc = &erbcmdc
/* gives message if value entered neither a valid selection nor a   */
/* valid RMF PASSTHRU command ************************************** */
   ver(&erbcmdc,LIST, DELAY, DEV, ENQ, HSM, JES, PROC, STOR, SYSINFO,
       WFEX, DEVR, ENQR, STORR, DELAYJ, DEVJ, ENQJ, HSMJ, JESJ, PROCJ,
       STORJ, DSINDEX, OPTIONS, TUTORIAL, EXIT, GRAPHIC, CANCEL, FIND,
       ICU, HARDCOPY, RESET, RETRIEVE, RFIND, TABULAR, TOGGLE,
       MSG=ERB562I)
/* gives message if value entered neither a valid selection nor a   */
/* valid RMF PASSTHRU command for this panel ********************** */
   ver(&erbcmdc,LIST, DELAY, DELAYJ, DEV, DEVJ, DEVR, ENQ, ENQJ, ENQR,
       HSM, HSMJ, JES, JESJ, PROC, PROCJ, STOR, STORJ, STORR, SYSINFO,
       WFEX, DSINDEX, OPTIONS, TUTORIAL, EXIT, RETRIEVE,
       MSG=ERB573I)
   &ERBZCMDT = '&ERBCMDC &ERBPARC' /* Saves translated command input*/
/* selects action according to input ****************************** */
```

Figure C-1 (Part 5 of 6). ERB3PRM

```
/*******************************************************************/
/* The following code should be modified when a private report      */
/* has been defined thru use of the utility ERB3RDUT. The parameter */
/* passed to program ERB3RDPC must be the report name as it has     */
/* been defined to the utility.                                     */
/*******************************************************************/
   if (&trail2 ¬= &z)
      &zcmd = '&erbcmdc..&trail2'
   if (&trail2 = &z)
      &zcmd = &erbcmdc
   &zsel = trans(trunc(&zcmd,'.')
         DELAY,'PGM(ERB3RDPC) PARM(DELAY)'
           DEV,'PGM(ERB3RDPC) PARM(DEV)'
           ENQ,'PGM(ERB3RDPC) PARM(ENQ)'
           HSM,'PGM(ERB3RDPC) PARM(HSM)'
           JES,'PGM(ERB3RDPC) PARM(JES)'
          PROC,'PGM(ERB3RDPC) PARM(PROC)'
          STOR,'PGM(ERB3RDPC) PARM(STOR)'
       SYSINFO,'PGM(ERB3RDPC) PARM(SYSINFO)'
          WFEX,'PGM(ERB3RDPC) PARM(WFEX)'
          DEVR,'PGM(ERB3RDPC) PARM(DEVR)'
          ENQR,'PGM(ERB3RDPC) PARM(ENQR)'
         STORR,'PGM(ERB3RDPC) PARM(STORR)'
        DELAYJ,'PGM(ERB3RDPC) PARM(DELAYJ)'
  ======> DEVJ,'PGM(ERB3RDPC) PARM(MYDEVJ)' <==========
          ENQJ,'PGM(ERB3RDPC) PARM(ENQJ)'
          HSMJ,'PGM(ERB3RDPC) PARM(HSMJ)'
          JESJ,'PGM(ERB3RDPC) PARM(JESJ)'
         PROCJ,'PGM(ERB3RDPC) PARM(PROCJ)'
         STORJ,'PGM(ERB3RDPC) PARM(STORJ)'
       DSINDEX,'PGM(ERB3RDPC) PARM(DSINDEX)'
       OPTIONS,'PANEL(ERB3OPT)'
          EXIT,'EXIT'
      TUTORIAL,'PGM(ISPTUTOR) PARM(&ERBHELP)'
           ' ',' ')
)end
```

Figure C-1 (Part 6 of 6). ERB3PRM

Setting Up a Report Panel

The panel ERB3CMN has been used as a model to create the panel USR3CMN. USR3CMN is used to display the tabular version of the new report. The inserted and changed lines have been marked with an arrow.

```
)attr default(!+_)
/* ********************************************************************
/*              NAME: USR3CMN
/* ********************************************************************
/*              MESSAGES:  ERB568I, ERB573I, ERB578I                        */
   _ type(input)  intens(high) color(green) caps(on)
   ¬ type(input)  intens(non)
   @ type(output) intens(high) color(green) caps(on)
   | type(output) intens(high) color(white) caps(on)
   # type(output) intens(low)  color(blue)  caps(on)
   ? type(output) intens(low)  color(turq)  caps(on)
   ! type(text)   intens(high) color(white)
   ¢ type(text)   intens(high) color(red)
   + type(text)   intens(low)  color(blue)
   } type(text)   intens(low)  color(green)
   < type(text)   intens(low)  color(turq)
)body expand("") CMD(ZCMD)
+          !&DSPHDR1
!Command ===>_zcmd " " !Scroll ===>_amt +
+
+
+&DSPHDR2
+
+&DSPSUBH1                   <======= insert this line
+&DSPSUBH2                   <======= insert this line
+&DSPSUBH3                   <======= insert this line
+&DSPSUBH4                   <======= insert this line
+&DSPSUBH5                   <======= insert this line
+                            <======= insert this line
!&FMTCOLH1
!&FMTCOLH2
+
)model
&FMTMODL1
)init
    .ZVARS = &fmtmplch
    &Ztdmsg = ERB578I
    &Ztdmark = ''
 /* sets command line position to bottom *************************** */
    &prmzpl = &zplace
    &zplace = 'BOTTOM'
    vput zplace profile
 /* sets help panel ************************************************* */
    .HELP = &fmtthlpp          /* INSERT NAME OF TUTORIAL PANEL     */
    &erbhelp = &fmtthlpp
    if (&erbcmdc ¬= RETRIEVE)
        &zcmd = &z
    if (&erbcmdc = RETRIEVE)
        &zcmd = &erbrtv
```

Figure C-2 (Part 1 of 3). USR3CMN

```
)reinit
 /* sets command line position to bottom *************************** */
    &zplace = BOTTOM
    vput zplace profile
 /* handles retrieve command ************************************** */
    if (&erbcmdc = RETRIEVE)
        &zcmd = &erbrtv
    refresh zcmd
)proc
 /* save cursor position ***************************************************** */
    &erbcrp = .csrrow
    &erbfnm = .cursor
    &erbcfp = .csrpos
    &erbtop = &ztdtop
 /* resets command line position *********************************** */
    &zplace = &prmzpl
    vput zplace profile
 /* saves previous command input *********************************** */
    &erbrtv0= &erbzcmdt
    vput (erbrtv0) shared
 /* separates command and parms ************************************ */
    &erbzcmd = &zcmd
    &erbcmdc = trunc(&erbzcmd,' ')
    &erbparc = .trail
 /* translate RMF PASSTHRU commands ******************************** */
    &erbcmdc = trans(&erbcmdc
                  GR,'GRAPHIC'
               GRAPH,'GRAPHIC'
             GRAPHIC,'GRAPHIC'
            GRAPHICS,'GRAPHIC'
              CANCEL,'CANCEL'
                FIND,'FIND'
                 ICU,'ICU'
                  HC,'HARDCOPY'
            HARDCOPY,'HARDCOPY'
               RESET,'RESET'
                  RE,'RETRIEVE'
                 RET,'RETRIEVE'
            RETRIEVE,'RETRIEVE'
               RFIND,'RFIND'
                 TAB,'TABULAR'
               TABLE,'TABULAR'
             TABULAR,'TABULAR'
                 TOG,'TOGGLE'
              TOGGLE,'TOGGLE'
```

Figure C-2 (Part 2 of 3). USR3CMN


```
                 *,*)
 /* gives message if value entered neither a valid selection nor a   */
 /* valid RMF PASSTHRU command ************************************** */
    ver(&erbcmdc,LIST, CANCEL, FIND, RFIND, GRAPHIC, ICU, HARDCOPY,
        RESET, RETRIEVE, TABULAR, TOGGLE, MSG=ERB568I)
 /* gives message if value entered is not a valid PASSTHRU command * */
    ver(&erbcmdc,LIST, FIND, RFIND, GRAPHIC, HARDCOPY, RESET,
        RETRIEVE, TABULAR, TOGGLE, MSG=ERB573I)
 /* saves values of ERBZCMD, ERBCMDC, ERBPARC, ERBRTV and ERBZCMDT   */
    &ERBZCMDT = '&ERBCMDC &ERBPARC' /* Translated command input      */
    &ERBCMDC = TRUNC(&ERBCMDC,8)    /* Truncates command to 8 chars  */
    IF (&ERBCMDX ¬= '1')            /* Command not set by ERB3RXRT   */
      if (&erbcmdc ¬= RETRIEVE)
        if (&erbcmdc ¬= &z)
          &erbrtv = &erbzcmd
          vput (erbzcmd erbcmdc erbparc erbzcmdt erbrtv) shared
      if (&erbcmdc = RETRIEVE)
        vput (erbzcmd erbcmdc erbparc erbzcmdt) shared
)end
```

Figure C-2 (Part 3 of 3). USR3CMN

Phase Two MYDEVJ CLIST for Example 1

This CLIST gets its information from ERBDVRT3 or ISPF shared pool variables. The CLIST scans all rows of the ERBDVRT3 table looking for the requested jobname.

```
PROC 0
CONTROL NOLIST NOFLUSH NOMSG NOCONLIST NOPROMPT
/*********************************************************************/
/* THIS IS AN EXAMPLE CLIST TO TAILOR RMF MONITOR III REPORTS        */
/* USING THE PHASE 2 OF THE REPORT GENERATION.                       */
/*                                                                   */
/* FUNCTION:                                                         */
/*  1. EXTRACTS INFORMATION OUT OF THE RMF MONITOR III PROCJ REPORT  */
/*     (TCB+SRB TIME).                                               */
/*  2. EXTRACTS INFORMATION OUT OF THE RMF MONITOR III STORJ REPORT  */
/*     (AVERAGE ACTIVE FRAMES).                                      */
/*  3. EXTRACTS INFORMATION OUT OF THE RMF MONITOR III DEVR REPORT   */
/*     WHICH ARE RELATED TO ONE SPECIFIC JOBNAME.                    */
/*                                                                   */
/* INVOCATION:                                                       */
/*   THIS CLIST WILL BE INVOKED AS THE PHASE 2 SELECTION.            */
/*                                                                   */
/* DEPENDENCY:                                                       */
/*   THE PHASE 1 FUNCTION MUST INVOKE THE RMF MONITOR III PROCJ,     */
/*   STORJ AND DEVR REPORT. THE REPORT OPTION FOR THE DEVR REPORT    */
/*   MUST BE THE DEFAULT VALUE (ALL VOLSERS)                         */
/*   THE REPORT OPTION FOR THE DEVJ, THE PROCJ, AND THE STORJ        */
/*   REPORT MUST CONTAIN THE REQUESTED JOBNAME ( THERE IS ONE        */
/*   COMMON JOBNAME REPORT OPTION FOR ALL THREE REPORT TYPES).       */
/*                                                                   */
/* NOTE:                                                             */
/*      NO CHECK IS DONE WHETHER THE PHASE 1 HAS COMPLETED           */
/*      SUCCESSFULLY.                                                */
/*                                                                   */
/* INPUT:                                                            */
/*       THE ISPF TABLE ERBPRJT3 CONTAINS THE DATA FOR THE PROCJ     */
/*       REPORT.                                                     */
/*       THE ISPF TABLE ERBSRJT3 CONTAINS THE DATA FOR THE STORJ     */
/*       REPORT.                                                     */
/*       THE ISPF TABLE ERBDVRT3 CONTAINS THE DATA FOR THE DEVR      */
/*       REPORT.                                                     */
/*       ERBCMDC, ERBPARC ISPF SHARED POOL VARIABLES CONTAIN THE     */
/*                        LAST COMMAND AND ITS PARAMETERS.           */
/*       ROPJJNU3 ISPF SHARED POOL VARIABLE CONTAINS THE JOBNAME     */
/*                        SPECIFIED FOR THE REPORT DEVJ.             */
```

Figure C-3 (Part 1 of 5). MYDEVJ CLIST for Phase Two (Example One)


```
/*                                                                   */
/* OUTPUT:                                                           */
/*        THE ISPF TABLE USRDVRT3 CONTAINS THE NEW DATA.             */
/*        - THE SELECTED JOBNAME                                     */
/*        - THE TCB + SRB TIME FOR THIS JOB                          */
/*        - THE AVERAGE ACTIVE FRAMES FOR THIS JOB                   */
/*        - THE RELATED VOLSERS FOR THIS JOB                         */
/*                                                                   */
/* USRDVRT3 TABLE STRUCTURE:                                         */
/*                                                                   */
/*  USR1:   LOGICAL LINE NUMBER                                      */
/*  USR2:   PHYSICAL LINE NUMBER WITHIN THE LOGICAL LINE NUMBER      */
/*  USR3:   VOLSER NAME.                                             */
/*  USR4:   USING PERCENTAGE OF THE JOB WHEN USING THE VOLSER        */
/*  USR5:   DELAY PERCENTAGE OF THE JOB WHILE WAITING FOR THIS VOLSER */
/*  USR6:   TCB + SRB TIME (PROCJ REPORT)                            */
/*  USR7:   REPORT OPTION JOBNAME AS SPECIFIED FOR THE DEVJ REPORT.  */
/*  USR8:   AVERAGE ACTIVE FRAMES (STORJ REPORT)                     */
/*********************************************************************/
/*********************************************************************/
ISPEXEC CONTROL ERRORS CANCEL /* CANCELS THE DIALOG IN CASE OF ERRORS  */
/*********************************************************************/
/* GETS THE FOLLOWING VARIABLES OUT OF THE ISPF SHARED POOL:         */
/* ROPJJNU3:     CONTAINS THE REPORT OPTION JOBNAME AS SPECIFIED FOR   */
/*               THE DEVJ REPORT.                                    */
/* ERBCMDC:      CONTAINS THE LAST COMMAND SPECIFIED.                */
/* ERBPARC:      CONTAINS THE PARAMETER OF THE LAST COMMAND SPECIFIED. */
/*                                                                   */
/*********************************************************************/
ISPEXEC VGET (ROPJJNU3 ERBCMDC ERBPARC ) SHARED
/*********************************************************************/
/* CREATES THE OUTPUT PHASE 2 OUTPUT TABLE USRDVRT3.                 */
/*                                                                   */
/* NOTE1:                                                            */
/*   USR1:  LOGICAL LINE NUMBER                                      */
/*   USR2:  PHYSICAL LINE NUMBER                                     */
/*     THESE TWO VARIABLES ARE KEY NAME VARIABLES.                   */
/*   USR3:  VOLSER OF THE DEVICE USED BY THE JOB                     */
/*   USR4:  USING PERCENTAGE OF THE JOB                              */
/*   USR5:  DELAY PERCENTAGE OF THE JOB                              */
/*   USR6:  TCB + SRB TIME   OF THE JOB                              */
/*   USR7:  JOBNAME                                                  */
/*   USR8:  AVERAGE ACTIVE FRAMES OF THE JOB                         */
/* NOTE2:                                                            */
/*   THE TABLE WILL BE KEPT ONLY WITHIN THE VIRTUAL STORAGE (NOWRITE  */
/*   OPTION). AN EXISTING TABLE FROM A PREVIOUS INVOCATION WILL BE    */
/*   ERASED ( REPLACE OPTION).                                       */
/*********************************************************************/
```

Figure C-3 (Part 2 of 5). MYDEVJ CLIST for Phase Two (Example One)

```
/**********************************************************************/
/* IF THE LAST COMMAND (CONTAINED IN ERBCMDC) WAS DEVJ               */
/* AND A PARAMETER ( CONTAINED IN ERBPARC ) WAS ALSO SPECIFIED,       */
/* USES THE PARAMETER AS THE JOBNAME. OTHERWISE USES THE REPORT       */
/* OPTION JOBNAME.                                                    */
/*                                                                    */
/* NOTE: THE PANEL SUBHEADER EXPECTS THE JOBNAME IN THE SHARED POOL   */
/*       VARIABLE USR7.                                               */
/**********************************************************************/
IF &ERBCMDC = &STR(DEVJ) AND &LENGTH(&STR(&ERBPARC)) > 0 THEN DO
   SET &USR7 = &STR(&ERBPARC)
END
ELSE DO
  SET &USR7 = &STR(&ROPJJNU3)
END
/**********************************************************************/
/* SAVES THE JOBNAME INTO THE ISPF SHARED POOL VARIABLE USR7          */
/**********************************************************************/
ISPEXEC VPUT USR7 SHARED
/**********************************************************************/
/* POSITIONS THE CURSOR BEFORE THE FIRST ROW OF THE INPUT TABLE       */
/* FOR PROCESSOR (ERBPRJT3).                                          */
/**********************************************************************/
/**********************************************************************/
ISPEXEC TBTOP ERBPRJT3
SET &USR6 = &STR(0)
ISPEXEC TBSKIP ERBPRJT3
/**********************************************************************/
/* GETS THE TCB + SRB TIME (PRCPTST)                                  */
/**********************************************************************/
SET &RETC = &LASTCC
IF &RETC <  8 THEN DO
  SET &USR6 = &STR(&PRCPTST)
END
ISPEXEC VPUT USR6 SHARED
/**********************************************************************/
/* POSITIONS THE CURSOR BEFORE THE FIRST ROW OF THE INPUT TABLE       */
/* FOR STORAGE (ERBSRJT3).                                            */
/**********************************************************************/
ISPEXEC TBTOP ERBSRJT3
SET &USR8 = &STR(0)
ISPEXEC TBSKIP ERBSRJT3
SET &RETC = &LASTCC
```

Figure C-3 (Part 3 of 5). MYDEVJ CLIST for Phase Two (Example One)


```
/*********************************************************************/
/* GETS THE AVERAGE ACTIVE FRAMES (STRPACTV)                         */
/*********************************************************************/
IF &RETC <  8 THEN DO
  SET &USR8 =&STR(&STRPACTV)
END
ISPEXEC VPUT USR8 SHARED
ISPEXEC TBCREATE USRDVRT3 KEYS(USR1,USR2) NAMES(USR3,USR4,USR5) -
        NOWRITE REPLACE
/*********************************************************************/
/* POSITIONS THE CURSOR BEFORE THE FIRST ROW OF THE INPUT TABLE.     */
/*                                                                   */
/* NOTE: THE INPUT TABLE IS THE SAME TABLE AS CREATED BY THE         */
/*        DEVR COMMAND.                                              */
/* THE FOLLOWING VARIABLES OF EACH ROW ARE USED:                     */
/*  DVRDTLLN:   CONTAINS THE LOGICAL LINE NUMBER.                    */
/*  DVRDTPSN:   CONTAINS THE PHYSICAL LINE NUMBER.                   */
/*              MORE THAN 1 PHYSICAL LINE MIGHT EXIST PER LOGICAL    */
/*              LINE NUMBER. THE FIRST LOGICAL LINE NUMBER CONTAINS  */
/*              THE NAME OF THE DEVICE.                              */
/*  DVRPVOLU:   CONTAINS THE VOLSER OF THE DEVICE.                   */
/*  DVRPJOBN:   CONTAINS THE NAME OF THE JOB WHICH IS EITHER USING   */
/*              THE DEVICE OR WAITING FOR IT.                        */
/*  DVRPSUSE:   CONTAINS THE PERCENT VALUE THE JOB IS USING THE      */
/*              DEVICE.                                              */
/*  DVRPSDEL:   CONTAINS THE PERCENT VALUE THE JOB IS WAITING FOR THE */
/*              DEVICE.                                              */
/*********************************************************************/
ISPEXEC TBTOP ERBDVRT3
/*********************************************************************/
```

Figure C-3 (Part 4 of 5). MYDEVJ CLIST for Phase Two (Example One)

```
/************************************************************************/
/* LOOPS THROUGH ALL ROWS OF THE INPUT TABLE. IF THE RETURN CODE      */
/* IS 8, THE END OF THE TABLE HAS BEEN REACHED.                        */
/************************************************************************/
LOOP: ISPEXEC TBSKIP ERBDVRT3
SET &RETC = &LASTCC
IF &RETC >= 8 THEN GOTO LOOPEX
/************************************************************************/
/* IF IT IS THE FIRST PHYSICAL LINE WITHIN A LOGICAL LINE, SETS:       */
/*  USR1 ... LOGICAL LINE NUMBER                                        */
/*  USR2 ... PHYSICAL LINE NUMBER WITHIN THE LOGICAL LINE               */
/*           ( ALWAYS ONE, BECAUSE ONLY ONE PHYSICAL LINE WILL BE       */
/*             CREATED FOR EACH LOGICAL LINE).                          */
/*  USR3 ... VOLSER OF THE DEVICE.                                      */
/************************************************************************/
IF &DVRDTPSN = 1 THEN DO
   SET &USR1 = &DVRDTLLN
   SET &USR2 = &DVRDTPSN
   SET &USR3 = &DVRPVOLU
END
/************************************************************************/
/* IF THE JOBNAME OF THE CURRENT ROW DOES NOT MATCH THE REQUESTED      */
/* JOBNAME, GETS THE NEXT ROW OF THE INPUT TABLE.                      */
/************************************************************************/
IF &STR(&DVRPJOBN) ¬= &STR(&USR7) THEN GOTO LOOP
/************************************************************************/
/* GETS THE USING AND THE DELAY PERCENTAGES FOR THE JOBNAME.           */
/************************************************************************/
SET &USR4 = &STR(&DVRPSUSE)
SET &USR5 = &STR(&DVRPSDEL)
/************************************************************************/
/* ADDS A NEW ROW TO THE OUTPUT TABLE USRDVRT3.                        */
/************************************************************************/
ISPEXEC TBADD USRDVRT3
GOTO LOOP
LOOPEX: +
EXIT CODE(0)
```

Figure C-3 (Part 5 of 5). MYDEVJ CLIST for Phase Two (Example One)

Phase one MYDEVJ1 CLIST for Example 2

This CLIST invokes phase one module ERBRPH1 with the DEVR parameter. This generates a report data table, ERB3DVRT3. It contains the information and format of the DEVR report.

```
PROC 0
CONTROL NOLIST NOFLUSH NOMSG NOCONLIST NOPROMPT
/*********************************************************************/
/* THIS IS AN EXAMPLE CLIST TO TAILOR RMF MONITOR III REPORTS       */
/* USING THE PHASE 1 OF THE REPORT GENERATION.                       */
/*                                                                   */
/* FUNCTION:                                                         */
/*   EXTRACTS INFORMATION OUT OF THE RMF MONITOR III PROCJ AND STORJ */
/*   REPORTS AND CONNECTS THEM TO THE DEVJ REPORT.                   */
/*                                                                   */
/* INVOCATION:                                                       */
/*   THIS CLIST WILL BE INVOKED AS THE PHASE 1 SELECTION.            */
/*                                                                   */
/* OUTPUT:                                                           */
/*       THE ISPF TABLE ERBPRJT3 CONTAINS THE DATA FOR THE PROCJ      */
/*       REPORT.                                                     */
/*       THE ISPF TABLE ERBSRJT3 CONTAINS THE DATA FOR THE STORJ      */
/*       REPORT.                                                     */
/*       THE ISPF TABLE ERBDVRT3 CONTAINS THE DATA FOR THE DEVR       */
/*       REPORT.                                                     */
/*********************************************************************/
ISPEXEC CONTROL ERRORS CANCEL /* CANCELS THE DIALOG IN CASE OF ERRORS  */
ISPEXEC SELECT PGM(ERB3RPH1) PARM(PROCJ)
ISPEXEC SELECT PGM(ERB3RPH1) PARM(STORJ)
ISPEXEC SELECT PGM(ERB3RPH1) PARM(DEVR)
EXIT CODE(0)
```

Figure C-4. Phase One MYDEVJ1 CLIST

Phase Two MYDEVJ2 CLIST for Example 2

This CLIST gets its information from ERBDVRT3 or ISPF shared pool variables. The CLIST scans all rows of the ERBDVRT3 table looking for the requested jobname.

```
PROC 0
CONTROL NOLIST NOFLUSH NOMSG NOCONLIST NOPROMPT
/**********************************************************************/
/* THIS IS AN EXAMPLE CLIST TO TAILOR RMF MONITOR III REPORTS         */
/* USING THE PHASE 2 OF THE REPORT GENERATION.                        */
/*                                                                    */
/* FUNCTION:                                                          */
/*   EXTRACTS INFORMATION OUT OF THE RMF MONITOR III DEVR REPORT      */
/*   WHICH ARE RELATED TO ONE SPECIFIC JOBNAME.                       */
/*                                                                    */
/* INVOCATION:                                                        */
/*   THIS CLIST WILL BE INVOKED AS THE PHASE 2 SELECTION.             */
/*                                                                    */
/* DEPENDENCY:                                                        */
/*   THE PHASE 1 FUNCTION MUST INVOKE THE RMF MONITOR III DEVR        */
/*   REPORT. THE REPORT OPTION FOR THE DEVR REPORT MUST BE THE        */
/*   DEFAULT VALUE ( ALL VOLSER'S)                                    */
/*                                                                    */
/* NOTE:                                                              */
/*      NO CHECK IS DONE WHETHER THE PHASE 1 HAS COMPLETED            */
/*      SUCCESSFULLY.                                                 */
/*                                                                    */
/* INPUT:                                                             */
/*       THE ISPF TABLE ERBDVRT3 CONTAINS THE DATA FOR THE DEVR       */
/*       REPORT.                                                      */
/*       ERBCMDC, ERBPARC ISPF SHARED POOL VARIABLES CONTAIN THE      */
/*                        LAST COMMAND AND ITS PARAMETERS.            */
/*       ROPJJNU3 ISPF SHARED POOL VARIABLE CONTAINS THE JOBNAME      */
/*                        SPECIFIED FOR THE REPORT DEVJ.              */
/*                                                                    */
/* OUTPUT:                                                            */
/*        THE ISPF TABLE USRDVRT3 CONTAINS THE NEW DATA.              */
/*        FOR EACH VOLSER WHICH SHOWED SOME ACTIVITY RELATED TO THE   */
/*        JOBNAME ONE ROW 1ST BUILT. IF THE JOB HAD NO I/O ACTIVITY,  */
/*        THE TABLE WILL BE EMPTY.                                    */
/*                                                                    */
/* USRDVRT3 TABLE STRUCTURE:                                          */
/*                                                                    */
/*  USR1:   LOGICAL LINE NUMBER                                       */
/*  USR2:   PHYSICAL LINE NUMBER WITHIN THE LOGICAL LINE NUMBER       */
/*  USR3:   VOLSER NAME.                                              */
/*  USR4:   USING PERCENTAGE OF THE JOB WHEN USING THE VOLSER         */
/*  USR5:   DELAY PERCENTAGE OF THE JOB WHILE WAITING FOR THIS VOLSER */
/**********************************************************************/
```

Figure C-5 (Part 1 of 4). MYDEVJ2 CLIST for Phase Two (Example Two)


```
/*******************************************************************/
ISPEXEC CONTROL ERRORS CANCEL /* CANCELS THE DIALOG IN CASE OF ERRORS  */
/*******************************************************************/
/* GETS THE FOLLOWING VARIABLES OUT OF THE ISPF SHARED POOL:         */
/* ROPJJNU3:     CONTAINS THE REPORT OPTION JOBNAME AS SPECIFIED FOR   */
/*               THE DEVJ REPORT.                                      */
/* ERBCMDC:      CONTAINS THE LAST COMMAND SPECIFIED.                  */
/* ERBPARC:      CONTAINS THE PARAMETER OF THE LAST COMMAND SPECIFIED. */
/*                                                                     */
/*******************************************************************/
ISPEXEC VGET (ROPJJNU3 ERBCMDC ERBPARC ) SHARED
/*******************************************************************/
/* IF THE LAST COMMAND (CONTAINED IN ERBCMDC) WAS DEVJ               */
/* AND A PARAMETER ( CONTAINED IN ERBPARC ) WAS ALSO SPECIFIED,      */
/* USES THE PARAMETER AS THE JOBNAME. OTHERWISE USES THE REPORT      */
/* OPTION JOBNAME.                                                   */
/*                                                                   */
/* NOTE: THE PANEL SUBHEADER EXPECTS THE JOBNAME IN THE SHARED POOL  */
/*       VARIABLE USR7.                                              */
/*******************************************************************/
IF &ERBCMDC = &STR(DEVJ) AND &LENGTH(&STR(&ERBPARC)) > 0 THEN DO
   SET &USR7 = &STR(&ERBPARC)
END
ELSE DO
  SET &USR7 = &STR(&ROPJJNU3)
END
/*******************************************************************/
/* SAVES THE JOBNAME INTO THE ISPF SHARED POOL VARIABLE USR7         */
/*******************************************************************/
ISPEXEC VPUT USR7 SHARED
/*******************************************************************/
/* CREATES THE OUTPUT PHASE 2 OUTPUT TABLE USRDVRT3.                 */
/*                                                                   */
/* NOTE1:                                                            */
/*   USR1:  LOGICAL LINE NUMBER                                      */
/*   USR2:  PHYSICAL LINE NUMBER                                     */
/*     THESE TWO VARIABLES ARE KEY NAME VARIABLES.                   */
/*   USR3:  VOLSER OF THE DEVICE USED BY THE JOB                     */
/*   USR4:  USING PERCENTAGE OF THE JOB                              */
/*   USR5:  DELAY PERCENTAGE OF THE JOB                              */
/* NOTE2:                                                            */
/*   THE TABLE WILL BE KEPT ONLY WITHIN THE VIRTUAL STORAGE (NOWRITE */
/*   OPTION). AN EXISTING TABLE FROM A PREVIOUS INVOCATION WILL BE   */
/*   ERASED ( REPLACE OPTION).                                       */
/*******************************************************************/
```

Figure C-5 (Part 2 of 4). MYDEVJ2 CLIST for Phase Two (Example Two)

```
ISPEXEC TBCREATE USRDVRT3 KEYS(USR1,USR2) NAMES(USR3,USR4,USR5) -
        NOWRITE REPLACE
/**********************************************************************/
/* POSITIONS THE CURSOR BEFORE THE FIRST ROW OF THE INPUT TABLE.      */
/*                                                                    */
/* NOTE: THE INPUT TABLE IS THE SAME TABLE AS CREATED BY THE          */
/*       DEVR COMMAND.                                                */
/* THE FOLLOWING VARIABLES OF EACH ROW ARE USED:                      */
/*  DVRDTLLN:   CONTAINS THE LOGICAL LINE NUMBER.                     */
/*  DVRDTPSN:   CONTAINS THE PHYSICAL LINE NUMBER.                    */
/*              MORE THAN 1 PHYSICAL LINE MIGHT EXIST PER LOGICAL     */
/*              LINE NUMBER. THE FIRST LOGICAL LINE NUMBER CONTAINS   */
/*              THE NAME OF THE DEVICE.                               */
/*  DVRPVOLU:   CONTAINS THE VOLSER OF THE DEVICE.                    */
/*  DVRPJOBN:   CONTAINS THE NAME OF THE JOB WHICH IS EITHER USING    */
/*              THE DEVICE OR WAITING FOR IT.                         */
/*  DVRPSUSE:   CONTAINS THE PERCENT VALUE THE JOB IS USING THE       */
/*              DEVICE.                                               */
/*  DVRPSDEL:   CONTAINS THE PERCENT VALUE THE JOB IS WAITING FOR THE */
/*              DEVICE.                                               */
/**********************************************************************/
/**********************************************************************/
ISPEXEC TBTOP ERBDVRT3
/**********************************************************************/
/* LOOPS THROUGH ALL ROWS OF THE INPUT TABLE. IF THE RETURN CODE      */
/* IS 8, THE END OF THE TABLE HAS BEEN REACHED.                       */
/**********************************************************************/
LOOP: ISPEXEC TBSKIP ERBDVRT3
SET &RETC = &LASTCC
IF &RETC >= 8 THEN GOTO LOOPEX
```

Figure C-5 (Part 3 of 4). MYDEVJ2 CLIST for Phase Two (Example Two)


```
/*********************************************************************/
/* IF IT IS THE FIRST PHYSICAL LINE WITHIN A LOGICAL LINE, SETS:     */
/*  USR1 ... LOGICAL LINE NUMBER                                     */
/*  USR2 ... PHYSICAL LINE NUMBER WITHIN THE LOGICAL LINE            */
/*            ( ALWAYS ONE, BECAUSE ONLY ONE PHYSICAL LINE WILL BE   */
/*              CREATED FOR EACH LOGICAL LINE).                      */
/*  USR3 ... VOLSER OF THE DEVICE.                                   */
/*********************************************************************/
IF &DVRDTPSN = 1 THEN DO
   SET &USR1 = &DVRDTLLN
   SET &USR2 = &DVRDTPSN
   SET &USR3 = &DVRPVOLU
END
/*********************************************************************/
/* IF THE JOBNAME OF THE CURRENT ROW DOES NOT MATCH THE REQUESTED    */
/* JOBNAME, GETS THE NEXT ROW OF THE INPUT TABLE.                    */
/*********************************************************************/
IF &STR(&DVRPJOBN) ¬= &STR(&USR7) THEN GOTO LOOP
/*********************************************************************/
/* GETS THE USING AND THE DELAY PERCENTAGES FOR THE JOBNAME.         */
/*********************************************************************/
SET &USR4 = &STR(&DVRPSUSE)
SET &USR5 = &STR(&DVRPSDEL)
/*********************************************************************/
/* ADDS A NEW ROW TO THE OUTPUT TABLE USRDVRT3.                      */
/*********************************************************************/
ISPEXEC TBADD USRDVRT3
GOTO LOOP
LOOPEX: +
EXIT CODE(0)
```

Figure C-5 (Part 4 of 4). MYDEVJ2 CLIST for Phase Two (Example Two)

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